DRAFT COMPENSATORY MITIGATION PLAN

Governor Harry W. Nice Memorial Bridge Improvement Project

July 2009

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I. EXECUTIVE SUMMARY

The Maryland Transportation Authority (Authority) prepared this Draft Compensatory Mitigation Plan (CMP) in accordance with the Final Rule on Compensatory Mitigation for Losses of Aquatic Resources (33 U.S.C 332). Currently, seven potential bridge alternates exist. In Maryland, the greatest impact alternate includes impacts to 0.70 acre of tidal open waters, 0.08 acre of wetland, 353 lf of stream and temporary impacts to 88.5 acres of open waters. In Virginia, the greatest impact alternate includes impacts to 0.57 acre of wetland and 3,366 lf of stream. Compensation for the impacted wetland and stream resources would occur through permittee provided mitigation in Maryland and mitigation banking in Virginia. Therefore, the CMP includes no mitigation discussion for Virginia resources.

A wetland mitigation site search in Maryland focused on locating a mitigation site within the same watershed as the Nice Bridge (i.e. the Lower Potomac Tidal Watershed). The mitigation site needed to fulfill specific characteristics including low-lying farmlands adjacent to existing marsh and/or eroding shoreline. The Authority identified 23 sites that met these requirements. The property owners from these sites were contacted and the sites were visited. This resulted in identifying five preferred mitigation sites. A site tour of the five preferred sites with Federal and State Resource Agencies resulted in a preferred *type* of mitigation and a *ranking preference* for the sites. The Authority developed Performance Standards for *tidal marsh creation* and *shoreline stabilization*, and established guidelines for short and long-term monitoring and management to ensure that regulatory requirements are met for mitigation site success.

II. INTRODUCTION

The Maryland Transportation Authority (Authority) is conducting a project planning study to evaluate improvements to the Governor Harry W. Nice Memorial Bridge (Nice Bridge). The Nice Bridge Improvement Project was initiated in 2006 and is currently in the alternate development and environmental analysis stage. During this stage, the proposed alternates are evaluated to determine their potential impacts on the surrounding environment. The purpose of this report is to propose compensatory mitigation for impacts to wetlands and waterways that would occur during construction. The Authority prepared this Draft Compensatory Mitigation Plan (CMP) in accordance with the Final Rule on Compensatory Mitigation for Losses of Aquatic Resources (33 U.S.C 332).

A. Project Description and Background

The Nice Bridge opened in December 1940 and was originally called the Potomac River Bridge. Located along US 301 between Charles County, Maryland and King George County, Virginia, it was the first bridge to provide direct roadway access from Maryland into Virginia, south of Washington, D.C. The bridge is a toll facility owned and maintained by the Authority, and is 1.7 miles in length. An estimated 6.7 million vehicles traveled the Nice Bridge in 2006. The average weekend daily traffic count was 20,800 vehicles in 2006.

The Nice Bridge project area (***Figure 1***) extends from just north of MD 234 in Charles County, MD to just east of Route 206 in King George County, Virginia along US 301, and extends 3,000 feet upstream and downstream of the current structure.

B. Purpose and Need

The purpose of the Nice Bridge Improvement Project is to address existing and future traffic conditions related to congestion, safety, and operations in the vicinity of the Nice Bridge. The existing two-lane bridge consists of 11-foot travel lanes and a one-foot offset to the barrier (parapet wall), and lacks a median separation and shoulders. This creates a bottleneck resulting in consistent traffic congestion and an increased risk of crashes.

Traffic patterns crossing the bridge are also affected by wide-load vehicles, maintenance activities, and the steep incline of the bridge. Due to the 11-foot lanes and lack of shoulders, the existing bridge is temporarily closed in one direction while the wide-load vehicles cross. Furthermore, the narrow width of the existing bridge requires partial or full closures of the roadway during bridge maintenance activities. The steep vertical grade of the bridge also contributes to traffic congestion because heavy trucks traveling on southbound US 301 are often unable to accelerate sufficiently up the grade of the bridge after leaving the toll plaza. Therefore, the trucks travel at lower speeds than the posted speed limit, which reduces the average speed and capacity of traffic on the Nice Bridge.

III. IMPACTS TO NATURAL RESOURCES

The proposed build alternates would result in unavoidable impacts to state and federally regulated aquatic resources. Tidal open waters of the Potomac River, nontidal wetlands and streams would be impacted.

A. Existing Natural Resources

An assessment of regulated resources within the project area was conducted to understand and quantify the potential impacts of the Nice Bridge Improvement Project as follows:

Maryland Resource Assessments

- *Waters of the United States Identification and Delineation Report: US 301 Nice Bridge Toll Plaza Improvements, Charles County, Maryland*, June 1, 2006.
- Functional Assessment conducted in March, 2009.

Virginia Resources Assessments

- *Wetland Delineation Report: Harry W. Nice Bridge Improvement Project*, April 4, 2008.
- Field Meeting Notes, *Nice Memorial Bridge Improvement Project Wetland Delineation Jurisdictional Determination*, April 7, 2008.

- US Army Corps of Engineers (USACE) Northern Virginia Regulatory Section Jurisdictional Determination Letter, NAO 2008-01741 (Potomac River), letter dated June 2, 2008, JD effective May 28, 2008.
- Functional Assessment conducted in March, 2009.

A jurisdictional determination has not been conducted for the Maryland resources; therefore, waters in Maryland will be referred to as "waterways." A jurisdictional determination was conducted for the Virginia resources, effective May 28, 2008 and waters in Virginia will be referred to as "Waters of the US."

B. Functions and Values of Natural Resources

A functional assessment of the potentially impacted wetland resources was performed on March 25, 2009 to determine resource function and value. This assessment was necessary to determine the mitigation necessary to compensate for lost functions and values. Methods and results of the functions and values assessment in Maryland and Virginia are discussed below.

Maryland - Wetlands

Wetlands were evaluated as either "high," "medium," or "low" quality based on the 13 wetland functions (eight) and values (five) listed in ***Table 1*** as defined by the USACE for Section 404 wetland permits (New England Functional Assessment Method).

Table 1. *USACE Wetland Functions and Values*

Functions	Values
• Groundwater Recharge/Discharge • Floodflow Alteration • Fish and Shellfish Habitat • Sediment/Toxicant Retention • Nutrient Removal • Production Export • Sediment/Shoreline Stabilization • Wildlife Habitat	• Recreation • Educational Scientific Value • Uniqueness/Heritage • Visual Quality/Aesthetics • Endangered Species Habitat

Other factors taken into consideration for the wetland quality evaluation included wetland size, connectivity to other wetland resources, and vegetation diversity. Two wetlands are identified within the Maryland portion of the project area (***Figure 1***), and functions and values results are shown in ***Table 2***.

Table 2. *Wetlands Quality - Maryland*

Resource ID	Type	Quality	Assessment
MD-WET-1	PEM	Low	***Functions: 1*** – floodflow alteration ***Values: 0*** (small, isolated, low species diversity, and high human disturbance (routinely mowed)
MD-WET-2	PFO	Medium	***Functions: 3*** – groundwater recharge, floodflow alteration, and wildlife habitat ***Values: 1*** (visual qualities/aesthetics)

Maryland - Waterways

Six waterways were identified within the Maryland portion of the project area. The quality evaluation for ephemeral channels was performed for riparian buffers and channel condition. The quality evaluation for the tidal open water (i.e. Potomac River) was performed for channel condition, riparian buffers, instream habitat and channel alteration. See ***Table 3*** for the quality summary of the waterways.

Table 3. *Quality Summary of Maryland Waterways*

Resource ID	Type	Quality	Assessment
MD-Waterway-1	Ephemeral	Low	No riparian buffer, mud bottom, periodically mowed
MD-Waterway-2	Ephemeral	Low	Riparian buffer along 1/3 of length, mud & riprap bottom
MD-Waterway-3	Ephemeral	Low	No riparian buffer, mud or riprap bottom, periodically mowed
MD-Waterway-4	Ephemeral	Low	No riparian buffer, mud bottom, periodically mowed
MD-Waterway-5	Ephemeral	Low	No riparian buffer, mud bottom, periodically mowed
MD- Waterway (Potomac River)	Tidal Open Water	High	Riparian buffer- suboptimal, instream habitat – optimal/suboptimal, good wildlife habitat including RTE habitat

Virginia - Wetlands

Ten wetlands were identified within the Virginia portion of the project area. As previously mentioned, a Jurisdictional Determination was issued for these resources in 2008. A quality evaluation of the Virginia resources is based on the same parameters as the Maryland resources. ***Table 4*** details the quality of each wetland and the assessment behind the quality rating.

Table 4. *Quality Summary of Virginia Wetlands*

Resource ID	Type	Quality	Reasoning
VA-WET-1	PFO	Low	***Functions: 2*** – groundwater recharge and wildlife habitat ***Values: 0*** (downed trees throughout with questionable soils and plants)
VA-WET-2	PEM	Low	***Function: 1*** – groundwater recharge ***Values: 0*** (small, low species diversity, and high human disturbance with mowing)
VA-WET-3	PFO	Medium	***Functions: 5*** – groundwater recharge, floodflow alteration, sediment/toxicant retention, production export, and wildlife habitat ***Values: 2*** – uniqueness/heritage and visual quality/ aesthetics (wetland is small, but connected to a larger wetland system, has a mature and diverse vegetation community, and salamander eggs noted in the wetland during March 2009 Functional Assessment)
VA-WET-4	PFO	Medium	***Functions: 5*** – groundwater recharge, floodflow alteration, sediment/toxicant retention, production export, and wildlife habitat ***Values: 2*** – uniqueness/heritage, visual quality/aesthetics (wetland is small, but connected to a larger wetland system, has a mature and diverse vegetation community)
VA-WET-5	PEM	Low	***Functions: 1*** – groundwater recharge ***Values: 0*** (small, low species diversity, and high human disturbance with mowing within the utility easement)
VA-WET-6	PEM	Medium	***Functions: 5*** – groundwater recharge, floodflow alteration, sediment/toxicant retention, production export, and wildlife habitat ***Values: 0*** (medium size, diverse vegetation, but adjacent to roadway and frequent human disturbances in the buffer of the wetland with mowing)
VA-WET-7	E2EM	Medium	***Functions: 6*** – groundwater recharge, floodflow alteration, sediment/toxicant retention, production export, sediment/shoreline stabilization, and wildlife habitat ***Values: 0*** (medium size, and diverse vegetation, adjacent to roadway)
VA-WET-8	PFO	Low	***Functions: 2*** – groundwater recharge and floodflow alteration ***Values: 0*** (based on supplemental JD report, it is a small isolated VA DEQ wetland located near utility right-of-way)
VA-WET-9	PFO	Low	***Functions: 2*** – groundwater recharge and floodflow alteration ***Values: 0*** (based on supplemental JD report, wetland is small and adjacent to a roadway)
VA-WET-10	PEM	Low	***Functions: 2*** – groundwater recharge, floodflow alteration ***Values: 0*** (based on supplemental JD report, wetland is small and adjacent to a roadway)

Virginia - Waters of the US

The quality of Virginia waterways was assessed using the Unified Stream Methodology (USM), adopted February 1, 2007. A collaborative effort between the USACE Norfolk District and the Virginia Department of Environmental Quality (VA DEQ), the USM method incorporates functions and values into a numerical rating score and is the standard method for mitigation replacement determination in Virginia. Primarily, the quality rating for Virginia ephemeral channels, using the USM Ephemeral Stream Assessment Form (***Appendix 1***), is based on vegetated buffer.

Four of the Virginia Waters of the US are ephemeral channels, and the remaining three Virginia Waters of the US are intermittent channels. The quality summary for Virginia Waters of the US is listed in ***Table 5***.

Table 5*. Quality Summary of Virginia Waters of the US*

Resource ID	Type	Quality
VA-Waters of the US-1	Ephemeral	0.65
VA-Waters of the US-2	Ephemeral	0.65
VA-Waters of the US-3	Ephemeral	0.75
VA-Waters of the US-4	Intermittent	0.97
VA-Waters of the US-6	Intermittent	0.71
VA-Waters of the US-7	Ephemeral	0.30
VA-Waters of the US-9	Intermittent	Unknown[1]

[1]*Resource located on Dahlgren property, and no other information is available at this time*
[2]*VA-WUS-5 and VA-WUS-8 were not considered jurisdictional by USACE*

C. Impacts to Natural Resources

The proposed build alternates would result in unavoidable impacts to state and federally regulated aquatic resources. Anticipated impacts by alternate are listed in ***Table 6***. The worst case scenario, per resource, is listed in the "Max Impact" column.

