STATEMENT OF FINDINGS: WETLAND AND FLOODPLAINS

REPAIR AND STABILIZE THE YORK RIVER SHORELINE TO PROTECT
THE COLONIAL PARKWAY
PHASE 1 – FROM INDIAN FIELD CREEK TO
APPROXIMATELY 1,400 FEET EAST OF INDIAN FIELD CREEK
PROJECT COLO PMIS 145520

COLONIAL NATIONAL HISTORICAL PARK

YORK COUNTY, VIRGINIA

Recommended: _____ 12/21/12
Superintendent, Colonial National Historical Park Date

Concurred: _____ 12/21/12
ACTING Chief, Water Resources Division, Washington Office Date

Approved: Dennis R. Reidenbach 1/15/13
Northeast Regional Director Date

INTRODUCTION

Executive Order (EO) 11990, *Protection of Wetlands*, and EO 11988, *Floodplain Management*, require the National Park Service (NPS) and other federal agencies to evaluate likely impacts of actions in wetlands and floodplains, respectively. NPS *Director's Order 77-1: Wetland Protection*, (NPS 2002a) and *Procedural Manual 77-1* (NPS 2012c) provide NPS policies and procedures for complying with EO 11990. NPS *Director's Order 77-2: Floodplain Management* (NPS 2003) and the *Procedural Manual 77-2: Floodplain Management* (NPS 2002b) provide NPS policies and procedures for complying with EO 11988.

This statement of findings has been prepared to comply with EO 11990 and EO 11988. The *Repair and Stabilize the York River Shoreline to Protect the Colonial Parkway Environmental Assessment* (EA) for the Repair and Stabilize the York River to Protect the Colonial Parkway project includes a phased approach to completing the entire project (NPS 2012a). As described in the EA, future statements of findings will be prepared on a phase-by-phase basis as preliminary design plans are advanced to construction-ready documents. This statement of findings evaluates the impacts to floodplains and wetlands for phase I of the proposed project, which includes stabilizing the shoreline from Indian Field Creek to one thousand four hundred feet east of Indian Field Creek.

In a Finding of No Significant Impact (FONSI) (NPS 2012b), the NPS selected the alternative for repairing and installing shoreline stabilization along the York River to protect the Colonial Parkway.

SITE DESCRIPTION

Colonial National Historical Park (the park) is located in the southern tidewater region of the Commonwealth of Virginia, on the peninsula between the James and York Rivers (Figure 1). Measuring 10,221 acres in size, "it encompasses most of Jamestown Island, site of the first permanent English settlement in North America, and Yorktown, scene of the culminating battle of the American Revolution" (NPS 1993). The parkway links these two units of the park, providing a scenic 23-mile long drive and connectivity to other colonial sites, including Williamsburg. It is a resource listed in the National Register of Historic Places (National Register), in recognition of its association with the National Park Service's (NPS) legacy of designed parkways that were built for conservation and interpretive purposes, particularly with respect to historic resources.

Approximately 4.2 miles of the parkway lie in close proximity to the York River. While riverbank erosion has been a recognized issue for years and has been combated via the placement of structural defenses or "armor" along the shoreline, strong storms in late 2009 markedly increased shoreline recession. Though the NPS has performed "spot treatments" to address areas of particularly aggressive erosion, more comprehensive action is required in the near term to prevent further landward migration of the shoreline and subsequent undermining of the parkway at multiple locations.

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Figure 1. Project Location Map.

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The NPS owns and maintains the parkway surface, including a minimum 500-foot wide right-of-way outside the limits of the Jamestown and Yorktown units of the park. As such, the NPS is solely responsible for all maintenance of the roadway and of vegetation and other natural and cultural resources within this right-of-way. In accordance with the park's General Management Plan (GMP), the NPS must "maintain the [parkway] for safety while retaining the integrity of its design as a scenic roadway."

PURPOSE AND NEED FOR ACTION

The parkway is both a means of transportation and the primary means by which visitors to the park can interpret the landscape history of early colonial settlements and life between Jamestown and Yorktown. It offers a variety of viewsheds, pull-offs, and roadside markers for motorized and bicycle traffic. The purpose of the project is to protect the parkway from the imminent threat of shoreline erosion along the York River and associated landward migration of the shoreline, particularly in areas where it runs in close proximity to the parkway (e.g., Bellfield Straight, see Figures 2a and 2b). Action is needed at this time in order to mitigate and remediate the effects of historic and continuing storm damage to the parkway. Furthermore, the project would reduce the risk of erosion along areas of the shoreline that are not adjacent to the parkway but where recession is nevertheless occurring and where cultural resources have been identified. Action would be taken in these areas to ensure the integrity of the resources.

The project also acknowledges Secretary of the Interior Order No. 3289, Amendment No. 1, Section 3a (DOI 2010), which requires that each bureau and office of the Department of the Interior consider and analyze potential climate change impacts when undertaking long-range planning exercises and making major decisions regarding the use of Department resources. The planning of the shoreline stabilization project would consider rates of sea-level rise and make sure the resulting design is adaptable to future conditions.

Lastly, the shoreline stabilization project would provide opportunities (where appropriate) to enhance or restore tidal wetland features as part of the overall shoreline management strategy. This is consistent with Executive Order 11990, which in part directs the federal agencies ". . .to preserve and enhance the natural and beneficial values of wetlands . . . " and to ". . . strive to achieve a longer-term goal of net gain of wetlands Servicewide."

DESIGN ALTERNATIVES CONSIDERED

A No-action alternative (Alternative 1) and two action alternatives (Alternatives 2 and 3), including the NPS Preferred Alternative (Alternative 2), were considered in the EA (NPS 2012a).

Under the No-action Alternative, no comprehensive or planned and designed shoreline improvements would be carried out. Reparations to existing shoreline defenses would be carried out as needed in response to an observed and imminent threat to the parkway caused by continued landward migration of the shoreline, storm-related or otherwise.

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Figure 2a. Study Area Map: Reaches IA, I, and II. (Orthophotograph)

Figure 2b. Study Area Map: Reaches III and IV. (Orthophotograph)

Other maintenance activities would include occasional removal of excess vegetation from riverbank slopes (particularly along Bellfield Straight), where such vegetation may pose a threat to bank stability and/or block the viewshed of the York River.

The No-action Alternative was not chosen as the selected alternative because the alternative does not meet the purpose and need. The existing structures along the York River shoreline, are deficient in their capacity to defend upland resources against shoreline erosion and would remain in their current configuration.

