ENVIRONMENTAL ASSESSMENT

for Training Area 1 Shoreline Stabilization and Erosion Protection

Final

June 2021

DEPARTMENT OF THE AIR FORCE
633D AIR BASE WING, 733D MISSION SUPPORT GROUP
CIVIL ENGINEER DIVISION, ENVIRONMENTAL SECTION
JOINT BASE LANGLEY-EUSTIS

Letters or other written comments provided may be published in the Final Environmental Assessment. As required by law, substantive comments will be addressed in the Final Environmental Assessment and made available to the public. Any personal information provided will be kept confidential. Private addresses will be compiled to develop a mailing list for those requesting copies of the Final Environmental Assessment. However, only the names of the individuals making comments and their specific comments will be disclosed. Personal home addresses and phone numbers will not be published in the Final Environmental Assessment.

COVER SHEET

ENVIRONMENTAL ASSESSMENT FOR TRAINING AREA 1 SHORELINE STABILIZATION AND EROSION PROTECTION AT

JOINT BASE LANGLEY-EUSTIS, VIRGINIA

a. Lead Agency: Department of the Air Force

b. Proposed Action: Stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land at the Training Area 1(TA1) site located at Joint Base Langley-Eustis -Eustis (JBLE-Eustis).

c. Inquiries regarding this document should be directed to: 733d Mission Support Group, Civil Engineer Division, Environmental Element (CED-CEIE), JLBE-Eustis, 1407 Washington Blvd, Fort Eustis, VA 23604. Email comments may be sent to: USAF.jble.733-msg.list.ced-ee-p2-procurement@mail.mil.

d. Designation: Final Environmental Assessment (EA)

e. Abstract: This EA evaluates the potential environmental impacts that may arise from the implementation of shoreline stabilization and erosion protection at JBLE-Eustis. The purpose of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land (and associated resources) at JBLE-Eustis TA1. The need for the Proposed Action is to protect available training land in order to maintain the quality of the training necessary to meet JBLE-Eustis mission and national defense requirements. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis. In addition to the loss of land and natural resources, erosion would continue to impact an adjacent National Register of Historic Places (NRHP) eligible archaeological site.

   Potential alternatives to the Proposed Action were each evaluated based on selection standards established by the Air Force. Alternatives that met all established selection standards were considered reasonable and retained for consideration in this EA. Alternatives that did not meet one or more of the standards were considered unreasonable and are not retained for consideration in the EA. Based on the results of this evaluation, three Action Alternatives, and the No Action Alternative, were carried forward for detailed analysis in the EA.

   The EA identifies and discloses potential impacts to the following environmental resources: land use and aesthetics; geology topography and soils; military munitions and restoration sites; water resources; biological resources; cultural resources; and air quality. The Proposed Action would result in no or negligible impacts to socioeconomics, environmental justice and protection of children, hazardous materials and waste, transportation, utilities, and noise.

   Through the EA process, the Air Force has determined that no significant impacts to the Proposed Actions would occur, and no mitigation measures are warranted. The Air Force has determined that for components of the Proposed Actions that occur within a floodplain, impacts would remain less than significant with the application of construction best management practices.

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FINAL
FINDING OF NO SIGNIFICANT IMPACT (FONSI) AND
FINDING OF NO PRACTICABLE ALTERNATIVE (FONPA)
TRAINING AREA 1 SHORELINE STABILIZATION AND EROSION PROTECTION AT
JOINT BASE LANGLEY EUSTIS- EUSTIS, VIRGINIA

Pursuant to provisions of the National Environmental Policy Act (NEPA), 42 United States Code (U.S.C.) 4321 to 4370h; Council on Environmental Quality (CEQ) Regulations, 40 Code of Federal Regulations (CFR) 1500-1508; and 32 CFR Part 989, *Environmental Impact Analysis Process*, the Department of the Air Force (Air Force) prepared the attached Environmental Assessment (EA) to assess the potential environmental consequences associated with the proposed shoreline stabilization and erosion protection of Training Area 1 (TA1) at Joint Base Langley Eustis – Eustis (JBLE-Eustis), Virginia, henceforth referred to as the "Proposed Action".