***Table 6**. Waterway and Wetland Impacts by Alternate*

Resource	Type	Quality/ USM Score	Unit	Max Impact	Alternates Retained For Detailed Study					
					No-Build	Alt. 2	Alt. 2 with Bike	Alt. 3	Alt. 3 With Bike	Alt. 4
Maryland Wetlands:										
MD-Wet 1	PEM	Low	acres	0.08	0	0.08	0.08	0.08	0.08	0.08
MD-Wet 2	PFO	Medium	acres	0	0	0	0	0	0	0
Total Impacts			acres	0.08	0	0.08	0.08	0.08	0.08	0.08
Maryland Non-Tidal Waterways:										
MD-Waterway 1	Ephemeral	Low	l.f.	1,244	0	1,244	1,244	1,244	1,244	1,244
MD-Waterway 2	Ephemeral	Low	l.f.	531	0	0	0	0	0	531
MD-Waterway 3	Ephemeral	Low	l.f.	204	0	15	15	15	15	204
MD-Waterway 4	Ephemeral	Low	l.f.	90	0	0	0	0	0	90
MD-Waterway 5	Ephemeral	Low	l.f.	1,298	0	1,129	1,128	1,128	1,128	1,298
Total Impacts			l.f.	3,367	0	2,388	2,387	2,387	2,387	3,367
MD-Tidal Waterway										
Open Water Pier Impacts:	Perennial	High	acres	0.70	0	0.30	0.40	0.70	0.70	0.30
Open Water Dredge Impacts:	Perennial	High	acres	88.49	0	60.75	62.43	84.73	88.12	61.68
Total Impacts			acres	89.19	0	61.05	62.83	85.43	88.82	61.98
Virginia Wetlands:										
VA-Wet 1	PFO	Low	acres	0	0	0	0	0	0	0
VA-Wet 2	PEM	Low	acres	0.14	0	0.14	0.14	0.14	0.14	0
VA-Wet 3	PFO	Medium	acres	0	0	0	0	0	0	0
VA-Wet 4	PFO	Medium	acres	0	0	0	0	0	0	0
VA-Wet 5	PEM	Low	acres	0	0	0	0	0	0	0
VA-Wet 6	PEM	Medium	acres	0.06	0	0.02	0.02	0.02	0.02	0
VA-Wet 7	E2EM1N	Medium	acres	0.41	0	0.41	0.41	0.41	0.41	0
VA-Wet 8	PFO1C	Low	acres	0	0	0	0	0	0	0
VA-Wet 9	PFO1C	Low	acres	0	0	0	0	0	0	0
VA-Wet 10	PEM1E	Low	acres	0	0	0	0	0	0	0
Total Impacts			acres	0.61	0	0.57	0.57	0.57	0.57	0.00
Virginia Waters of the US:										
VA-WUS 1	Ephemeral	0.65	l.f.	83	0	36.24	36.27	44.19	44	74
VA-WUS 2	Ephemeral	0.65	l.f.	0	0	0	0	0	0	0
VA-WUS 3	Ephemeral	0.75	l.f.	0	0	0	0	0	0	0
VA-WUS 4	Intermittent	0.97	l.f.	78	0	27.54	27.55	40.89	41	59
VA-WUS 6	Intermittent	0.71	l.f.	22	0	21.75	21.75	21.75	22	0
VA-WUS 7	Ephemeral	0.03	l.f.	136	0	0	0	0	0	136
VA-WUS 9	Intermittent	Unknown	l.f.	0	0	0	0	0	0	0
Total Impacts			l.f.	319	0	85.53	85.57	106.83	107	269

Table 6 Cont'd. *Waterway and Wetland Impacts by Alternate*

Resource	Type	Quality/ USM Score	Unit	Alternates Retained For Detailed Study						
				Alt. 4 with Bike	Alt. 5	Alt. 5 With Bike	Alt. 6	Alt. 6 with Bike	Alt. 7	Alt. 7 with Bike
Maryland Wetlands:										
MD-Wet 1	PEM	Low	acres	0.08	0.08	0.08	0.08	0.08	0.08	0.08
MD-Wet 2	PFO	Medium	acres	0	0	0	0	0	0	0
Total Impacts			acres	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Maryland Waterways:										
MD-Waterway 1	Ephemeral	Low	l.f.	1,244	1,244	1,244	1,244	1,244	1,244	1,244
MD-Waterway 2	Ephemeral	Low	l.f.	531	531	531	0	0	531	531
MD-Waterway 3	Ephemeral	Low	l.f.	204	204	204	13	13	204	204
MD-Waterway 4	Ephemeral	Low	l.f.	90	90	90	0	0	90	90
MD-Waterway 5	Ephemeral	Low	l.f.	1,298	1,298	1,298	1,113	1,113	1,298	1,298
Total Impacts			l.f.	3,367	3,367	3,367	2,370	2,370	3,367	3,367
MD-Waterway 6 (Potomac)										
Open Water Pier Impacts:	Perennial	High	acres	0.40	0.70	0.70	0.50	0.60	0.50	0.60
Open Water Dredge Impacts:	Perennial	High	acres	63.38	85.08	88.49	66.69	67.96	65.38	67.09
Total Impacts			acres	63.78	85.78	89.19	67.19	68.56	65.88	67.69
Virginia Wetlands:										
VA-Wet 1	PFO	Low	acres	0	0	0	0	0	0	0
VA-Wet 2	PEM	Low	acres	0	0.14	0.14	0.09	0.09	0.02	0.02
VA-Wet 3	PFO	Medium	acres	0	0	0	0	0	0	0
VA-Wet 4	PFO	Medium	acres	0	0	0	0	0	0	0
VA-Wet 5	PEM	Low	acres	0	0	0	0	0	0	0
VA-Wet 6	PEM	Medium	acres	0	0	0	0.06	0.06	0	0
VA-Wet 7	E2EM1N	Medium	acres	0	0	0	0.41	0.41	0	0
VA-Wet 8	PFO1C	Low	acres	0	0	0	0	0	0	0
VA-Wet 9	PFO1C	Low	acres	0	0	0	0	0	0	0
VA-Wet 10	PEM1E	Low	acres	0	0	0	0	0	0	0
Total Impacts			acres	0.00	0.14	0.14	0.56	0.56	0.02	0.02
Virginia Waters of the US:										
VA-WUS 1	Ephemeral	0.65	l.f.	74	74	74	16	16	83	82
VA-WUS 2	Ephemeral	0.65	l.f.	0	0	0	0	0	0	0
VA-WUS 3	Ephemeral	0.75	l.f.	0	0	0	0	0	0	0
VA-WUS 4	Intermittent	0.97	l.f.	59	59	59	13	13	78	78
VA-WUS 6	Intermittent	0.71	l.f.	0	22	22	22	22	0	0
VA-WUS 7	Ephemeral	0.03	l.f.	136	136	136	0	0	136	136
VA-WUS 9	Intermittent	Unknown	l.f.	0	0	0	0	0	0	0
Total Impacts			l.f.	269	291	291	51	51	297	296

IV. COMPENSATORY MITIGATION OPPORTUNITIES

The new Compensatory Mitigation Rule (The Rule) issued by the USACE and the US Environmental Protection Agency (US EPA) on April 10, 2008 set federal requirements for a mitigation preference hierarchy. The Rule defines that first preference shall be given to wetland and stream mitigation from available mitigation banks. In addition to the federal Rule, both Maryland and Virginia maintain legal conditions authorizing the use of wetland mitigation banks.

A desktop search, correspondence with the National Wetland Mitigation Banking Association and direct communications with local, state and federal resource agencies identified the mitigation banking and trust fund opportunities within the Lower Potomac River Watershed, Hydrologic Unit Code 02070011. The watershed encompasses 390.70 square miles (***Figure 2***).

A. Banking

The Authority researched the availability of existing wetland and/or or stream mitigation banks in the Lower Potomac River Tidal Watershed. A web-based search, email and phone calls confirmed that two wetland mitigation banks occur within the project watershed in Virginia. The Prince William Environmental Bank, located in Prince William County, VA is anticipated to be approved by USACE in summer or fall 2009, and will offer both wetland and stream mitigation credits. The Buena Vista Mitigation Bank, located in King George County, VA is an USACE and Virginia Department of Environmental Quality (VDEQ) approved bank and currently has wetland credits available.

Communications with the National Wetland Mitigation Banking Association in Maryland confirmed that no Maryland mitigation banking opportunities occur within the Lower Potomac River Watershed.

B. Trust Fund/In-Lieu Fee

The Rule next gives preference to Trust Funds or In-Lieu Fee Programs if mitigation banks do not exist. Maryland regulations address the establishment of Trust Fund programs, yet no active Trust Fund programs could be found in Maryland. Virginia has statutes addressing such establishment. The use of the Virginia Aquatic Resources Trust Fund as a mitigation option is at the discretion of the appropriate regulatory agencies. Generally, the Trust Fund consolidates fees from many projects with small impacts (less than one acre), to accomplish larger projects that have a greater chance of ecological success. The Nature Conservancy, with approval from USACE, implements projects involving the restoration of wetlands and streams or preservation of existing wetlands and streams. The Authority initiated contact with The Nature Conservancy in Virginia to pursue possible opportunities within the watershed under the Trust Fund.

In-lieu fee programs are used in Maryland but are generally used for smaller projects with smaller impacts than the Nice Bridge Improvement Project. In-lieu fee programs may exist in Virginia, however since approved mitigation banks were located, this option was not pursued.

C. Permittee-Provided Mitigation

If banks, trust funds or in-lieu fee programs do not exist, The Rule next gives preference to permittee-provided on-site mitigation, followed by off-site mitigation, to compensate for aquatic resource impacts. The wetland permit issued for the project will specify the amount and type of mitigation required. If off-site mitigation is necessary, a mitigation site search within the watershed will be conducted to identify potential sites for the mitigation, then the regulatory agencies review and approve the site, and the site will be purchased (if necessary). After the construction documents are prepared, a contractor is hired to build the mitigation site, which is then monitored for a time period specified in the permit.

D. Proposed Mitigation

In Maryland, in-lieu fee is not appropriate for the Nice Bridge Improvement Project, and wetland mitigation banks are not available in the watershed. Therefore, aquatic resource impacts in Maryland will require permittee-provided mitigation. As a result, the remainder of the CMP will focus on permittee-provided wetland/stream mitigation in Maryland.

Due to the current availability of wetland mitigation banks in Virginia, the Authority proposes to use one of the available Virginia banks to compensate for aquatic resource impacts.

V. MITIGATION OBJECTIVES

From this point forward in the CMP, assuming the no-build alternate is not selected, text will address mitigation for Maryland resource impacts since all Virginia resource impacts will be mitigated via an established mitigation bank.

A. Primary Objectives

The primary objective of Compensatory Mitigation is to replace the functions and values lost from the impacted aquatic resources. This discussion occurs under Section V.C. (Function and Value Mitigation for Impacts). Another objective is to comply with US EPA policy of "no-net-loss" of regulated wetland resources. Compliance with "no-net-loss" will occur by providing mitigation at required ratios to replacing lost functions and values.

To meet these objectives, the preferred mitigation site should be in-kind habitat replacement to provide the same functions and values as the lost resource. If in-kind mitigation is not possible or preferred, out-of-kind mitigation can provide most, all or different functions and values from the lost resource. The preferred mitigation site should be within the same watershed and in close proximity to the impacted resources to provide local compensation for lost functions and values. Proposed mitigation sites in Maryland are within the 8-digit MDE

watershed area and within eight miles of the Nice Bridge. Proposed mitigation sites (i.e. mitigation banks) in Virginia will be within the 8-digit United States Geological Survey (USGS) watershed.

B. Watershed Needs

The 1998 Maryland Clean Water Action Plan classified the Lower Potomac River Tidal Watershed as a watershed not meeting clean water and other natural resource goals, and targeted the watershed for restoration. This classification results from poor submerged aquatic vegetation (SAV) abundance and habitat index, poor tidal benthic index of biotic integrity (BIBI), and a high historic wetland loss of 42,383 acres. The VA DEQ 2002 305(b) report of the watershed identifies 20% of the watershed's length as failing to support designated uses due to polychlorinated biphenyls (PCBs), low oxygen, bacteria from nonpoint sources, poor tidal flushing, and eutrophication. The VA DEQ 2004 303(d) report identified the following impairments in the project area: nutrients, sediments, PCBs in fish tissue and poor biological community. In May 2005, US EPA approved a Total Maximum Daily Load (TMDL) specifically aimed at limiting fecal coliforms in two shellfish areas (Tall Timbers Cove and Whites Neck Creek) that are currently rated by MDE as "restricted" due to high coliform counts. A TMDL for PCB contamination was established on October 31, 2007 for the tidal Potomac River. Virginia DEQ is in the process of developing bacterial TMDLs for three impaired shellfishing areas in the Upper Machodoc Creek Watershed, a tributary to the Potomac River.