Due to the considerable length of York River shoreline within the park, the EA study area was divided into five individual segments, or "Reaches" (Figures 2a and 2b). Shoreline stabilization techniques for Alternatives 2 and 3 were developed as a result of a shoreline management plan completed by the Virginia Institute of Marine Sciences (VIMS 2006). Although Alternative 3 does meet the purpose and need of the project, it was not chosen as the selected alternative because the substantial use of sheet piling would limit the degree of habitat restoration relative to Alternative 2 and wetland impacts would be higher than for Alternative 2. Under Alternative 3, the shoreline treatment, means of access, and necessary equipment would be identical to Alternative 2 for Reach IA, with a continuous wooden sill being used instead of a rock sill. The large pocket beach shown in a central location of Reach IA in Alternative 2 would not be created. For Reach I, the only difference between Alternatives 2 and 3 is the use of steel sheet piling as opposed to revetment rehabilitation. The specifications of the haul road and required heavy equipment would remain the same, with the addition of a pile driver. The footprint of the pile driver may require a wider haul road and turn out width than that described for Alternative 2. This additional width would likely be made up by extending the road in a seaward direction (fill) as opposed to additional bank cut back. However, because stone material from the revetment may lie in close proximity to the toe of the slope (i.e., the ideal position for sheet pile installation), more extensive bank cut back may be required in order to expose a substrate that is relatively void of large stone material and thus amenable to pile driving.

The proposed treatments for Reach II in Alternative 3 vary somewhat from Alternative 2. The most pronounced difference is the use of revetment along the back beach at Sub-Reach "f" as opposed to the rehabilitation of the NPS breakwaters. Under Alternative 3 for Reach III, Sub-Reach "a" would be treated in similar fashion to the area landward of the NPS breakwaters; with a rock revetment installed at the back beach. Steel sheet piling would be employed along the base of the York River Cliffs at Sub-Reach "c," as opposed to revetment rehabilitation under Alternative 2. The approach carried out for Reach IV would be identical to Alternative 2 (i.e., revetment rehabilitation).

PROPOSED ACTION

The proposed action is described in its entirety in *Chapter 2: Alternatives* under Shoreline Treatment Alternative 2, the NPS Preferred Alternative in the EA (NPS 2012a).

As noted above, the study area for the EA was divided into reaches. Several shoreline treatment options will be implemented for the overall project within these reaches. Pictures of each of the shoreline treatments are provided below:

Revetments are shoreline armoring systems that protect the base of eroding upland. They are by far the most common means of shoreline defense currently in use within the study area. Revetments are typically placed atop a graded slope. This slope may be achieved by excavating eroding banks in a landward direction (commonly referred to as bank "layback") or via the placement of fill materials in a seaward direction or by a combination of both cut and fill. The dimensions of the revetment are dependent on existing bank conditions and design parameters such as storm surge and wave height. These parameters also determine the size of the stone required for long-term structural integrity. Generally, two interlocking faces of armor stone are laid over a bedding stone layer with filter cloth between the earth subgrade and the bedding layer.

Sheet piling consists of interlocking sheets of steel that are driven into the earth using heavy equipment such as a pile driver or vibrating hammer. The resulting continuous wall is typically corrugated in cross-section. For the purposes of this project, the sheet piling will be of a cantilevered design as opposed to anchored into the bank using tiebacks. In cantilevered design, sheet piling is driven a sufficient depth into the ground to become fixed as a vertical cantilever in resisting the lateral active earth pressure (USS 1984).

Sills and breakwaters are free-standing structures designed to reduce wave action by energy attenuation (such as by surface friction or by the wave breaking), refraction (changing the wave direction as it moves into shallower water), and diffraction (waves "bending" around the sill or breakwater). A sill has a lower crest, is closer to the shore and usually is more continuous than larger breakwater units which the sills can be used in combination with. Sills are installed with beach fill behind (landward) to create a substrate for establishing a vegetated marsh fringe. They can be constructed of either stone or wood. Both sills and breakwaters may have spurs attached to them. Spurs typically project seaward away from the shoreline to move the point of wave diffraction farther offshore. Spurs or purposeful gaps created in otherwise continuous sills (gapped sill) allow for the creation of relatively small "pocket beaches," which offer habitat diversity along long stretches of artificially protected shoreline. These approaches are commonly referred to as "living shorelines," as they can provide habitat for marine plants and animals, improved water quality, and reduced sedimentation (Hardaway and Duhring 2010).

Headland control controls existing points of land (i.e., headlands) or strategically creates new points of land with stone breakwaters. The means of headland control employed for the overall project is referred to as shore-attached or headland breakwaters. Headland breakwaters usually require beach fill in order to acquire long-term shoreline erosion control since they are constructed in areas that are subject to more energetic wind and wave conditions. The beach fill between the stone breakwater and the original shoreline is called a tombolo. The dimensions of the breakwater system and their positioning relative to the shoreline are dependent on the desired degree of protection, nearshore bathymetry, and potential impacts to littoral sediment transport (i.e. potential for the headland breakwaters to trap sediment that would otherwise be delivered downstream).

Photograph 1. Example of stone revetment installed as a shoreline defense structure. (Source: Vanasse Hangen Brustlin, Inc. (VHB))

Photograph 2. Example of steel sheet piling installed as shoreline defensive structure. (Source: Atlantic Civil Products)

Photograph 3. Example of continuous sill with vegetated area between the structure and the upland. (Source: VIMS)

Photograph 4. View of shore-attached breakwaters at the Yorktown waterfront, an example of headland control structures. NWS-Yorktown is visible at the top of the frame. (Source: VHB)

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The shoreline treatment around Indian Field Creek for the study area evaluated in this statement of findings is included in Reach I. As described in Chapter 2 of the EA, the rehabilitated revetment associated with the study area will consist of three components: armor stone, splash apron, and bluff stone.

Revetment efforts will include a barge port. See Figures 3a and 3b. Material staging will be required in the grassy areas near the barge port (i.e., area around the mouth of Indian Field Creek between the parkway and the York River). The rock materials that comprise the current revetment will be reused as part of both the construction process and as the foundations for the new armor stone. The typical section is shown in Figure 4.

WETLANDS IN THE STUDY AREA

Wetland delineation fieldwork was conducted on March 31 and April 1-16, 2010, using the technical criteria and procedures outlined in the Interim Regional Supplement to the U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (USACE 2008). The delineation was performed by Douglas A. DeBerry, Ph.D, PWS, PWD (Virginia) with Vanasse Hangen Brustlin, Inc (VHB). In addition to the Regional Supplement (USACE 2008), the wetland delineation and classification efforts were kept consistent with the National Park Service Procedural Manual 77-1: Wetland Protection (NPS 2012c), including the use of a wetland classification scheme based on Cowardin et al. (1979). Figures 5a and 5b show the wetlands delineated in this reach during the 2010 wetland delineation. A complete report of the wetland delineation methods and findings, including photographs and data sheets is available under separate cover (NPS 2011).

Indian Field Creek – Phase I Project Area

The shorelines on both sides of the inlet at Indian Field Creek have been hardened by a rip-rap revetment. No vegetated wetlands were found on either side of the mouth, or along the abutting segments of the York River shoreline during the 2010 wetland delineation.