Purpose and Need

The purpose of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land (and associated resources) at JBLE-Eustis TA1. The Proposed Action is needed to protect available training land in order to maintain the quality of the training necessary to meet JBLE-Eustis mission and national defense requirements. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis.

Description of Proposed Action and Alternatives

The Proposed Action involves stabilizing and protecting TA1's 1,800 linear feet (LF) of contiguous peninsula shoreline along Bailey Creek and Skiffes Creek. Construction would be conducted over the course of approximately one year, beginning with site preparation, including vegetation clearing and grubbing. After implementation of appropriate stabilization techniques, revegetation would occur and the appropriate marsh, shrub zones, and/or bank areas would be planted. As part of the vegetation management program, additional stabilization erosion control matting would protect the graded areas from erosion and the newly-planted vegetation from waterfowl until the vegetation can become established.

The Air Force is considering three proposed alternatives towards meeting the objectives and goals of the Proposed Action. In addition to these three action alternatives, the No Action Alternative is also being considered:

Alternative A – Marsh Management. Construction of Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural protective features of the existing ecosystem. Marsh management techniques include adjacent bank grading, installation of an 875 LF fiber log, vegetation restoration, and long-term vegetation management. This alternative would be implemented in areas higher than the mean-tide level where there is minimal wave action and boat wake. The area behind the fiber log would be graded and planted with new marsh areas. The installation of 4,480 LF of erosion control matting would maintain permanent stabilization of the bank. Long-term vegetation management would include selective tree pruning and clearing, the removal of shoreline debris (particularly after storm events), visual inspections of the restoration status, maintenance of the coir log as needed, and future, supplemental plantings as deemed necessary.

Alternative B – Living Shoreline. Alternative B would employ a living shoreline design to create a structural solution that maintains the natural functionality and connectivity of the existing ecosystem. This alternative includes adjacent bank grading, a 1,150-LF stone sill, a man-made oyster reef, vegetation

restoration, and long-term vegetation management. Alternative B would be suitable for areas that have increased tidal ranges and boat wake. The sill would be located at an elevation near mean low water, with a height between 0 and 1 foot above mean high water to allow for regular wave overtopping, and contain sand fill to support a newly-planted marsh area. Tidal gaps would be strategically placed along the sill to allow for drainage and provide connectivity between ecosystems. The oyster reef would comprise concrete/granite structures constructed within shallow, near-shore water adjacent to the shoreline. Once complete, the oyster reef would serve as a barrier between the near- and far-shore and provide appropriate substrate and habitat for the eastern oyster (*Crassostrea virginica*) and blue crab (*Callinectes sapidus*). In addition, a low and high marsh and a tidal shrub zone would be planted in the same manner as Alternative A, and a long-term vegetation management and maintenance program would be necessary to maintain Alternative B.

Alternative C – Concrete Bulkhead. Alternative C would include the construction of 500 LF of precast concrete walls (bulkheads) to stabilize sections of eroded shoreline, focusing on bluff areas that have eroded into steep and unstable banks. Banks adjacent to the bulkhead would be graded; however, a steeply sloped bank could remain in some cases, as upland areas would not be exposed to regular wave action with the implementation of a bulkhead. In addition to the bulkhead, Alternative C would install a sill on 200-LF of eroded shoreline adjacent to a pedestrian bridge to protect the foundation of the bridge. A low and high marsh and a tidal shrub zone would be planted in the same manner as Alternatives A and B, and a long-term vegetation management and maintenance program would be necessary to maintain Alternative C.

No Action Alternative. Under the No Action Alternative, the Air Force would retain the existing conditions of the eroded site. No construction, alteration, improvement/rehabilitation, or planting of vegetation would be performed. Continued erosion would result in the additional loss of land and habitat, and subsequently continue to impact the quality of training on JBLE-Eustis. While the No Action Alternative would not meet the Proposed Action's purpose and need, it is analyzed in the EA to provide a comparative baseline as required under the CEQ regulations (40 CFR §1502.14).