This watershed is also classified as Category 3, a pristine and/or sensitive watershed in need of protection (*Prioritizing Sites for Wetland Restoration, Mitigation, and Preservation in Maryland. May 18, 2006, MDE*). Indicators for Category 3 include migratory fish spawning areas, a high percentage of headwater streams in Interior Forest (28%), and a high percentage of forested watershed(s) (59%). The Popes Creek Natural Heritage Area is a Maryland State Designated Wetland of Special State Concern (WSSC) located less than three miles from Nice Bridge. This site provides habitat for forest interior dwelling birds and is not protected. *The Charles County Comprehensive Plan (1997)* identifies the Potomac River shoreline between Blossom Point and Windmill Point and between Port Tobacco River and Pope's Creek as having erosion rates greater than two feet per year. The Plan recommends restoration and protection of wetlands and streams within headwaters, and protection of WSSC and their buffers.

To identify the aquatic resource problems in the Potomac River Lower Tidal watershed, the Authority conducted desktop research, including gathering Geographic Information System (GIS) and other data from local grassroots, county and state organizations. This information provided insight on water quality, SAV, pollutants, erosion, unique wetlands and wildlife specific to the Nice Bridge area. The desktop research supports the "Site Selection" and "Baseline Information" components of The Rule.

In keeping with the biological deficiencies in the watershed, the Authority tailored its site search to identify sites that 1) expand existing tidal marsh to improve poor water quality and

increase biological diversity, 2) provide shoreline stabilization to areas identified with high rates of erosion, and 3) protect WSSC and other sensitive resources.

C. Mitigation for Lost Functions and Values

The most significant wetland impacts anticipated for the Nice Bridge Improvement Project in Maryland are open water impacts to the Potomac River. As previously noted, pier construction would result in approximately 0.7 acre of permanent open water impact and dredging would result in approximately 88.5 acres of temporary open water impact. Dredging impacts are temporary because they would occur only during construction, and there would be no loss of open water resource. There is no impact to SAV since no SAV beds have been observed in the project area for over five years. In addition, permanent impacts in Maryland include a small emergent wetland and five ephemeral streams (see ***Tables 1, 3 and 7***).

Table 7. *Impacts to Maryland Aquatic Resources*

Resource Type	Impact Area	Type
Emergent Wetland	0.08 Acre	Permanent
Open Water / Subaqueous Land (piers)	0.70 Acre	Permanent
Open Water / Subaqueous Land (dredging)	88.50 Acres	Temporary
Ephemeral Roadside Ditch	3,367 lf	Permanent

The CMP will outline the replacement of lost functions and values for resources impacted by the project, and propose shoreline stabilization and/or the creation of tidal marsh to mitigate the unavoidable resource impacts listed in ***Table 7***, should a build alternate be selected.

The functions and values of the impacted resources are detailed in ***Tables 2 and 3***. The emergent wetland is located in an open, mowed field, does not appear to be connected to the water table, and stormwater runoff is its primary water source (see ***Photo #1***). It provides

Photo #1. Emergent Wetland

Photo #2. Ephemeral roadside ditch at Nice Bridge

some function for flood storage during and after storm events, and habitat for limited fauna. The Potomac River provides ten out of the thirteen potential functions and is home to several resident and migrating species. Numerous types of recreation occur on the Potomac River, and it contains many Uniqueness/Heritage values including archeological sites, unique plants and geologic features.

The ephemeral roadside ditches (see ***Photo #2***) are riprap, dirt bottom and/or concrete channels draining uplands, and provide minor value for nutrient removal. These resource function and values will be considered during the alternate selection process and will result in the application of avoidance and minimization measures during design. Accordingly, the same functions and values were considered during the development of the CMP and their replacement/enhancement is a primary design goal at the proposed mitigation sites.

D. Credit Determination

A summary of anticipated impacts and credits is listed in ***Table 8***. The Authority proposes to provide out-of-kind mitigation through shoreline stabilization and/or tidal marsh creation that adequately compensates for all functions and values from impacted resources. A justification for the proposed mitigation follows.

Shoreline stabilization sites would include an offshore breakwater to halt erosion from eroding bluffs. Six functions and values would be provided with shoreline stabilization: *fish and shellfish habitat* as habitat forms in rock structures, *sediment retention* as erosion along Potomac River bluffs is reduced, *production export* as areas shoreward of breakwater often colonizes with SAV, *sediment/shoreline stabilization*, *wildlife habitat*, and *uniqueness/heritage* as shoreline archeological sites, such as shell middens, are prevented from being washed away by erosion.

Marsh creation is proposed in areas where existing marshes can be easily expanded. At least nine functions and values would be provided with marsh creation as follows: *groundwater recharge* as the enlarged marsh has more capacity to contribute water to the aquifer, *floodflow alteration, fish and shellfish habitat, sediment/toxicant/pathogen retention* as an enlarged marsh has more capacity to trap sediments, *nutrient removal/retention/transformation, production export* as the enlarged marsh has more capacity to produce food for wildlife, *wildlife habitat, visual quality/aesthetics* and *threatened or endangered species habitat* as endangered species, such as the shortnose sturgeon, inhabit the potential mitigation area.

Temporary impacts to tidal open water related to the dredging operation would be minimized, and the effects to functions and values for this activity would be minimal. There are time-of-year restrictions for dredging, so temporary sedimentation effects would be minimized. SAV has not been in the Nice Bridge project area for at least five years, but an improvement in water quality could trigger SAV growth in the area.

While tidal marsh creation provides slightly more functions and values than shoreline stabilization, a greater “need” for shoreline stabilization was recognized during the Agency

field tour on April 20, 2009. The combined functions and values of marsh creation and shoreline stabilization provide eleven of the thirteen potential functions and values.

Table 8. *Anticipated Impacts and Mitigation Requirements (worst case impacts)*

Wetland/ Waters	Tidal/ Nontidal	Type	Impact		Ratio	Required Mitigation	Mitigation Type
			SF/LF	Acres		Acres	
Wetlands WET 1	Nontidal	PEM	-	0.08	1 : 1	0.08	Out-of-kind, Tidal Wetland or Shoreline Stabilization
Waters (MD)	Nontidal	Drainage Ditches	3,367 LF	-	1 : 1	-	In-kind drainage ditches
	Tidal	Tidal Open Water (Permanent)	-	0.70	1 : 1	0.70	Out-of-kind, Tidal Wetland or Shoreline Stabilization
	Tidal	Tidal Open Water (Temporary)	-	88.5	-	-	Out-of-kind, Tidal Wetland or Shoreline Stabilization

VI. SITE SELECTION

In consideration of the watershed needs of the Lower Potomac River Watershed, the site search focused on lands adjacent to the Potomac River and its tidal tributaries within ten miles of Nice Bridge (***Figure 2***) with the following characteristics:

1. Non-forested;
2. Farmland (with preference for prior converted cropland, land that has low productivity due to high water table, or land that requires little excavation to intercept the water table);
3. Low-lying land contiguous to water or existing marsh and suitable for marsh creation;
4. Eroding shoreline;
5. Waterfront having little or no vegetative buffer;
6. Sites that have an opportunity to provide high ecological benefit (e.g., nutrient retention, attenuation of storm surges, flood storage, water quality improvement, aquatic food chain support, wildlife habitat, habitat for Rare, Threatened and Endangered species (RTE);
7. Approximately two acres of tidal wetland mitigation to accommodate all mitigation needs on one site;
8. Sites that are on, or adjacent to, land that is managed for conservation;
9. Sites that are easily accessible by construction equipment;
10. Soils suitable for use as highway fill material (if the site requires significant excavation).

Through the use of aerial photography and GIS data mapping, the Authority identified 23 sites that met many of the above characteristics (***Figure 3***). Property owners were identified using MD Property View© 2008, and were contacted by letter (followed by phone calls) seeking approval to enter properties. Site visits were conducted on April 1 and 2, 2009 to assess the suitability of the sites, and to further explain the mitigation component of the project and confirm property owner interest.

A rating form (***Appendix 2***) was used to assess site suitability based on soils, amount of excavation required, slope, sources of hydrology, opportunity for water quality improvement, habitat value, site constraints (such as invasive species infestation or poor landscape position), and potential functions and values. A summary of the rating form results is provided in ***Table 9***. Sites dropped from further consideration include:

- Sites 1, 6, 7, 12, 20, and 21 (identified in Figure 3 as "Not Preferred") lacked appropriate site conditions for development of mitigation;
- Sites 3, 5, 8, 9, 10, 15, and 16 (identified in Figure 3 as "Inaccessible") were inaccessible or had existing land uses that conflicted with the mitigation goals and objectives;
- Site 17 (identified in Figure 3 as "Not Preferred") was heavily overrun with Phragmites and was rated as having a low probability of success for establishment of wetland vegetation;
- Sites 12, 22, and 23 (identified in Figure 3 as "Not Preferred") property owners were not interested after hearing more details about the proposed mitigation objectives;
- Sites 18 and 19 (identified in Figure 3 as "Inaccessible") are under the stewardship of the Maryland Environmental Trust (M.E.T.). M.E.T. did not want to participate in the Nice Bridge mitigation efforts so the property owners were not contacted.

These limitations resulted in the selection of five preferred sites: Sites 2, 4, 11, 13 and 14 (identified in Figure 3 as "Preferred").

Table 9. *Summary of Mitigation Site Search Ranking Form*

Site #	Soils Score	Estimated Excavation Depth Score	Existing Slope Score	Hydrology Score	Water Quality Opportunity Score	Habitat Value of Site Score	Constraints Score	Overall Functional Replacement Ranking	Mitigation Ranking Score
1	1	1	3	3	2	2	1	2	**15**
2	1	3	3	3	2	3	3	3	**21**
4	2	2	2	3	1	4	3	4	**21**
6	1	1	3	2	2	2	2	0	**13**
7	1	1	3	3	1	3	1	0	**13**
11	2	3	3	3	2	3	3	2	**21**
12	1	2.5	2	3	1	4	3	3	**19.5**
13	2	3	3	3	2	4	3	3	**23**
14	2	3	3	3	2	3	3	3	**22**
17	2	3	2	3	2	3	2	1	**18**
20	1	3	2	2	2	2	1	2	**15**
22	1	1	1	2	2	3	2	0	**12**
23	1	1	2	3	2	1	1	0	**11**

* Highlighted sites were preferred

VII. MITIGATION OPPORTUNITIES

The remaining five sites the Authority is considering (Sites 2, 4, 11, 13, and 14) based on the rating form results are shaded in ***Table 9***. A field tour to these five sites was conducted with the regulatory agencies on April 20, 2009 to seek their concerns and preferences for a project mitigation site. Agencies generally favored shoreline stabilization over marsh creation due to the immediate environmental benefit for preventing further shoreline erosion. Shoreline stabilization will likely involve the construction of an off-shore breakwater. Due to the proximity of the proposed mitigation sites to Blossom Point, breakwater construction may require an underwater search for unexploded ordnance as well as continuous monitoring and technical support during construction.

Site #2 – Shoreline Stabilization

Existing Conditions - Site 2 (Figure 4) is located directly on the Potomac River, approximately one mile south of Nice Bridge. The shoreline is at least 1500 feet long, the vertical bluffs are 15 to 20-feet high, and the property currently experiences erosion at a rate of one foot per year.

The soils adjacent to the waterfront are comprised of two soil series, Mattapeake fine sandy loam and Mattapex silt loam, on 0 to 2% slopes. The Mattapeake series soils are well-drained

soils found mostly on terraces above major rivers and streams. In a representative profile, the surface layer, about 14 inches thick, is brown to yellowish-brown fine sandy loam. The subsoil, from a depth of 14 inches to 40 inches, is brown or dark-brown silty clay loam that is sticky. The underlying material, from 40 to 60 inches, is stratified silt loam and fine sandy loam of mixed colors. This series is among the most suitable soils for farming in Charles County, and is rated "fair" for highway embankment. This is not a hydric soil.