However, during an October 23, 2012, meeting with the York County Planning Commission, it was determined that the county jurisdictional boundary was behind the existing revetment. Low spots containing patches of wetland plant species, such as saltmeadow cordgrass (*Spartina patens*), marsh orach (*Atriplex patula*), groundsel bush (*Baccharis halimnifolia*), and sea ox-eye (*Borrichia frutescens*) were found within the project area during the site visit. Since the wetland delineation was done in 2010, patches of estuarine intertidal emergent persistent irregularly flooded wetland have developed where there was enough overwash to settle the soil and have water come through behind the revetment (NPS 2012d). See Figure 5b for exact locations of the wetland patches. These patches would be considered estuarine emergent irregularly flooded wetland.

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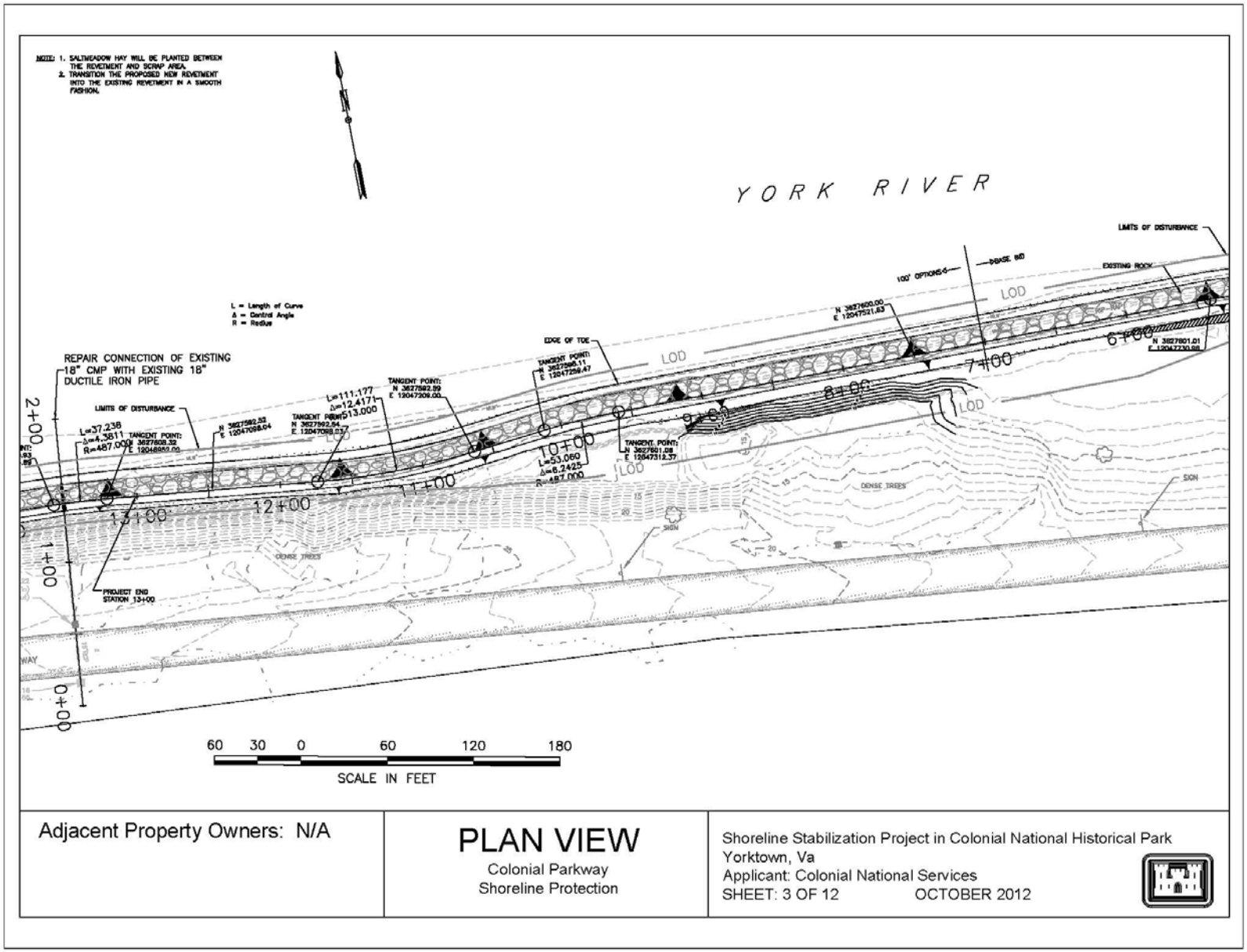
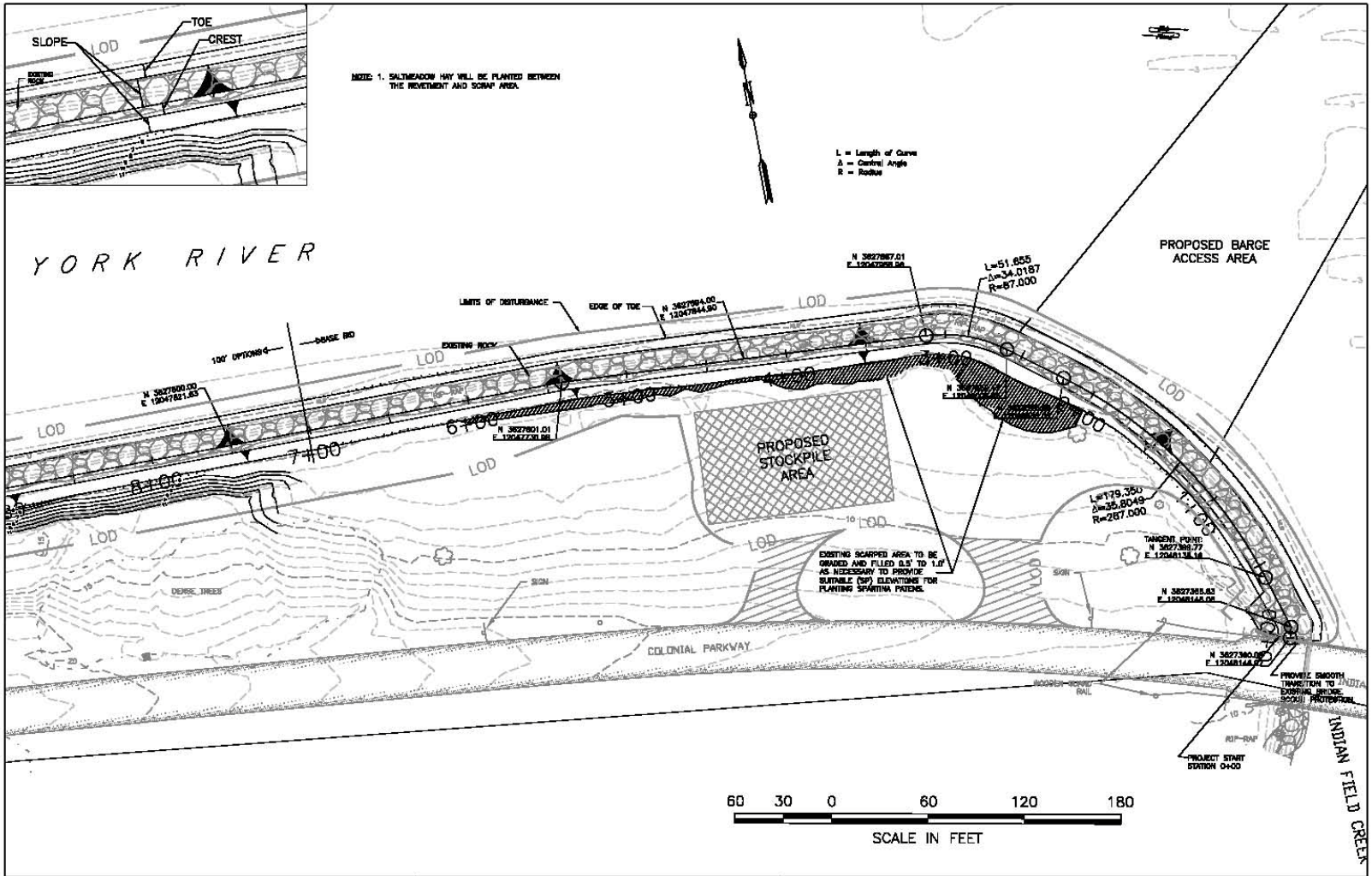