Summary of Environmental Impacts

The EA evaluates the existing environmental conditions and potential environmental consequences of implementing the Proposed Action with regard to land use and aesthetics; geology topography, and soils; military munitions and restoration sites; water resources; biological resources; cultural resources; and air quality. The Air Force has concluded that the Proposed Action would not affect the following resources: socioeconomics, environmental justice and protection of children, hazardous materials and waste, transportation, utilities, and noise; thus, these resources were eliminated from detailed analysis in the EA. Environmental impacts are summarized below.

Land Use and Aesthetics: Construction of the Proposed Action would interfere with training activities and land use at the site. In addition, construction equipment and activities would interrupt the visual landscape and be visible throughout the viewshed. These disturbances would be temporary and only last for the duration of construction. In the long term, the current land use and aesthetic background of TA1 would be preserved with implementation of the Proposed Action, although some impacts to the visual landscape could occur with placement of the concrete bulkheads under Alternative C. No significant impacts on land use and aesthetics are anticipated.

Geology, Topography, and Soils: The Proposed Action would require varying levels of grading and soil excavation to prevent future shoreline erosion from occurring. Thus, changes in topography and temporary increases in erosion on the construction site may occur; there would be no impacts on geology. An erosion and sediment control (E&SC) plan and a stormwater management (SWM) plan would be required under all action alternatives. Additionally, for Alternatives B and C, a Storm Water Pollution Prevention Plan

(SWPPP) would be developed prior to construction. These plans would include erosion control practices, inspection procedures, and other best management practices (BMPs) designed to reduce erosion during the construction process. Further, compared to Alternatives A and B, Alternative C could have the potential to result in erosion along the sides of and behind the concrete bulkheads. If Alternative C is selected, the Air Force would conduct periodic site visits to determine if erosion is occurring and mitigate it accordingly. In the long term, implementation of the Proposed Action would stabilize the shoreline and minimize erosion and sedimentation events in the vicinity of the TA1 site. No significant impacts on soils, geology, and topography are anticipated.

Military Munitions and Restoration Sites: One Installation Restoration Program (IRP) site (Bailey Creek) occurs along the southern border of TA1. Construction and operation of the Proposed Action could potentially disturb Bailey Creek; however, disturbances are unlikely to affect existing contamination sites at Outfall No. 18 and its associated drainage swale, as TA1 is located over 0.5 mile away. Further, current land use controls are in place surrounding Bailey Creek to minimize disturbance to the IRP site and existing contaminants. While there is a risk of accidental discharge and spills into Bailey Creek during land clearing and grubbing activities, implementation of Spill Prevention, Control and Countermeasure Plans and an Installation-specific Hazardous Materials Management Plan would minimize the potential for adverse impacts to the extent practicable. No military munitions sites are within the Proposed Action area. No significant impacts on munitions and restoration sites are anticipated.

Water Resources: The James River, which borders JBLE-Eustis to the south, does not meet Federal/ State water quality standards per the 2018 Virginia Water Quality Assessment (VDEQ, 2019b). Total maximum daily loads have been established for some of the parameters causing impairment within this river. Additionally, Bailey Creek is also listed as impaired for recreation, aquatic life, and fish consumption, due to high levels of bacteria (e.g., *Escherichia coli*), chemicals (e.g., PCBs and aldrin), and low benthic-macroinvertebrate counts. With the amount of grading and earthwork required for the Proposed Action, construction would result in increased turbidity and sedimentation from soil disturbance, degrading the water quality in Bailey Creek. Potential effects to the subaqueous bottomlands in Bailey Creek and Skiffes Creek from increased turbidity and sedimentation could occur as well.

Less than 5 acres of jurisdictional wetlands have been identified within TA1. Additionally, 8 acres within TA1 are within the 100-year floodplain. Because TA1 is within the flood zone and wetlands are present, there is no practicable alternative to implementing shoreline stabilization and erosion protection measures without disturbing the flood zone and wetlands; as such, this FONSI includes a FONPA.