The Mattapex series soils are chiefly in low-lying areas bordering major rivers. They formed in loamy deposits underlain by older, coarser sediment. In a representative profile, the surface layer, about 13 inches thick, is silt loam. It is grayish brown in the upper 7 inches and yellowish brown below. The subsoil, from a depth of 13 inches to 36 inches, is yellowish-brown silty clay loam or silt loam that is mottled with gray in the lower part. Underlying the subsoil, fine sandy loam mottled with yellowish-brown and gravelly loamy sand extends from 36 to 72 inches deep. This series is rated "fair" for highway embankment. It is not a hydric soil.

Proposed Project - The site would require armor stone, most likely in the form of a breakwater, to protect the shoreline against wave action. The type of shoreline stabilization employed would depend on more detailed investigation of fetch, wave height, and wave energy. A small inter-tidal beach area could be created and planted with Spartina. Specific project elements such as stone placement, stone sizes, grades, elevations, and planting widths will be based on site conditions, and these issues would be explored if the site is selected for mitigation. The vertical bluff would not need to be regraded, as the bluff would seek a natural angle of repose in a few years. An off-shore breakwater could be constructed entirely from the water since the site has good access from the Potomac River with adequate water depth.

The Charles County Soil Survey indicates that this location may contain American Indian shell middens. Shell middens generally take the form of distinctive mounds within a landscape and are always associated with tidal waterways. Shell middens are considered potentially important archeological sites because Native American artifacts are typically found within the shell middens. The lime content of the shells also enables a high degree of preservation of organic materials such as fish and animal bone which are another important data set in archaeological interpretation. Middens are generally mounded with the presence of oyster shells on the surface or in the face of an eroding bluff. GIS information shows an oyster bed off the shoreline at this site. Time-of-year restrictions would apply if construction were to occur within 1500 feet of an oyster bed prohibiting work between December 16 to March 14 and between June 1 to September 30.

Ecological Benefits - The project would benefit water quality by controlling erosion. The Chesapeake Bay will benefit from reduced sedimentation in the Potomac River traveling downstream. The improved water quality would benefit the aquatic fauna, and Spartina vegetation would enrich their food supply with beneficial nutrients and benthic organisms. An existing leased oyster bar immediately off-shore would also benefit from the improvement in water quality. During the April field tour, the Agencies favored proposed shoreline stabilization at this site due to the noticeable erosion. NMFS favored breakwater construction

on this site and recommended leaving the bank untouched so that it can reach its own angle of repose. This site was the last tour stop and Agencies stated that the "need" was most compelling at this site.

Cost and Logistical Considerations - Recent costs (year) for off-shore breakwater projects are $300 per linear foot of shoreline. This cost would be partially offset by constructing the offshore breakwater without encroaching on the property (i.e. the Authority would not be required to purchase any property, conservation easements, or construction easement). An off-shore breakwater site would be accessible by barge without the need for additional dredging. Potential costs include an underwater search for unexploded ordnance and/or continuous monitoring and technical support related to ordnance during construction.

There would be no need to regrade the bluff, or to access the site from the bluff. Therefore, the potential archeological site(s) would be avoided, and the breakwater would minimize further erosion of the archeological site. There would be little additional cost for Phragmites control since Phragmites could be easily managed.

Site #4 – Marsh Creation

Existing Conditions - Site #4 (***Figure 5***) is located on the upper headwaters of Piccowaxen Creek, a tidal tributary to the Potomac River. The low-lying land in the rear of the property is adjacent to a Phragmites-dominated marsh. The Creek flows through the property and frequently floods its banks. There is a small pond on the property which is silting-in as a result of the sediment transported during out-of-bank flooding of the Creek. Soils at the potential mitigation site consist of the previously-described Mattapex series, a silt loam soil that is non-hydric.

Proposed Project - The existing pond could be preserved, and the surrounding lowlands converted to a wetland, thereby providing approximately one acre of mitigation. The created wetland would have two potential sources of hydrology, from Piccowaxen Creek: tides and from the out-of-bank flows of a Mill Run tributary. The site would require minor excavation. This site is considered moderate to high probability for an archeological site, and would likely require some level of cultural resource investigation, or coordination with the Maryland Historical Trust. Moderate to high probability zones are typically defined by their proximity to water sources, presence of well-drained and level ground, and/or proximity to previously recorded archeological sites or architectural properties.

Ecological Benefits - The site would be excavated to create a wetland, and would, therefore, provide additional flood storage capacity. Phragmites eradication and plantings would add diversity to the vegetation in the marsh, thereby improving wildlife habitat and increasing wildlife diversity. The marsh would provide water quality benefits (sediment and nutrient retention) to Piccowaxen Creek during out-of-bank flows. During the Agency tour, the Agencies mildly endorsed this site for marsh creation. While they were supportive of a marsh creation abutting the existing marsh/pond/creek with its history of flooding, they were

concerned about the plentiful Phragmites nearby and its potential to overrun the creation project.

Cost and Logistical Considerations - Concerns regarding this site include potential for Phragmites invasion, and the existence of a bald eagle's nest on the property, which would potentially necessitate time-of-year restrictions on construction. Extensive Phragmites eradication would be necessary in the adjacent marsh. In addition, construction equipment access onto the property via the gravel driveway could result in damage to the shallow-buried culverts and timber bridge that convey Piccowaxen Creek beneath the driveway. Replacement of the culverts and timber bridge would be an added cost to the project. While there are concerns about using this site for marsh creation, it would be suitable as a site for Critical Areas buffer mitigation (i.e., plantings).

Site #11- Shoreline Stabilization

Existing Conditions - Site #11 (***Figure 6***) is located on the Potomac River, four miles upstream of the mouth of Port Tobacco Creek. The shoreline of this property currently exhibits erosion rates of two feet per year, and the vertical bluff is currently as high as 20 feet. Soils consist of the previously-described Mattapex series, which is a non-hydric soil series. This is the only mitigation site in which the Authority has not discussed the mitigation options with the property owner or property representative.

Proposed Project - The site would require armor stone, most likely in the form of a breakwater, to protect the shoreline against wave action. The type of shoreline stabilization employed would depend on the results of a detailed investigation of fetch, wave height, and wave energy. The slopes would not need to be regraded as the bluff would seek a natural angle of repose in a few years. One low-lying area along the shoreline has a small marsh that could be expanded. Bathymetric information will be obtained to ensure that a breakwater could be constructed entirely from the Potomac River. The Charles County Soil Survey indicates that this location may contain American Indian shell middens, but these would not be impacted if the project can be constructed from the Potomac River.

Ecological Benefits - The project would provide water quality benefits by controlling erosion. There is a leased oyster bar immediately off-shore, which would benefit from the improved water quality, and habitat for aquatic fauna would also be enhanced by the improved water quality. During the Agency site tour, the Agencies were supportive of this site for shoreline stabilization along the two eroding bluffs. They also supported the creation of marsh in the lower elevation portion of the site.

Cost and Logistical Considerations - It is anticipated that an offshore breakwater could be constructed without encroaching on the property, and therefore, would not require any purchase of property, conservation easement, or construction easement. If conditions exist preventing breakwater construction from the River, construction easement costs would be necessary. An off-shore breakwater site would be accessible by barge without the need for additional dredging. Potential costs include an underwater search for unexploded ordnance

and/or continuous monitoring and technical support related to ordnance during construction. Any archeological shell middens would be avoided; therefore no further on-shore archeological studies would be needed, although archival research would be conducted regarding underwater archeology. Control of Phragmites could be managed easily, therefore, this would add minor costs to the project.

Site # 13 – Marsh Creation

Existing Conditions - Site #13 (Figure 7) is located on Neale Sound, a tidal tributary to the Potomac River. The site is currently leased for soybean farming. The soils are Mattapeake Silt Loam on 0 to 2% slopes, which is a non-hydric soil series.

Proposed Project - The site has potential for approximately 0.667-acre marsh creation, which would enhance the marsh that exists adjacent to Neale Sound. Marsh creation on this property would entail minimal excavation to achieve inundation by the Spring high tide or saturation by groundwater. Any topsoil would be salvaged and replaced. Because the water table is influenced by tides, it would be relatively easy to establish the elevations that would be suitable to sustain wetland hydrology. The excavation of the site would result in a steeper slope landward of the created marsh. The new slope would be planted with native species to provide an upland buffer. This site is also considered moderate to high probability for an archeological site, and would likely require some level of cultural resource investigation, or coordination with the Maryland Historical Trust.

Ecological Benefits - The site would have benefits that are typical of tidal marshes, such as nutrient retention, flood storage, wildlife habitat, and water quality. However, the acreage of created marsh would be minor compared to the size of the existing marsh; thus adding only incrementally to the environmental functions of the marsh. During the Agencies site tour, the Agencies were supportive of this site for marsh creation, noting that excavation was minor and that Phragmites were not too prevalent in the abutting marsh.

Cost and Logistical Considerations - The site is easily accessible by construction equipment, and would require minor excavation with spoils transported off-site. Minor Phragmites eradication in the existing marsh would be required to limit an invasion of Phragmites in the created marsh. Special measures may be needed to limit predation by voles and deer. The adjacent property owner also expressed an interest in making his property available for mitigation. Both properties would provide suitable locations to plant shrubs as mitigation to offset impacts to Critical Area buffers.

Site # 14 – Marsh Creation and Shoreline Stabilization

Existing Conditions - Site #14 (***Figure 8***) is located on Cuckold Creek, a tidal tributary to the Potomac River, directly across from Swan Point. Trees and shrubs have been cleared along this section of waterfront to provide unobstructed views of Cuckold Creek from the property owner's house. Middletown Branch runs along the western edge of the property. Most of the property (except the five acres surrounding the house) is currently in a

conservation easement held by the Maryland Agricultural Land Preservation Foundation (MALPF).

There is a narrow fringe marsh of Spartina and Iva, which is relatively stable, bordering Cuckold Creek downstream of the potentially historic house, and adjacent to a horse pasture. Cuckold Creek is currently closed to shell-fishing, by order of the Maryland Department of the Environment, due to high bacteria counts associated with the discharge of sewage treatment effluent upstream. The land that abuts Middletown Branch is severely eroded, and large concrete blocks have been placed as a breakwater.

The soils closest to the waterfront consist of two soils series: Keyport silt loam and Sassafras sandy loam, on 2 to 5% slopes. The Keyport soils are found at low elevations along Cuckold Creek. In a representative profile, the surface layer, about 11 inches thick, is dark grayish brown in the upper part and light yellowish brown below. From 11 to 16 inches thick (B-1 horizon), the subsoil is yellowish-brown heavy silt loam. The middle part, about 23 inches thick, is yellowish-brown silty clay or heavy silty clay loam mottled with light gray. The lower part of the subsoil, about 17 inches thick, is light-gray fine sandy loam mottled with yellowish brown. The underlying material, from 56 to 66 inches deep, is gravelly sandy loam of various colors. The soil is very strongly acid, non-hydric, and rated "poor" for highway embankment.

The Sassafras series soils are well-drained soils formed in loose deposits of sandy and loamy sediment of marine and alluvial origin. In a representative sample, the surface layer is sandy loam about 8 inches thick. This layer is grayish brown in the thinner upper part and brown in the lower part. The upper part of the subsoil (B-1 horizon), from 8 to 12 inches thick, is yellowish-brown fine sandy loam. The lower part, about 26 inches thick, is strong-brown sandy clay loam that is friable. The underlying material, from 38 to 60 inches deep, is loose loamy sand of various colors. The soil is strongly acid, non-hydric, and rated "good" for highway embankment.

Proposed Project - Little excavation would be needed to create a suitable elevation to expand the marsh along Cuckold Creek, and minimal Phragmites eradication would be needed. The expanded marsh would provide an important function of filtering nutrients from the nutrient-enriched Creek. The shoreline along Middletown Branch could be riprapped to protect the shoreline against wave action, and the 8 to 10 foot high, eroded, vertical bluffs would require re-grading to a 3:1 slope, followed by planting. This site is also considered moderate to high probability for an archeological site, and would likely require some level of cultural resource investigation, or coordination with the Maryland Historical Trust.

Ecological Benefits - The site would have benefits for nutrient retention, sediment retention, water quality, food chain support, wildlife habitat, and wave energy attenuation. The Agencies were not in favor of this site for shoreline stabilization for two reasons: 1) the trees along Middletown Branch should be saved for their habitat value; and 2) the jersey barrier revetments along the tip of the peninsula at Cuckold Creek and Middletown Branch already

provide sufficient stabilization. The Agencies stated that the low portion of the site along Cuckold Creek with existing marsh could be expanded to accommodate marsh creation.