Figure 3a. Revetment Plan.



Adjacent Property Owners: N/A	PLAN VIEW Colonial Parkway Shoreline Protection	Shoreline Stabilization Project in Colonial National Historical Park Yorktown, Va Applicant: Colonial National Services SHEET: 2 OF 12 OCTOBER 2012

Figure 3b. Revetment Plan.

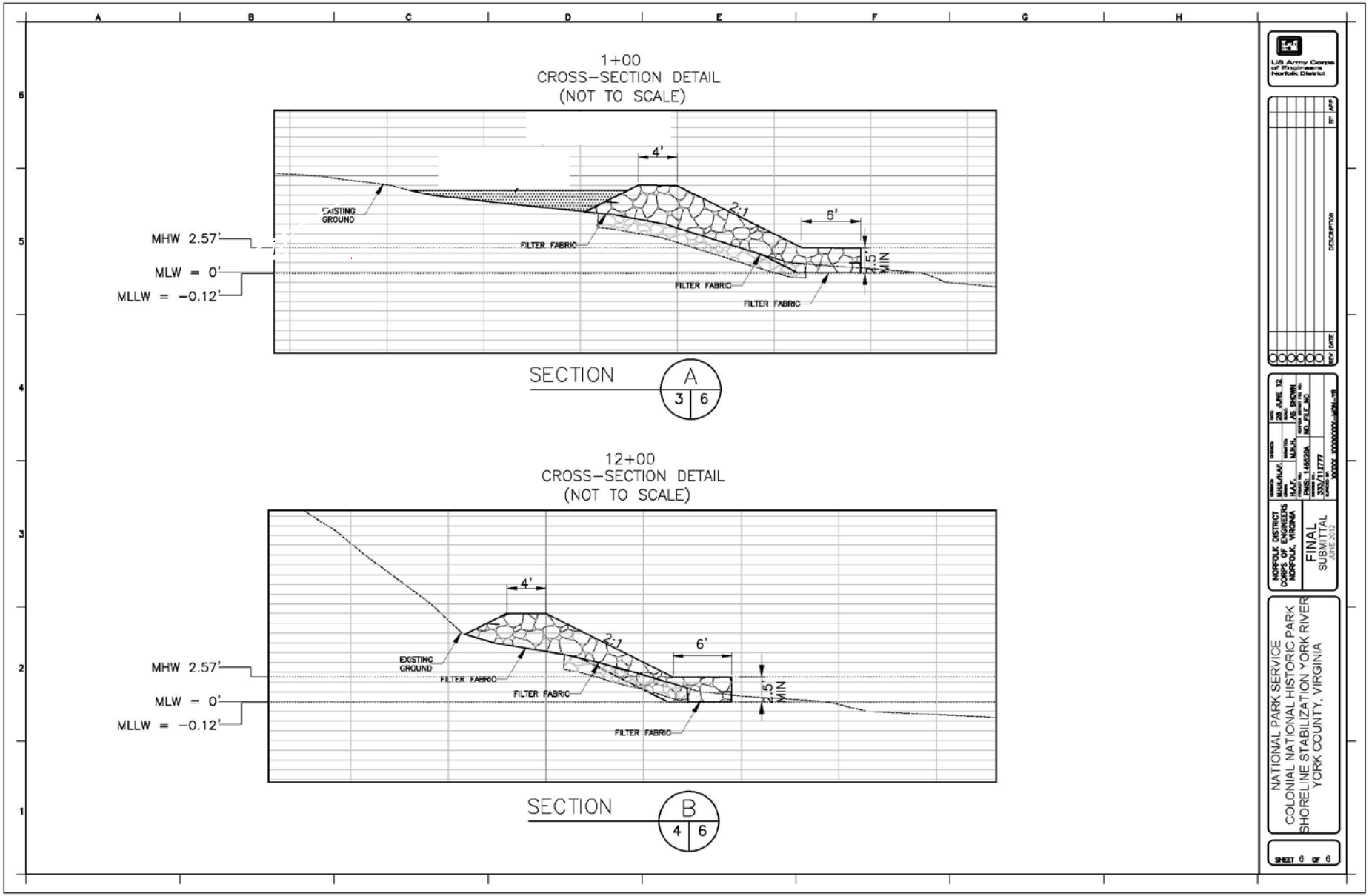


Figure 4. Revetment typical sections.

Figure 5a. 2010 Wetland Delineation of this location (NPS).

Figure 5b. 2010 Wetland Delineation of this location (NPS).

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According to the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979),

> "The estuarine system consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open ocean by evaporation. Along some low-energy coastlines there is appreciable dilution of sea water. Offshore areas with typical estuarine plants and animals, such as red mangroves (*Rhizophora mangle*) and eastern oysters (*Crassostrea virginica*), are also included in the estuarine system."

The estuarine system extends (1) upstream and landward to where ocean-derived salts measure less than 0.5 parts per thousand during the period of average annual low flow; (2) to an imaginary line closing the mouth of a river, bay, or sound; and (3) to the seaward limit of wetland emergents, shrubs, or trees where they are not included in (2). The estuarine system also includes offshore areas of continuously diluted sea water (Cowardin et al. 1979).

The substrate in an intertidal wetland is exposed and flooded by tides and includes the associated splash zone (Cowardin et al. 1979). The classes of estuarine are broken down further by distinguishing features as shown in Figure 6.

WETLAND FUNCTIONS AND VALUES

The evaluation of wetland functions and values is an integral part of project review, impacts analysis, and compensatory mitigation planning. The USACE and the EPA have long held the policy that assessment of impacts and the determination of mitigation to achieve a no-net loss of wetlands should be based on the functions and values of the impacted wetlands (Dahl 2006). The Virginia Department of Environmental Quality (DEQ), by rule, also requires that the functions and values of wetlands be evaluated as part of the permit review process.