Cost and Logistical Considerations - The site is accessible by construction equipment. Submerged aquatic vegetation has been documented in recent years along both the Cuckold Creek and the Middletown Branch shorelines of this property; therefore, the marsh creation and shoreline stabilization should occur landward of the existing shoreline. Consequently, it would be necessary to remove trees to construct the shoreline stabilization, and this would require coordination regarding impacts to Critical Areas. More research will be needed to determine whether the proposed mitigation project is consistent with any restrictions that may be imposed by the MALPF easement. This site could also be planted with shrubs to provide mitigation for Critical Areas buffer impacts.

Conclusions

Coordination with the Agencies provided needed direction on the suitability of these five sites for mitigation. Until the dredging impacts are finalized and funding is secured for the project, all five sites will be retained as potential mitigation sites to offset impacts to aquatic resources and Critical Areas buffers. Consequently, performance standards (Section IX) have been developed for each type of mitigation that could be advanced at these five sites.

VIII. WORK PLAN

Once a final mitigation site is chosen, a conceptual mitigation design will be developed. The concept design will include a color illustrative site plan with proposed spot elevations and a proposed plant materials list. The concept plan will then be reviewed by the Agencies, their comments incorporated into the design, and the final design plans developed. Final design plans shall include a standard set of construction drawings, specifications, Erosion and Sediment Control plans, a sequence of construction, and invasive control plans.

IX. PERFORMANCE STANDARDS

Performance standards for Emergent Tidal Marsh and Shoreline Stabilization have been developed and are presented below. These performance standards will be refined and/or modified to fit the unique parameters of the site chosen for mitigation.

A. Performance Standards - Emergent Tidal Marsh

The success of emergent tidal marsh wetland creation sites will be dependent on the establishment of the correct hydrology, thereby leading to the successful establishment of the planned wetland vegetation communities. Performance standards are consistent with those outlined in the *Maryland Compensatory Mitigation Guidance* (IMTF, 1994). Soils will be monitored but will not be used to determine the success of tidal marsh creation sites. Hydric soils should result from the newly established tidal flow regime but it is unlikely they will form during the monitoring period. Similarly, functions and values of the created marshes

will not be assessed during the monitoring period; rather it is assumed that the functions and values typical of an emergent tidal marsh wetland will be present if the site is a success.

The performance standards outlined below only apply to emergent tidal marsh creation areas that will be regularly inundated (tides alternately flood and expose land surface at least once daily). If a different or additional hydrologic regime is determined during final design, the performance standards will be revised accordingly.

Emergent Tidal Marsh Vegetation

To ensure each emergent tidal marsh creation site is successful, planting densities will be consistent with the recommendations outlined in the *Maryland Compensatory Mitigation Guidance*. The initial planting will consist of a minimum of two emergent wetland species that will be planted one foot to two feet on center (43,560 to 10,890 plants per acre, respectively), depending on site conditions and final design. To track progress during the monitoring period, and to ultimately determine if the site achieves the vegetation performance standards, emergent tidal marsh plantings must achieve the percent coverage of wetland species outlined below. Species percent cover in each growing season can be met through a combination of originally planted material and native, non-invasive recruited emergent wetland species (i.e. Phragmites and Purple Loosestrife are unacceptable).

a. Second Growing Season – 45% coverage with wetland species
b. Third Growing Season – 70% coverage with wetland species
c. Fifth Growing Season – 85% coverage with wetland species

If monitoring of the emergent tidal marsh vegetation during any year reveals that vegetation densities are below the minimum requirements, replanting will be required during the following year. If success is not achieved at the end of Year 5, monitoring may be required for another one to five years. If the percent cover of invasive species during any of the milestone years exceeds 50%, an invasive species management plan shall be implemented to eradicate or reduce the coverage of the invasive species.

Emergent Tidal Marsh Hydrology

Planting zones for emergent tidal marsh creation sites will be graded to specific elevations to achieve a regularly flooded tidal inundation with tidal waters having free access to the entire site. To be consistent with the *Maryland Compensatory Mitigation Guidance* hydrology performance standard for a regularly flooded tidal wetland, the surface elevations for the tidal marsh will be between the mean high and mean low tide elevations. If normal high tides are observed to inundate the entire herbaceous emergent tidal marsh planting zone, and normal low tides expose the same zone, the site will be considered successful. Neap and spring tide monitoring will not be conducted because of tidal irregularities and scheduling.

B. Performance Standards - Shoreline Stabilization

Shoreline stabilization efforts will be focused on areas experiencing severe erosion where degraded cliffs or bluffs with little ecological value occur. It is likely that stabilization efforts would consist of the creation of a tidal marsh area at the base of a bluff, in addition to grading and/or vegetative plantings to stabilize the bluff. Rock sills or similar structures may be used to ensure long-term stability and success depending on site conditions and final design. Performance standards for the shoreline stabilization areas are outlined in the following paragraphs.

Shoreline Stabilization - Tidal Marsh Area Vegetation

Success of the vegetated tidal marsh area will be dependent on the establishment of the appropriate soil medium (fill), hydrology and grading plan. Fill material for the marsh area shall consist primarily of sandy soil with no more than 10% of the fill substrate passing through a number 100 sieve to ensure a hospitable soil medium for the marsh grasses (Bosch et al, 2006). Planting densities will be consistent with the recommendations outlined in the *Maryland Compensatory Mitigation Guidance*. Plant quantities, percent cover requirements, and replanting requirements will be the same as those previously described for Emergent Marsh.

If a rock sill or similar structure is used on the channelward side of the marsh area, the performance standards will require that the structure be constructed to the specified design elevations and maintains structural integrity during the monitoring period.

Shoreline Stabilization – Tidal Marsh Area Hydrology

Planting zones for emergent tidal marsh creation sites will be graded to specific elevations to achieve a regularly flooded tidal inundation with tidal waters freely accessing the entire site. To be consistent with the *Maryland Compensatory Mitigation Guidance* hydrology performance standard for a regularly flooded tidal wetland, the surface elevations for the tidal marsh will be set between the mean high and mean low tide elevations. If normal high tides are observed to inundate the entire herbaceous tidal marsh planting zone and normal low tides expose the same zone, the site will be considered successful. Neap and spring tide monitoring will not be conducted because of tidal irregularities and scheduling.

Cliff/Bluff Stabilization Area

Performance standards for cliff/bluff stabilization areas will be both quantitative and qualitative. Survivability and percent cover will be utilized to evaluate vegetation success. The survivability standard shall be 85% survivability of the planted material at the end of Year 2. Percent cover in each growing season can be met through a combination of originally planted material and native, non-invasive recruited species.

a. Second Growing Season – 45% coverage
b. Third Growing Season – 70% coverage
c. Fifth Growing Season – 85% coverage

If vegetation monitoring during any of the milestone years reveals that vegetation densities are below the minimum requirements (above), replanting will be required during the following year. If success is not achieved at the end of year five, monitoring may be required for another five years. If the percent cover of invasive species during any of the milestone years exceeds 50%, an invasive species management plan shall be adopted to eradicate or reduce the coverage of the invasive species.

Qualitative performance standards for the bluff stabilization area will require that the area experience little to no continued erosion from landward runoff (e.g., gullies, rills), or undercutting from wave action.

X. MONITORING REQUIREMENTS

Monitoring requirements for emergent tidal marsh and shoreline stabilization are outlined below and will be refined and/or modified to fit special parameters for the selected mitigation site.

A. Monitoring Plans

A five-year monitoring period for the mitigation site will begin during the first growing season after mitigation construction is complete and the site is planted. All monitoring components (vegetation, soils, hydrology, stability, etc.) applicable to the site will be monitored annually toward the end of the growing season. Permanent monitoring stations will be established at the mitigation site at locations to be determined following final design. These stations will serve as focal points for photographic, soil (if applicable), hydrology (if applicable), and vegetation monitoring. Monitoring for the emergent tidal marsh creation areas and shoreline stabilization areas will be conducted as outlined below.

Emergent Tidal Marsh Creation Monitoring

Monitoring of emergent tidal marsh creation sites will be adopted from the Maryland State Highway Administration (MD SHA) *Mitigation Monitoring Protocols for Wetlands and Stream Restoration, Revised: August 2007* (MD SHA, 2007). Elements of this protocol that will be adopted include:

- Ground Level Photography;
- Vegetation;
- Hydrology;
- Soils;
- Wildlife.

Ground Level Photography

Photographic documentation will be conducted in late summer to establish a permanent record of the overall appearance and vegetation establishment, and will occur once a year in

conjunction with vegetation monitoring. Permanent locations will be established for year-to-year comparisons, and the number and placement of the locations shall be sufficient to show most of the mitigation site and document the planned vegetation communities. Additional photographs shall also be taken to document any unusual conditions, problem areas, wildlife usage, or other features and conditions worth noting.

Vegetation

Vegetation community, species composition, and vegetation cover type will be mapped and monitored in each tidal marsh creation area on an annual basis towards the end of the growing season. Vegetation community, species composition, and percent cover will be described using the sampling plot method described in the *USACE Wetland Delineation Manual* (Environmental Laboratory, 1987), and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* (USACE Interim Regional Supplement) (Environmental Laboratory, 2008). Sampling plots will be located so that one or more plots are located in each vegetation community and cover type.

Any bare soil areas greater than 0.01 acre in size will be mapped. Areas dominated by invasive species will also be mapped and described, noting percent cover, species, and degree of dominance. Field data will be recorded on the Wetland Determination Data Form from the USACE Interim Regional Supplement.

Hydrology

Hydrology will be measured annually at the permanent monitoring locations during a normal high and low tide. Following monitoring, local tidal gauge information will be checked to verify that tides were within the normal range. Visual documentation of tidal inundation will be recorded at each monitoring station and shall include photos taken from monitoring station center points in each cardinal direction. Hydrologic monitoring will be conducted concurrently with vegetation and soil monitoring. Field notes regarding hydrology will be recorded on mapping.

Soils

One soil boring will be performed and described at each tidal marsh sampling plot during each monitoring year visit. Additional borings may be performed in areas that appear to be problematic (e.g., poor vegetation coverage), as needed. The pits will be excavated to a minimum depth of 20 inches. The results of the sampling, including soil profile data and characteristics will be documented in accordance with the USACE Interim Regional Supplement. The Wetland Determination Data Form from the USACE Interim Regional Supplement will be used to record field data.

Wildlife

Any sightings or evidence of wading birds, songbirds, waterfowl, amphibians, reptiles, and other animal use (e.g., lodges, nests, tracks, and scat) within the tidal marsh will be noted during monitoring. The documentation will include the number, type, date, and hour of the sightings and/or evidence. Performed once a year, wildlife monitoring will help determine which type and species of wildlife use the wetland mitigation habitat. Problem areas such as

deer browse or beaver activity will also be noted. Field data will be recorded on the MD SHA Wetland Mitigation Monitoring System, Observational Field Summary Sheet.

Shoreline Stabilization Monitoring

Monitoring of the shoreline stabilization areas will focus on the tidal marsh and the bluff areas separately. Although similar monitoring protocols will be applied to both areas (e.g., ground level photography and vegetation), there will be some protocols that will be applied to one area but not the other. For example, if a rock sill or similar structure is a component of the tidal marsh area, there will be measurements and visual assessments of the structure's integrity, whereas this protocol will not be applicable to the bluff area. Monitoring protocols for the tidal marsh and bluff areas are outlined below.

Shoreline Stabilization – Tidal Marsh Area Monitoring

Monitoring of emergent tidal marsh creation sites will be adopted from applicable components of the *SHA Mitigation Monitoring Protocols for Wetlands and Stream Restoration, Revised: August 2007* (Maryland SHA, 2007). Applicable components of this protocol that will be adopted include:

- Ground Level Photography;
- Vegetation;
- Soils.

Ground Level Photography

Photographic documentation will be conducted to establish a permanent record of the overall appearance and vegetation establishment, and will occur once a year in conjunction with vegetation monitoring. Permanent locations will be established for year to year comparisons. The number and placement of the locations shall be sufficient to show most of the mitigation site and document the planned vegetation communities, and rock sill or other similar structure if applicable. Additional photographs shall also be taken to document any unusual conditions, problem areas, wildlife usage, or other features and conditions worth noting.

Vegetation

Vegetation community, species composition, and vegetation cover type will be mapped and monitored on an annual basis towards the end of the growing season. Vegetation community, species composition, and percent cover will be described using the sampling plot method described in the *USACE Wetland Delineation Manual*, and the USACE Interim Regional Supplement. A dominance test, however, will not be necessary for monitoring the shoreline stabilization emergent tidal marsh creation areas because these areas will not be applied towards wetland mitigation credit. Therefore, the dominance test outlined in the vegetation sampling methodology within the USACE Interim Regional Supplement will not be performed. Sampling plots will be located so that one or more plots are located in each vegetation community and cover type.