In order to make unbiased comparisons of functions and values, wetland scientists have developed assessment methodologies using a wide variety of techniques. One such technique is the Highway Methodology (USACE 1995), which assesses 13 functions and values through a "descriptive approach" using both wetland science and judgment in the field. The 13 functions and values include: Groundwater Recharge/Discharge; Floodflow Alteration/Attenuation; 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; and Endangered Species Habitat. If the evaluator judges a particular function to be present, justification for identifying that function is documented by descriptive characteristics. This method was applied to the wetland areas within the EA study corridor to evaluate relative functions and values. The project area upstream of Indian Field Creek was not considered to be a wetland area, so the Highway Methodology was not used to evaluate the principal functions and values in the wetland delineation report at that time (NPS 2011).

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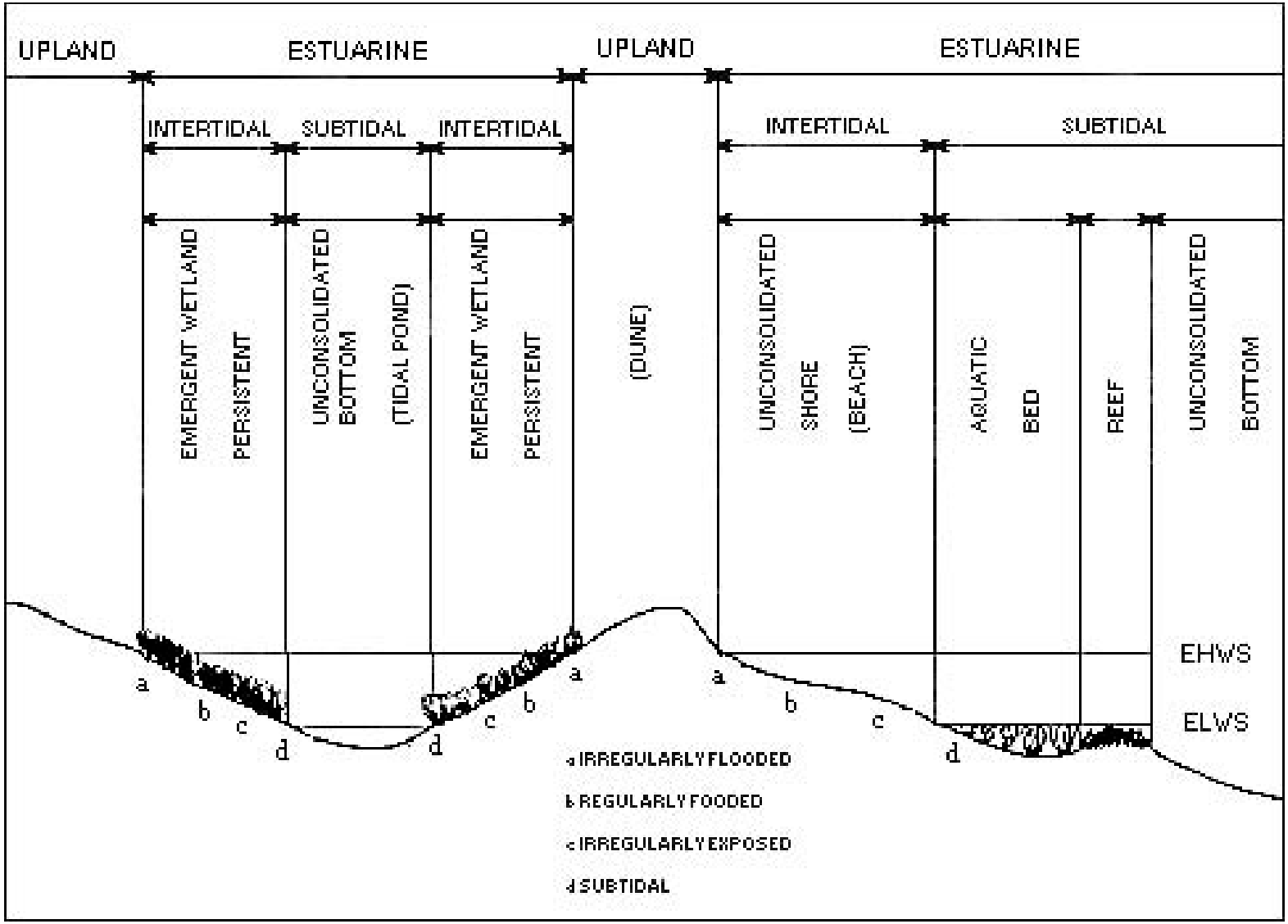

Figure 6. Distinguishing features and examples of habitats in the estuarine system. EHWS = extreme high water of spring tides; ELWS = extreme low water of spring tides (Cowardin et al. 1979).

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Indian Field Creek – Phase I Project Area

The following is a qualitative analysis of the wetland functions and values of the project area based on anecdotal information from the Lead Scientist on the wetland delineation, Doug DeBerry, and Senior Environmental Scientist, Brad Ketterling, author of the EA, who are both employed by VHB and are very familiar with the project area. Using the Highway Methodology to evaluate the project site based on previous experience with the area, the patches of wetland vegetation and the existing revetment would have minimal to no value regarding groundwater recharge/discharge, sediment/toxicant retention, nutrient removal, recreation, educational/scientific value, uniqueness and heritage, visual quality/aesthetics, and endangered species habitat.

As stated above, the shorelines on both sides of the inlet at Indian Field Creek have been hardened by rip-rap revetment. Though the project area contains existing shoreline defense structures, the extent and elevation of these structures are insufficient to provide substantial protection against erosion. The substrate supporting the revetment and the area between the revetment and the road mainly consists of hydraulic fill. During storm events sand is eroded from the back beach. The substrate is constantly being re-worked by wave action, making it difficult for vegetation to become established. No vegetated wetlands were within the Phase I project area during the 2010 wetland delineation (Figures 5a and 5b). As stated above, low spots at points behind the existing revetment in the proposed project area (outlined in red on Figure 5b) have developed patches of wetland species, such as saltmeadow cordgrass, marsh orach, groundsel bush, and sea ox-eye since the 2010 wetland delineation.

The patches of wetland vegetation would provide minimal forage and cover for terrestrial wildlife. A 2006 study looking at landscape-level impacts of shoreline development on Chesapeake Bay benthos and their predators, which included sampling sites in the York River, found that infaunal species density and diversity were significantly higher near natural marsh and riprap habitats than near bulkhead habitats, though near riprap, diversity and density were intermediate and not significantly different than natural marsh habitats. Riprap also had the largest individuals of several species, including mummichog (*Fundulus heteroclitus*) , mud crab (*Panopeus herbstii*), grass shrimp (*Palaemonetes pugio*), and green sunfish (*Lepomis cyanellus*), monitored during the study. It was speculated that riprap may play a refuge role for mating individuals (Davis, et al. 2006). The existing revetment may provide habitat for some fish species and may provide minimal production export or food chain support.

FLOODPLAINS IN THE STUDY AREA

According to the most recent data published by the Federal Emergency Management Agency (FEMA) for the study area (June 2009), the entire York River shoreline lies within a Special Flood Hazard Area (Zone AE) that is subject to inundation by the 100-year flood. A base flood elevation of 7.3 ft National Geodetic Vertical Datum (NGVD) (8.0 ft MLW) extends from the upstream point at Reach IA through both Reaches I and II and to the midpoint of Reach III at Ballard Creek. Flood zone mapping for the Phase I project area is provided on Figure 7.

Two portions of the EA study area are subject to inundation by 500-year flooding and are classified by FEMA as "Other Flood Areas." Such areas include the estuarine emergent and scrub-shrub wetlands at Poley Point in Reach I (Wetlands 4, 5, and 6, NPS 2011) and estuarine emergent, scrub-shrub, and forested wetlands at Sandy Point in Reach II (Wetlands 10, 11, and 12, NPS 2011). With the exception of shoreline defense structures and stormwater outfalls, no park infrastructure is located in designated floodplains.

The flood zone of the York River in the EA study area is different from a floodplain. Floodplains are lands adjacent to freshwater streams and rivers that are inundated by rising stage in response to a higher than normal influx of upstream water supply (e.g., storm events, excessive snowpack, etc.). Floodplains are important resources as they can store floodwaters and attenuate downstream flooding and mitigate flood-related impacts. Flood zones, on the other hand, are areas subject to the risk of flooding and flood damage regardless of location or type of flooding. Flood zones include broad bottomland floodplains adjacent to non-tidal streams as well as low-lying coastal areas subject to tidal storm surges. Flood zones affected by tidal storm surges are locations where water is actually pushed up from normal sea level to an elevation much higher than the mean high tide due to extremely high winds. The York River in the EA study area has an average water level that approximates sea level. Because sea level is viewed as having an infinite storage capacity, the study area is not subject to flooding caused by upstream sources. For this reason, none of the proposed alternatives will truly affect floodplain values.

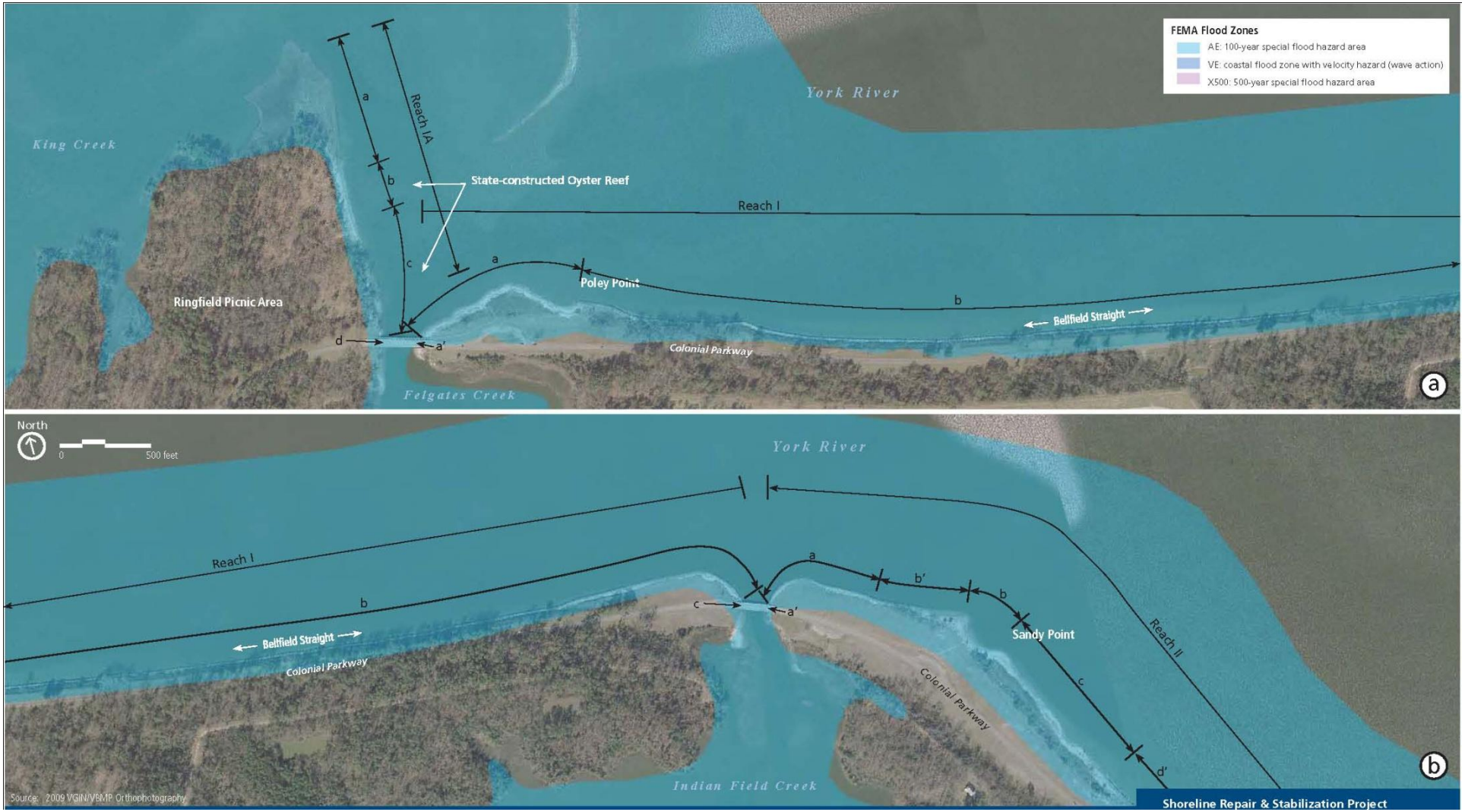

Figure 7. FEMA Flood Hazard Area Mapping – Reach I.

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JUSTIFICATION FOR USE OF WETLANDS AND FLOODPLAINS

A majority of the proposed action will occur in previously disturbed areas due to existing revetments and the study area's proximity to the parkway.

As described in the EA, pursuing the No-action Alternative would leave the parkway vulnerable to damage by shoreline recession. Portions of the parkway, especially along Bellfield Straight in Reach I, adjacent to the proposed project area, are especially at risk because of riverbank slumping and the formation of gully erosion in close proximity to the road surface.

WETLANDS

Due to the nature of the proposed action and its proximity to the York River, associated efforts will necessarily result in minor impacts to the abutting wetlands in this area. Specifically, the proposed action has been designed to protect the parkway from imminent threat of shoreline erosion along the York River and associated landward migration of the shoreline. The shoreline stabilization project will provide an opportunity to enhance or restore tidal wetland features as part of the overall shoreline management strategy.