Any bare soil areas greater than 0.01 acre in size will be mapped. Areas dominated by invasive species will also be mapped and described, noting percent cover, species, and degree of dominance. Field data will be recorded on the Wetland Determination Data Form from the USACE Interim Regional Supplement.

Soils
Annual soil monitoring for the tidal marsh component of shoreline stabilization areas will not be necessary because these areas will not be applied towards wetland mitigation credit. Soil monitoring will occur during or immediately following construction to confirm that the specified soil medium was used for the fill material in the planned marsh area. A sieve analysis will be used to confirm that no more than 10% of the fill material passes through a number 100 sieve.

Rock Sill or Similar Structure
If a rock sill, or similar structure, is a component of the tidal marsh area, the first monitoring protocol to be implemented will be the completion and analysis of an as-built survey to confirm the structure was constructed to specified design elevations. During subsequent annual monitoring events, visual assessments of the structure for problem areas or severe rock displacement will be conducted to ensure its structural integrity is intact. No specific data form will be utilized for this assessment other than field notes.

Shoreline Stabilization – Cliff/Bluff Area Monitoring
Ground level photography and vegetation monitoring will follow the same protocol as the tidal marsh area outlined above. In addition to the quantitative vegetation assessment, the stability of the bluff area will be qualitatively assessed via visual observations to determine if the area is experiencing any erosion from landward runoff (e.g., gullies, rills) or undercutting from wave action. No specific data form will be utilized for this assessment other than field notes.

B. Monitoring Reports

Annual monitoring reports will be submitted to the Regulatory Agencies by December 30th of each calendar year; five annual reports will be submitted over the monitoring period.

The following information will be included in each report:

1. The monitoring year, permit number, brief permit history, date the mitigation site was constructed, description of existing conditions, site location map, and methods used to assess success of the mitigation site.
2. Discussion of monitoring data collected (e.g., vegetation, hydrology, soils) along with comparisons to previous monitoring years and performance standards.
3. Copies of all field data sheets.
4. Photographic documentation.
5. Mapping depicting the location of vegetation community and cover types, including high and low tide interfaces and problem areas.

6. A description of problems observed within the mitigation site affecting the ability of the site to meet the performance standards, and recommendations for remedial measures.

XI. MAINTENANCE PLAN

The sites shall be designed to be self-maintaining once established. However, prior to establishment of full vegetative cover in created wetlands and living shorelines, the vegetation is susceptible to disturbance and damage from dense wrack and debris deposited by tides, particularly after storm events. To prevent wrack and debris from entering the site during the first growing season, a turbidity curtain will be maintained around the site. The curtain will be maintained as needed to ensure it is in good working order and functioning as designed. Deficiencies in the turbidity curtain, its operation, or position will be corrected. Debris and wrack detrimental to plant growth deposited in the marsh during a turbidity curtain malfunction will be removed as needed.

After the first growing season, debris and wrack removal efforts will occur as needed until the percent cover of the marsh during the prior growing season reaches 85 percent or until Year 5, whichever occurs first. Debris and wrack removal shall occur as needed just prior to the growing season, and all debris and wrack detrimental to plant growth shall be removed from the marsh area.

XII. ADAPTIVE MANAGEMENT PLAN

The Adaptive Management Plan will be implemented in the event that any of the Performance Standards are not met by Year 5.

Adaptive management may be necessary to address potential and unforeseen issues that may hinder the success of the mitigation site, and the Authority or its designee shall be responsible for implementing adaptive management. USACE and MDE will be consulted immediately when adaptive management is determined necessary, and corrective measures will be approved prior to implementation. The performance standards and monitoring criteria outlined in this CMP provide the basis to determine if the site is trending towards successful establishment of desired conditions. If monitoring indicates the site is not trending towards desired conditions, the following adaptive management steps will be implemented:

1. The Authority or its designee will notify USACE and MDE of the issues, probable causes, and suggested solutions.
2. USACE and MDE will work with the Authority or its designee to agree upon and approve corrective measures and a timeframe for completion.
3. The Authority or its designee will implement the corrective measures within the agreed upon timeframe.
4. If the Performance Standards are not met, the Authority will work with the Agencies to adjust the monitoring period/time frame as appropriate.

Some potential issues that may require adaptive management have been identified by the Authority. Invasive species, in particular, common reed (*Phragmites australis*) is common in the tidal marshes in the watershed. Due to the connected nature of tidal systems, it is likely that common reed may invade the marsh site. Should common reed or other invasive species cause the site to fail the performance standards, chemical and physical control shall be used to control the invasive species.

Erosion can damage the mitigation site, particularly during vegetative establishment. Eroded areas resulting from extreme events may require repair/regrading and replanting, and unanticipated erosion resulting from storm events and/or normal wave and boat wake energy may require the addition or modification of sill structures to protect the marsh area.

XIII. SITE PROTECTION INSTRUMENT

Site protection instruments currently approved include: conservation easements, deed restrictions, restrictive covenants, or deeding the land to an organization or public agency. Acceptable methods of securing legal rights to undertake the mitigation project include recorded deeds, executed conservation easements, landowner agreements, or contracts of sale for the selected site. It is anticipated that the proposed mitigation site would be protected by a conservation easement that will ensure ongoing protection of the mitigation site. This would be the case whether the mitigation site is owned by the Authority or a private owner.

The site will not need a protection instrument if the site is owned by the State.

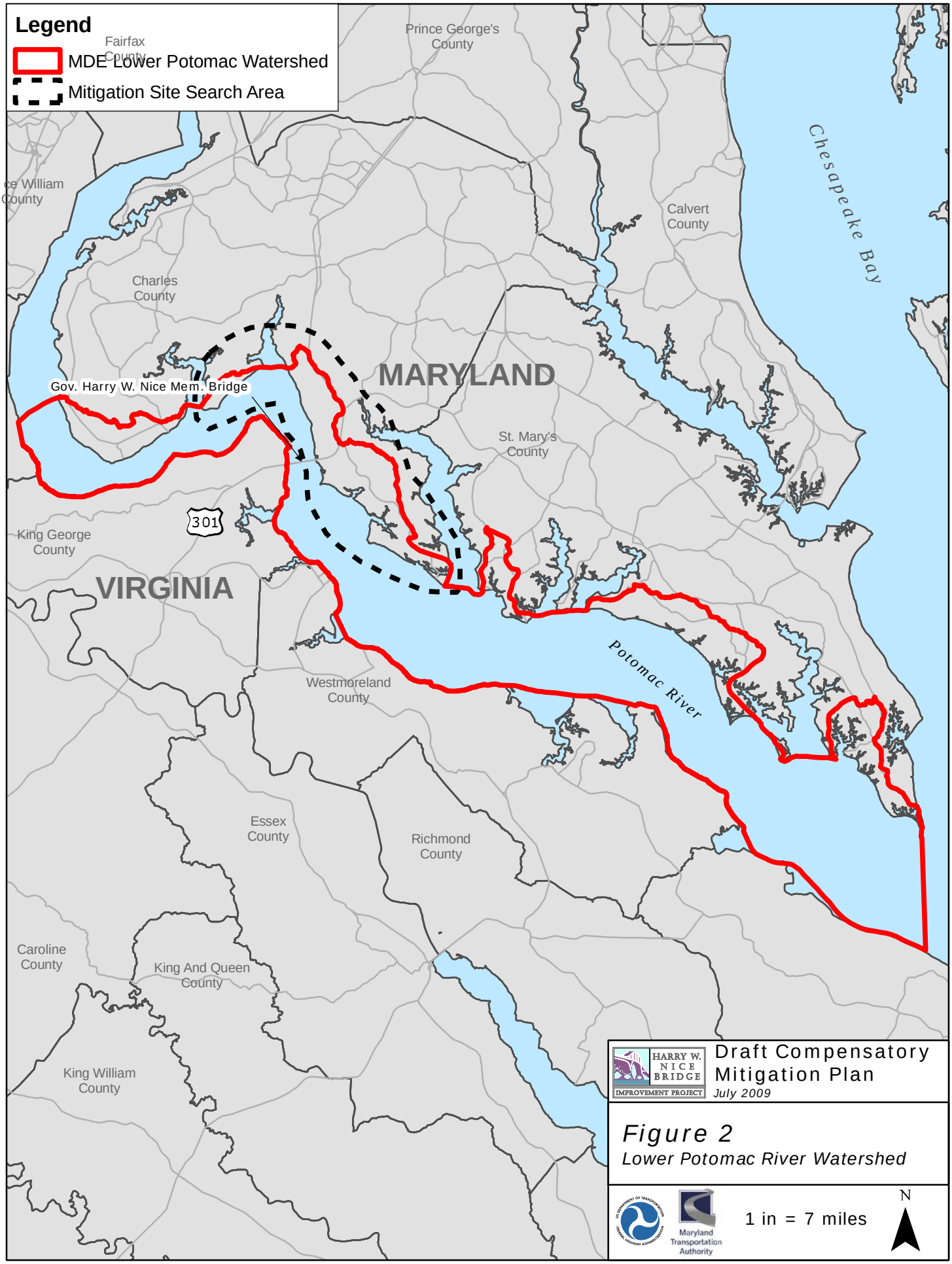
XIV. FINANCIAL ASSURANCES

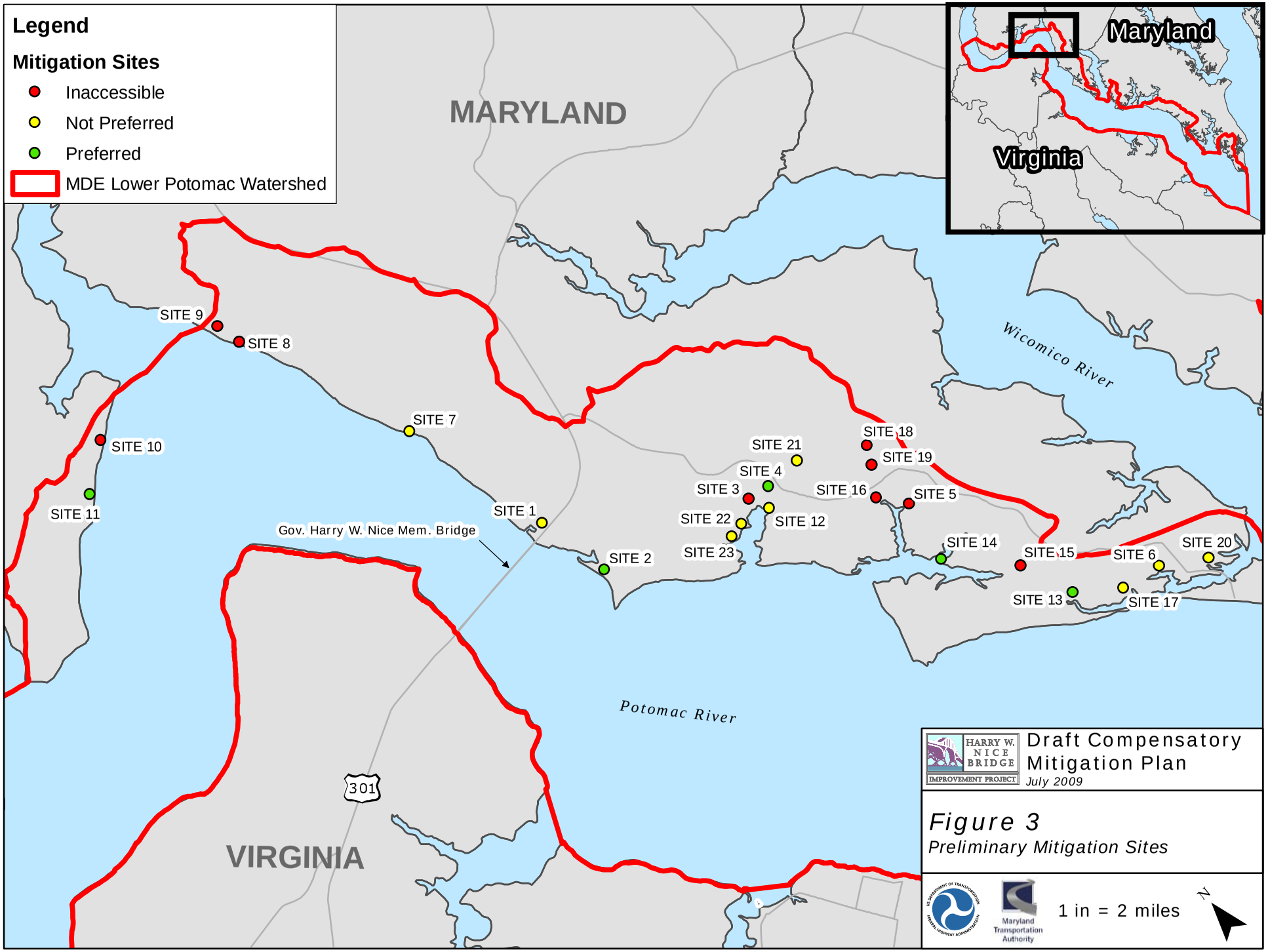
The Authority is an independent agency that is financially separate from the State's General Fund and the Transportation Trust Fund. Its projects and services are funded through tolls paid by customers, other user revenues, and the proceeds from toll revenue bonds issued by the Authority. Once design and construction funds are programmed, acquisition and construction of mitigation sites can begin, where possible.