Permanent impacts to wetlands occur where proposed structures intersect mapped wetlands. Impacts associated with the application of sandy fill behind structures and the associated burial of wetland features are deemed to be temporary, as these areas will be revegetated with native wetland species consistent with the current vegetative assemblage. In addition, it is anticipated that in many instances, sandy fill will be "feathered" into existing marsh fragments, resulting in a relatively thin veneer of sand through which the existing vegetation can emerge and persist. Permanent impacts to estuarine, intertidal emergent persistent irregularly flooded wetland from the proposed project total 0.089 acres.

FLOODPLAINS

The study area lies within the 100-year flood hazard zone of the York River. This project has been undertaken to repair the existing means of shoreline defense along a portion of the York River. Therefore, there is no practicable alternative site within which to conduct the proposed action. Repair and stabilization of the shoreline is needed to cease ongoing erosion and halt the landward migration of the shoreline. Measures will be taken to minimize harm to life, property, and natural resources. No occupancy of floodplain areas will be encouraged by the implementation of the project. The project will be designed to minimize the impact on previously undisturbed areas. Roughly 0.089 acres will be subject to the placement of shoreline treatment structure. The volume of material constituting rehabilitated revetment is estimated to be 1,250 cubic yards. Neither the area or volume calculation account for the placement of sandy fill material behind these structures for the establishment of a marsh fringe. These values are subject to revision based on detailed project design plans.

INVESTIGATION OF ALTERNATIVES

In addition to the proposed action, two action alternatives and a no action alternative were considered. A full description of these alternatives is included in Chapter 2 of the EA.

AVOIDANCE AND MINIMIZATION

WETLANDS

Avoidance and minimization measures were applied throughout the conceptual design to preserve and enhance wetland environments along the shoreline and limit impacts to sensitive wetland resources. In particular, existing structures will be rehabilitated to the greatest extent possible.

FLOODPLAINS

The design for the proposed action includes avoidance and minimization measures to reduce impacts to the 100-year floodplain, which encompasses the proposed project area. The design was developed specifically for the unique hydrodynamic setting associated with the project area and considers past approaches to floodplain avoidance and minimization. As described in the wetlands discussion, an existing structure will be rehabilitated to the greatest extent possible, and the design for revetment rehabilitation includes elements that limit disturbance to previously undisturbed lands within the floodplain (such as building atop existing revetments). No new structures such as dwellings, or other human-centric facilities, will be constructed within the floodplain. Such an approach will limit disturbance to the floodplain as well as the use of natural resources.

The overall project is using several shoreline treatment options, which have been described above. Through the implementation of living shoreline approaches, the overall project will include wetland enhancement and creation opportunities that will encourage flood attenuation and shoreline protection using a natural systems approach. In the project area for this phase roughly 1,400 linear feet of rip-rap revetment will be improved. In addition, the study corridor is in close proximity to the mouth of the York River, where the river empties into the Atlantic Ocean. Since the ocean is considered to provide infinite storage for floodwaters, it is unlikely that the proposed action will result in impacts to the existing flood zone. Furthermore, the acreage consumed by the proposed action will comprise only a small portion of the overall river and its floodplain. Therefore, any impacts within the study corridor will be considered negligible.

MITIGATION

WETLAND MITIGATION

An area ranging from one- foot wide to approximately eight-foot wide behind the new revetment between stations 3+00 and 9+00 will be graded to approximately the same grade as existing (Figures 3a, 3b, and 4). See Figure 5b. This area will be planted with *Spartina patens*. Other plants are expected to establish themselves from seed sources upstream. Permits authorized for similar projects by the U.S. Army Corps of Engineers(USACE), the Virginia Marine Resources Commission and local wetlands boards have included conditions that require a post-construction vegetation monitoring plan, photodocumentation of the restored areas, and a requirement for annual reporting of results and the needs for remedial actions (if necessary). Based on the project specifications and past precedent, the following compensation plan is provided in accordance with Section 5.3.5.9 of D.O. 77-1:

Location of the Compensation Site

The compensation site will be located behind the revetment. See Figure 3b. The area will be compensation for permanent and temporary wetland impacts to the project site.

Wetland Types and Wetland Functions to be Restored

As discussed in the preceding section, temporary and permanent wetland impacts that will occur as a result of this project are estuarine emergent wetlands (0.089 acre). The planting of the sandy intertidal substrate installed landward of these treatments will result in the creation of 0.089 acre of the same wetland type, providing identical functions and values (primarily wildlife habitat) and enhancing notably the sediment / shoreline stabilization functions. The ratio of proposed compensation to proposed impact is 1:1.

Restoration Process

As described above, the area ranging from one foot wide to approximately eight-foot wide behind the new revetment between stations 3+00 and 9+00 will be graded to approximately the same grade as existing. This area will be planted with *Spartina patens*. Other plants are expected to establish themselves from seed sources upstream. Planting will be accomplished as soon as possible after the establishment of final grade but only within the periods February 01 to July 30, or September 01 to November 30.

Schedule for Project Completion

The shoreline repair and stabilization project will be constructed as part of a single effort. Those elements of the project involving permanent wetland impacts will also include sufficient wetland creation following construction as compensation. However, depending on the time of the construction, planting of *Spartina patens* may have to be delayed somewhat until the next planting window.

Timeframe to Fully Functioning Wetlands

It is anticipated that it will take two growing seasons to achieve fully functioning estuarine emergent wetlands.

Monitoring and Maintenance of Compensation Areas

The compensation areas will be evaluated at the end of the next growing season following plant installation and for one additional year thereafter. Monitoring will be carried out between June and September of each monitoring period. At a minimum, the annual monitoring report will:

- Reference the regulatory permits authorizing the project activity
- Include a summary of the work accomplished
- Include photos of new planting areas with the photo locations identified on a plan view figure of the project site
- Include the following information from the photo stations:
    - Photographs from the station
    - Percent cover of herbaceous vegetation, visually estimated within a ten-foot radius
    - Species composition (including all species present as well as an indication of dominant species)
    - Identify any invasion of the mitigation site by undesirable species (e.g., *Phragmites*) and quantify the extent of invasion by percent cover. Outline what corrective measures are planned to control any undesirable species.

Performance Criteria

If the new *Spartina patens* planting areas have not successfully become vegetated within the monitoring time periods, the NPS may be required to augment the plantings to meet a minimum of 75% vegetative coverage during the next growing season. After the two-year time period, additional monitoring requirements will be determined if needed.

Funding Source for Compensatory Mitigation

The cost of compensatory mitigation has been factored into the construction cost of the project and is accordingly consistent with D.O. 77-1, Section 5.2.3.

In addition to the compensation activities outlined above, the NPS will implement additional mitigation measures to minimize environmental impacts related to the proposed action. The following is a list of actions that will be implemented:

- Equipment use in vegetated wetland areas will be avoided. Mats composed of individual timbers cabled together will be used to minimize impacts where avoidance is not possible.