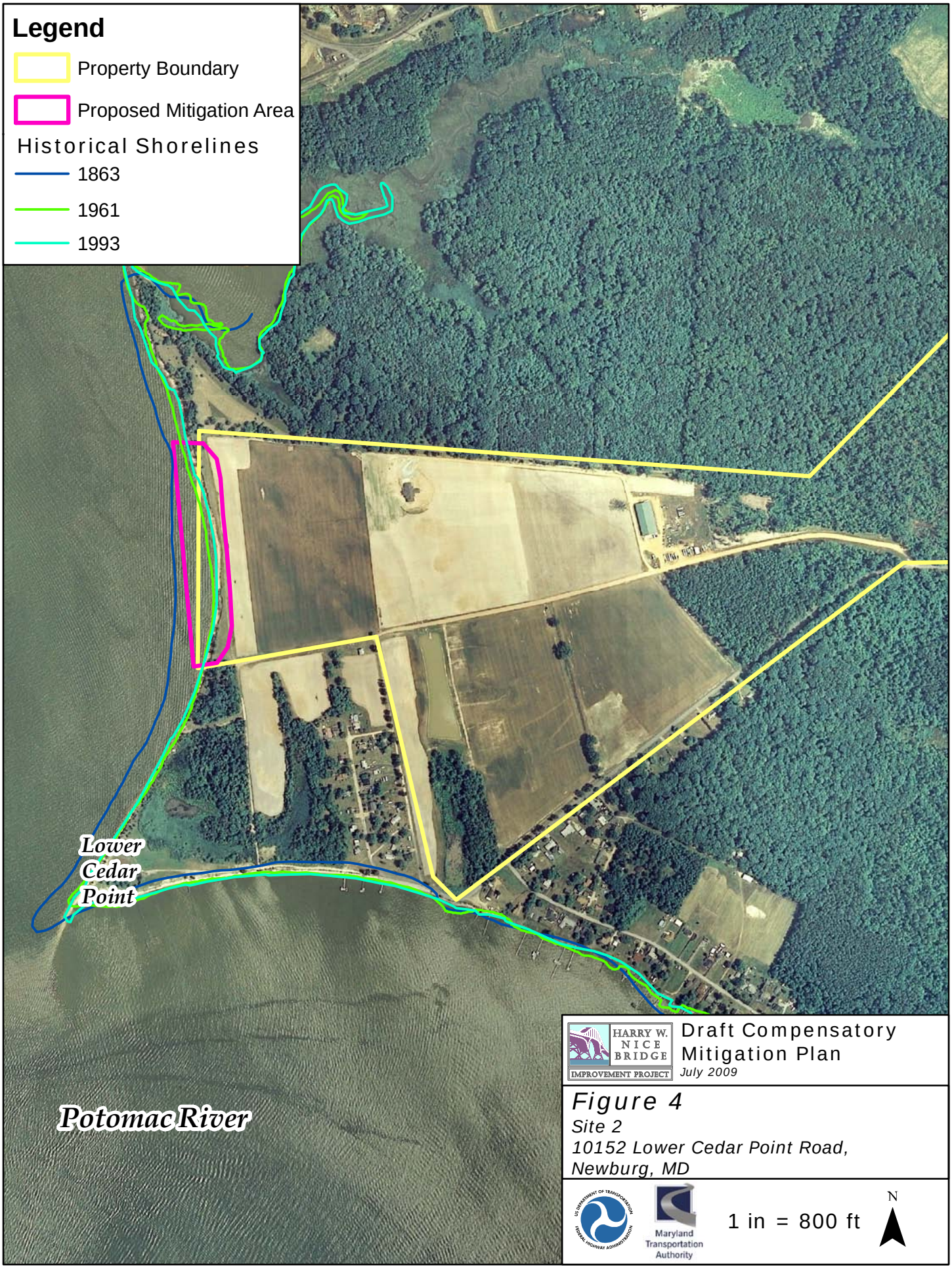
XV. LONG-TERM MANAGEMENT PLAN

The Authority is committed to assuring the long term success of mitigation for the Nice Bridge Improvement Project. It will review project mitigation to assure the project meets performance standards as part of its annual site monitoring activities. Both shoreline stabilization and marsh creation sites will be designed and constructed to be self-sustaining systems within the five-year monitoring period and as such, should not require any long-term management. If the project meets performance standards, then no future action is proposed.

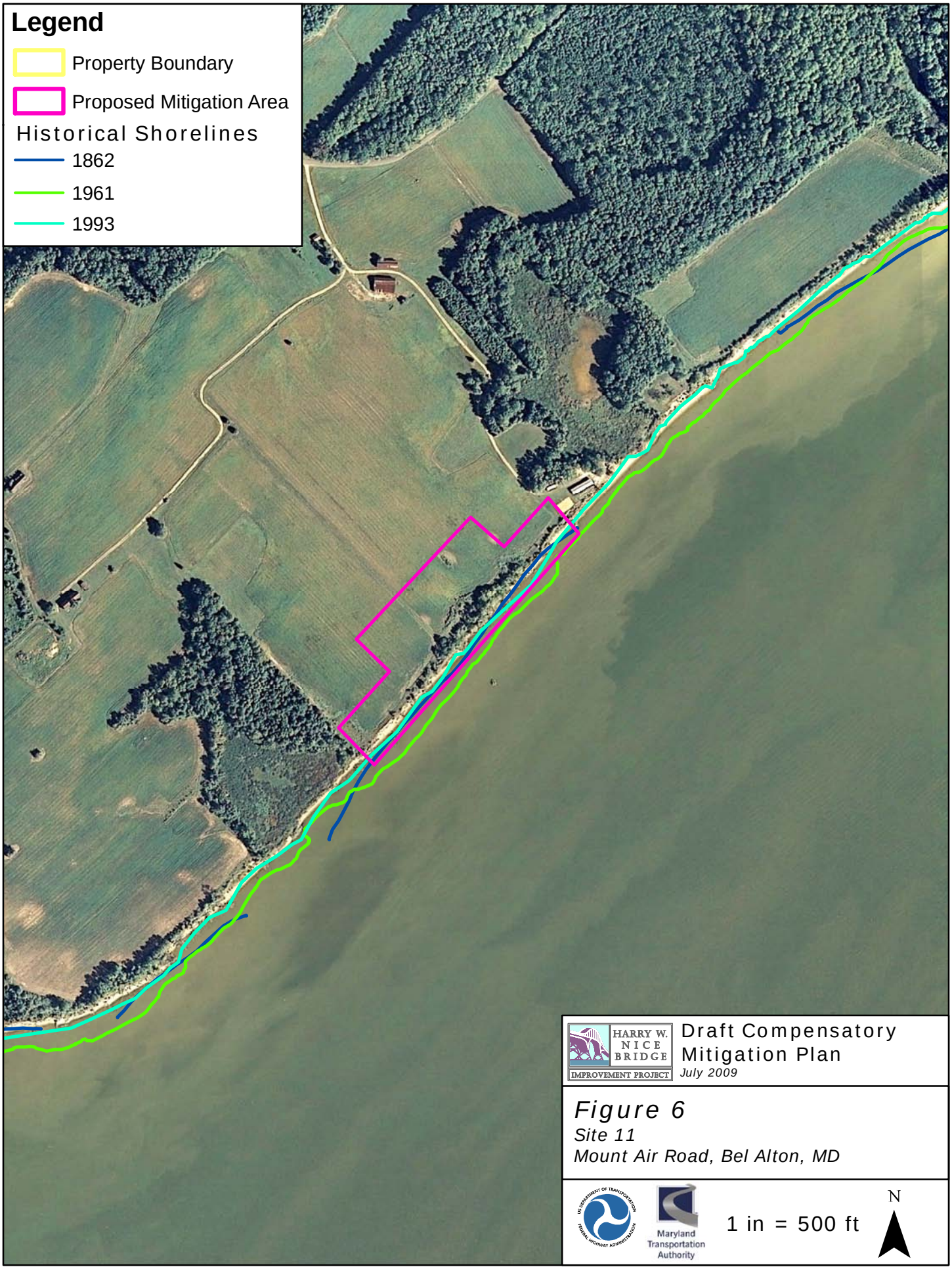

Legend
Nice Bridge Project Area
MARYLAND
POTOMAC
VIRGINIA
Cliffton Drive
Aqua-Land
Campground
and Marina
Gov. Harry W. Nice Memorial Bridge
301
Morgantown
Generating Plant
RIVER
Lower Cedar P
Naval Support
Facility Dahlgren
HARRY W. NICE BRIDGE
IMPROVEMENT PROJECT
Draft Compensatory
Mitigation Plan
July 2009
Figure 1
Nice Bridge Project Area
Maryland
Transportation
Authority
1 inch = 0.5 mile
N


Legend
MDE Lower Potomac Watershed
Mitigation Site Search Area
Fairfax County
Prince George's County
ce William County
Calvert County
Chesapeake Bay
Charles County
MARYLAND
Gov. Harry W. Nice Mem. Bridge
St. Mary's County
301
King George County
VIRGINIA
Potomac River
Westmoreland County
Essex County
Richmond County
Caroline County
King And Queen County
King William County
HARRY W. NICE BRIDGE
IMPROVEMENT PROJECT
Draft Compensatory Mitigation Plan
July 2009
Figure 2
Lower Potomac River Watershed
Maryland Transportation Authority
1 in = 7 miles
N


Legend
Mitigation Sites
Inaccessible
Not Preferred
Preferred
MDE Lower Potomac Watershed
MARYLAND
VIRGINIA
Maryland
Virginia
Wicomico River
Potomac River
Gov. Harry W. Nice Mem. Bridge
301
SITE 1
SITE 2
SITE 3
SITE 4
SITE 5
SITE 6
SITE 7
SITE 8
SITE 9
SITE 10
SITE 11
SITE 12
SITE 13
SITE 14
SITE 15
SITE 16
SITE 17
SITE 18
SITE 19
SITE 20
SITE 21
SITE 22
SITE 23
HARRY W. NICE BRIDGE IMPROVEMENT PROJECT
Draft Compensatory Mitigation Plan
July 2009
Figure 3
Preliminary Mitigation Sites
Maryland Transportation Authority
1 in = 2 miles
N


Legend
Property Boundary
Proposed Mitigation Area
Historical Shorelines
1863
1961
1993
Lower Cedar Point
Potomac River
HARRY W. NICE BRIDGE
IMPROVEMENT PROJECT
Draft Compensatory Mitigation Plan
July 2009
Figure 4
Site 2
10152 Lower Cedar Point Road, Newburg, MD
Maryland Transportation Authority
1 in = 800 ft
N


Legend
Property Boundary
Proposed Mitigation Area
HARRY W. NICE BRIDGE
IMPROVEMENT PROJECT
Draft Compensatory Mitigation Plan
July 2009
Figure 5
Site 4
Rock Point Road, Newburg, MD
Maryland Transportation Authority
1 in = 800 ft
N