- Appropriate measures will be employed to prevent or control spills of fuels, lubricants, or other contaminants from entering waterways or wetlands. These include safe handling and refueling procedures and proper deployment of containment measures such as oil booms. Actions will be consistent with state water quality standards and Clean Water Act Section 401 certification requirements. A hazardous spill plan will be approved by the park prior to construction. This plan will state what actions will be taken in the case of a spill, notification measures, and preventive measures to be implemented, such as the placement of refueling facilities, storage, and handling of hazardous materials, etc.
- Regulations require that a Stormwater Pollution Prevention Plan (SWPPP) must be prepared prior to submitting a registration statement for permit coverage under the Virginia Stormwater Management Permit (VSMP).
- During the shoreline stabilization design phase, the NPS will prepare and implement Erosion and Sediment Control Plans that comply with the Virginia Erosion and Sediment Control Law. The NPS will be responsible for overseeing on-site contractors, conducting regular field inspections, and taking prompt action against non-compliance, if necessary. Appropriate erosion and siltation controls will be maintained during construction, and all exposed soil or fill material will be permanently stabilized at the earliest practicable date. A Type II turbidity curtain will be used to minimize the movement of turbid water away from the construction site. A Type II curtain extends from the water surface below the water line to the river bottom and is rated for a slight current of no greater than five feet per second and mild wind conditions. A float in the top of the curtain and weights along the bottom keep the curtain hanging vertically in the water.
- Best management practices (BMPs) for drainage and sediment control will be implemented to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in drainage areas. BMPs will include all or some of the following actions, depending on site-specific requirements:
    - Disturbed areas will be kept as small as possible to minimize exposed soil and the potential for erosion;
    - Regular site inspections will occur during construction to ensure that erosion-control measures were properly installed and are functioning effectively.
- Should high wave and water conditions be forecasted, equipment will be moved to a safe location within the study area or to another location outside the study area.
- If required, stockpile materials will be placed in grassy areas at the mouths of Felgates Creek and Indian Fields Creek so as to avoid impacting previously undisturbed or unmaintained areas. Erosion prevention and sediment control measures will be placed down-gradient of each area to contain any potential spills or sediment run-off.
- Plantings will consist of native plant material and will be obtained and used in accordance with NPS policies and guidance. In an effort to avoid introduction of non-native/noxious plant species, no hay or straw bales will be used during revegetation or for temporary erosion control

- Management techniques will be implemented to foster rapid development of target native plant communities and to eliminate invasion by exotic or other undesirable species. Techniques may include the use of hydroseeding and a tackifier, plant inspection at delivery and before installation to ensure plant health, plant installation during appropriate planting windows and with due regard for tide forecasts, and inspection of installed plants. Planted areas will be monitored after construction to determine if efforts are successful or if plant mortality warrants replanting and/or controlling non-native plant species (per monitoring plan discussed above).

FLOODPLAIN MITIGATION

The proposed project area is in close proximity to the mouth of the York River, where the river empties into the Atlantic Ocean. Since the ocean is considered to serve as an infinite storage basin for floodwaters, it is unlikely that the proposed action will result in impacts to the existing flood zone. To ensure minimal storm damage to the existing flood zones, avoidance and minimization elements will be incorporated into the final design for the proposed action (as described above). The final design will consider reincorporating existing materials, where feasible, to limit disturbance and use of resources, and will take into account past approaches (including the success of each). NPS also will implement sustainable design principles and use best management practices during and after construction.

Mitigation measures will be designed and implemented in accordance with the NPS floodplain guidelines and with *EO 11988, Floodplain Management*. Therefore, the proposed action will not have an adverse impact on the floodplain and its associated value.

COMPLIANCE

The Coastal Zone Management Act of 1972 requires that federal activities affecting land, water, or natural resources within the coastal zone be consistent with applicable, enforceable policies. A Federal Consistency Determination was completed for the proposed action subsequent to completion of the NEPA process. Further, in order to comply fully with environmental regulations, the following approval and permits (described in *Chapter 5, Consultation and Coordination* of the EA) will be obtained prior to construction:

- A USACE Individual Permit for impacts to navigable waters of the United States pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.
- A permit for encroachment on subaqueous lands and tidal wetlands administered by the Virginia Marine Resources Commission (VMRC) pursuant to Virginia Code sections 28.2-1200 et seq. and 28.2-1300 et seq.
- A tidal wetlands permit from the York County Wetlands Board in accordance with Section 23.1 (Wetlands) of the County Code.

- A permit from York County for land disturbance activities within areas designated as Chesapeake Bay Preservation Areas, pursuant to Section 23.2 (Chesapeake Bay Preservation Areas) and Section 10.1-2100 of the Code of Virginia.
- A Virginia Stormwater Management Program (VSMP) Permit will be required to authorize land disturbance and construction of the project.
- Coordination with the Virginia Department of Game and Inland Fisheries (DGIF) and the U.S. Fish and Wildlife Service (USFWS) will be required regarding the possible presence of state and federally listed rare, threatened or endangered species within the project area.
- Coordination with the U.S. Navy will be required to insure that barge traffic does not present any interference with operational activities at NWS Yorktown.
- A waiver will likely be issued by the Virginia Department of Environmental Quality, exempting the project from obtaining a Virginia Water Protection Permit, pursuant to Section 401 of the Clean Water Act, as long as Federal, State, and local permits are issued.

The Environmental Assessment, Section 106 Compliance review, this Statement of Findings for Executive Orders 11990 and 11988, and the Finding of No Significant Impact, when signed, will complete the requirements for the National Environmental Policy Act for this project.

CONCLUSIONS

The protection of people and property, including natural resources, is of high priority to NPS. The proposed action will occur primarily in areas that have been previously disturbed and NPS concludes that no other practicable alternative exists for the proposed project. The project is designed to minimize impacts to wetlands and will compensate for those unavoidable impacts via the creation of wetlands of the same type and with the same functions and values. Compensation for the loss of estuarine emergent wetlands will be provided at a 1:1 ratio, satisfying the “no net loss of wetlands” policy contained in DO 77-1. Mitigation will also include the implementation of best management practices during and after construction. Due to the location of the proposed action, proximal to the mouth of the York River (at the Atlantic Ocean), the proposed action will not result in impacts to the existing 100-year flood hazard area because the ocean provides infinite storage for floodwaters.

While the proposed project will result in direct adverse impacts to wetlands via permanent loss at the location of shoreline treatment structures, the project includes compensation to a degree that offsets the area of wetlands impacted. Moreover, the project is designed to reduce the risk of existing wetlands being degraded or lost to storm-induced erosion; the likelihood of which would otherwise increase if left undefended, particularly as sea-level continues to rise and wave energy impinges farther inland. Accordingly, the NPS finds that this proposed action is consistent with the policies and procedures of EO 11988 as well as NPS *Director’s Order 77-1: Wetland Protection*, including the “no net loss of wetlands” policy, and *Director’s Order 77-2: Floodplain Management*.

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