HARRY W. NICE BRIDGE IMPROVEMENT PROJECT

Draft Compensatory Mitigation Plan

July 2009

Figure 6

Site 11

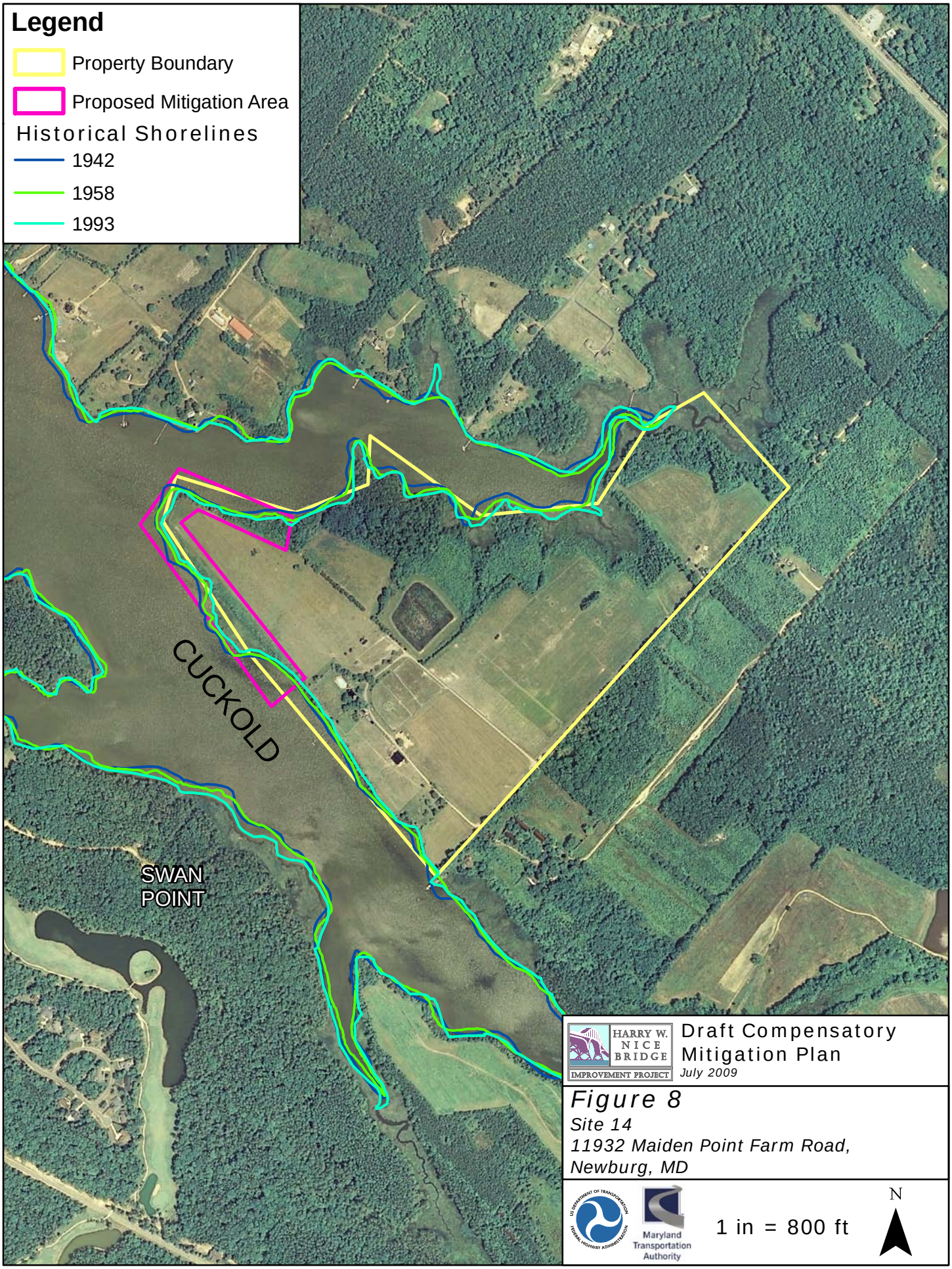
Mount Air Road, Bel Alton, MD

Maryland Transportation Authority

1 in = 500 ft

N


Legend
Property Boundary
Proposed Mitigation Area
HARRY W. NICE BRIDGE
IMPROVEMENT PROJECT
Draft Compensatory Mitigation Plan
July 2009
Figure 7
Site 13
16220 Wilson Road, Issue, MD
Maryland Transportation Authority
1 in = 800 ft
N


Legend
Property Boundary
Proposed Mitigation Area
Historical Shorelines
1942
1958
1993
CUCKOLD
SWAN POINT
HARRY W. NICE BRIDGE
IMPROVEMENT PROJECT
Draft Compensatory Mitigation Plan
July 2009
Figure 8
Site 14
11932 Maiden Point Farm Road, Newburg, MD
Maryland Transportation Authority
1 in = 800 ft
N

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
	Nice Bridge Improvement Project		R2UB3		3/25/2009		83	1

Name(s) of Evaluator(s)	Stream Name and Information
WMMS, ERB	VA-WUS-1

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		
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>	80%	20%					100%			
	Score >	1.5	0.5								
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	80%	20%					100%	Rt Bank CI >	1.30	CI
	Score >	1.5	0.5						Lt Bank CI >	1.30	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) >>	**0.65**
RCI= (Riparian CI)/2	
COMPENSATION REQUIREMENT (CR) >>	**54**
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

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
	Nice Bridge Improvement Project		R2UB4		3/25/2009		0	0

Name(s) of Evaluator(s)	Stream Name and Information
WMM, ERB	VA-WUS-2

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		
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>	80%	20%					100%			
	Score >	1.5	0.5								
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	80%	20%					100%	Rt Bank CI >	1.30	CI
	Score >	1.5	0.5						Lt Bank CI >	1.30	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) >>	**0.65**
RCI= (Riparian CI)/2	
COMPENSATION REQUIREMENT (CR) >>	**0**
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

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
	Nice Bridge Improvement Project		R2UB3		3/25/2009		0	0

Name(s) of Evaluator(s)	Stream Name and Information
WMM, ERB	VA-WUS-3

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		
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) >>	0
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

Stream Assessment Form (Form 1)

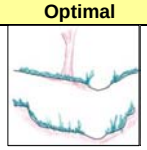
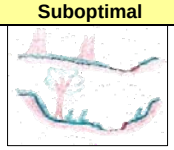
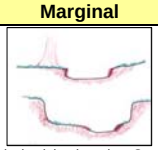
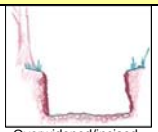
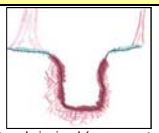
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Nice Bridge		R4UB2		3/25/2009		119	1

Name(s) of Evaluator(s)	Stream Name and Information
WMM, ERB	VA-WUS-4

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>>						

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		
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>	80%	20%					100%	
	Score >	1.2	0.5						
									CI= (Sum % RA * Scores*0.01)/2
Left Bank	% Riparian Area>	80%	20%					100%	Rt Bank CI > 1.06 — CI
	Score >	1.2	0.5						Lt Bank CI > 1.06 — 1.06

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>>
	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	0.70

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

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

NOTES>>

	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**	**1.10**

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) >>	**0.97**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**115**
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

Stream Assessment Form (Form 1)

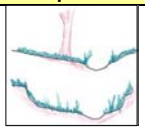
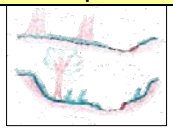
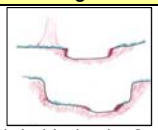
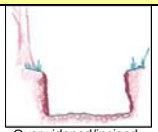
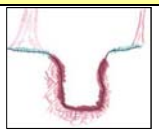
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Nice Bridge		R4UB2		3/25/2009		22	1

Name(s) of Evaluator(s)	Stream Name and Information
WMM, ERB	VA-WUS-6

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 bankfu	 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	 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%	 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	 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 p	CI
Score	3	2.4	2	1.6	1	2.0
NOTES>>						

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>>
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>	50%	50%					100%	
	Score >	0.6	0.5						
									CI= (Sum % RA * Scores*0.01)/2
Left Bank	% Riparian Area>	50%	50%					100%	Rt Bank CI > 0.55
	Score >	0.6	0.5						Lt Bank CI > 0.55

CI: 0.55

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	NOTES>>	
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
							500	1

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

NOTES>>

	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) >>	**0.71**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**15**
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

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
	Nice Bridge Improvement Project		R2UB3		3/25/2009		136	1

Name(s) of Evaluator(s)	Stream Name and Information
WMM, ERB	VA-WUS-7

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		
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 >	0.6									
									CI= (Sum % RA * Scores*0.01)/2		
Left Bank	% Riparian Area>	100%						100%	Rt Bank CI >	0.60	CI
	Score >	0.6							Lt Bank CI >	0.60	0.60

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) >>	**0.30**
RCI= (Riparian CI)/2	
COMPENSATION REQUIREMENT (CR) >>	**41**
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

Stream Assessment Form (Form 1)

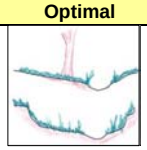
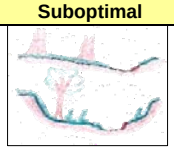
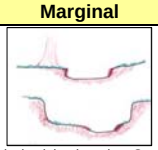
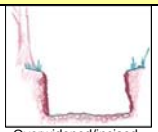
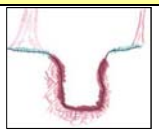
Unified Stream Methodology for use in Virginia

For use in wadeable channels classified as intermittent or perennial

Project #	Project Name	Locality	Cowardin Class.	HUC	Date	SAR #	Impact/SAR length	Impact Factor
	Nice Bridge		R4UB2		3/25/2009		0	0

Name(s) of Evaluator(s)	Stream Name and Information
WMM, ERB	VA-WUS-9

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 bankfu	 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	 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%	 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	 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 p	CI
Score	3	2.4	2	1.6	1	
NOTES>>	No impacts to this feature					

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

Stream Impact Assessment Form Page 2

Project #	Applicant	Locality	Cowardin Class.	HUC	Date	Data Point	SAR length	Impact Factor
							500	1

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

NOTES>>

	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**	

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) >>	**0.00**
RCI= (Sum of all CI's)/5	
COMPENSATION REQUIREMENT (CR) >>	**0**
CR = RCI X LF X IF	

INSERT PHOTOS:

DESCRIBE PROPOSED IMPACT:

Wetland Mitigation Site Evaluation Worksheet
Nice Bridge Improvement Project

Site Identification Number: _____ Mitigation Ranking Total: ##

Site information

Date: _____ Size of Parcel: _____

Property Owner: _____ Watershed: _____

Street Address: _____ Tax Map: _____

City: _____ Subwatershed: _____

State: _____ Parcel: _____

Zip: _____ Zoning: _____

County: _____ Drainage Acreage: _____

Potential Mitigation Acreage: _____

Site Description:

Cover Type/Land Use: _____

Soils

Soil Type	Abbreviation	~ % of Mitigation Area	Groundwater	Hydric

3 >= 50% Primary Hydric
2 >= 50% Secondary Hydric or > 50% Combined Primary/ Secondary Hydric
1 = Non Hydric

Ranking: _____

Estimated Excavation Depth:

3 = less than 3 feet
2 = 3 to 6 feet
1 = greater than 6 feet

Ranking: _____

Existing Slope:

3 = 2% or less
2 = 3 - 9%
1 = 10% or greater

Ranking: _____

Hydrology _____ Tidal _____ Non-Tidal

Hydrology: _____ Weather: _____

Source(s): Depth to Groundwater (feet): _____

Ground _____ Flood _____ Surface _____ Stream _____

Other: _____

Comments: _____

Distance to tidal source _____'
3 = Abutting to 10'
2 = 10' to 200'
1 = > 200'

Ranking: _____

Distance between you and tidal source _____'

Site Identification Number: 0 Mitigation Ranking Total: ###

Drainage Area/ Creation Area Ratio:

3 = Greater than 20:1
2 = 2:1 to 20:1
1 = less than 2:1 Ranking:

Water Quality Opportunity:

3 = Drainage area primarily commercial/high density residential
2 = Drainage area primarily agricultural/low density residential
1 = Drainage area primarly parkland/resource conservation Ranking:

Habitat Value of Site:

4 = Site contiguous to wetland/upland forest >100 acres
3 = Site contiguous to wetland/upland forest 25 - 100 acres
2 = Site contiguous to wetland/upland forest < 25 acres
1 = Site isolated from wetland/forest Ranking:

Constraints:

Surrounding Land Use: Access: Hazardous Waste:
upland fill, residential, commercial
Feasibility: Utilities:
3 = No Constraints
2 = Moderate constraints
1 = Significant constraints Ranking: #DIV/0!
Obstructions to hydraulic connections

Additional Information:

Functions and Values	Potential	Functions and Values	Potential
Groundwater recharge:		Wildlife diversity/abundances:	
Groundwater discharge:		Wildlife D/A breeding	
Floodflow alterations:		Wildlife D/A Migration:	
Sediment stabilization:		Wildlife D/A Wintering:	
Sediment/toxics retention:		Aquatic diversity/abundance:	
Nutrient removal/transformation:		Uniqueness/Heritage:	
Production export:		Recreation:	

Average overall functional replacement ranking: 1

Other:

Invasives

Beaver

Deer

Dirt Bike Trails