Impacts and encroachments (both temporary and permanent) on tidal wetlands and waters are anticipated as part of the Proposed Action. Therefore, authorizations are anticipated from the Local Wetlands Board (LWB) and/or Virginia Marine Resource Commission (VMRC), pursuant to the Virginia Tidal Wetlands Act, and the US Army Corps of Engineers (USACE), pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. A Tidewater Joint Permit Application (JPA) would need to be submitted to the VMRC for coordination with the LWB and USACE. It is anticipated the Proposed Action may qualify for authorization under the USACE Regional Permit 19 (13-RP-19). The State Water Control Board has issued unconditional 401 Water Quality Certification for the 13-RP-19. As such, the activities that qualify for 13-RP-19 also meet the requirements of the Virginia Department of Environmental Quality (DEQ) Virginia Water Protection Permit (VWP) Regulation and no additional authorization from DEQ would be required as long as the Proposed Action meets the terms and conditions of 13-RP-19. In lieu of 13-RP-19, USACE may also authorize shoreline stabilization projects under Nationwide Permit 13 (Bank Stabilization). Measures identified as part of these permits would be implemented to minimize impacts to jurisdictional waters including water quality, wetlands, and floodplains. Additionally, the Proposed Action would not contribute to any measurable loss in the area's flood control capacity; the Air Force would comply

with all local, State, and Federal floodplain regulations. No significant impacts on water resources would be anticipated.

Biological Resources: Required clearing and grubbing from construction of the Proposed Action would temporarily affect vegetation; cleared areas would be re-vegetated with native species. The tidal shrub and marsh plantings proposed under all of the action alternatives, along with long-term stabilization of the shoreline and decreased erosion at the site, would permanently benefit vegetation communities (including wetlands). No significant impacts on vegetation would be anticipated.

Terrestrial and aquatic wildlife would be temporarily displaced during construction activities; however, it is anticipated that once construction is complete, wildlife would establish communities similar to pre-construction levels. In the long term, both terrestrial and aquatic wildlife would benefit from shoreline stabilization and decreased erosion and sedimentation. No significant impacts on wildlife would be anticipated.

Potential effects to the federally threatened northern long eared bat (NLEB) (*Myotis septentrionalis*) and Indiana Bat (*Myotis sodalis*) may occur as a result of shoreline stabilization activities and tree clearance. To protect any potential maternal roosting and pupping habitat in the project area, the Air Force would adhere to a seasonal restriction on tree cutting during the maternal roost and pup season (April 15-September 15). Similarly, the Proposed Action would adhere to time of year restrictions for migratory birds. No bald eagle nests are present in or near TA1. No significant impacts on special status species would be anticipated.

Construction of the Proposed Action could potentially affect Essential Fish Habitat (EFH) and EFH species from increased turbidity and sedimentation, as well as the placement of in-water structures. Water conditions surrounding TA1 are not conducive to supporting EFH; therefore, EFH species are not likely to occur or would occur in limited numbers. In the long-term, the Proposed Action would reduce erosion and minimize sedimentation in Bailey Creek and Skiffes Creek, resulting in improved water quality. No significant impacts on EFH would be anticipated.

Construction of the Proposed Action would occur within Resource Protection Areas (RPAs) and RPAs would be impacted from required clearing and grubbing. Following completion of construction, cleared areas would be revegetated with native species. Shoreline stabilization in conjunction with tidal shrub and marsh plantings proposed under all action alternatives would benefit RPAs. No significant impacts on RPAs would be anticipated.

Cultural Resources: Heavy equipment staging and grading activities during construction of the Proposed Action would have the potential to impact the National Register of Historic Places-eligible archaeological site 44NN0024 located within TA1. However, the Air Force would implement protective measures such as requiring all vehicles remain on established roads and prohibiting skidding or dragging of downed trees to protect archaeological resources. In addition, the proposed access road and turn around area would be sited in a location that avoids significant archaeological deposits; disturbance of site 44NN0024 is unlikely. In the long-term, shoreline stabilization and reduction in erosion would help preserve the site. Further, should Alternative C be selected, the Air Force would conduct additional consultation with the Pamunkey Tribe who noted concerns associated with Alternative C's ability to control erosion. No significant impacts on cultural resources are anticipated.

Air Quality and Climate: Construction activities would temporarily increase air emissions from the use of construction equipment and vehicles. Implementation of the vegetation management program would also involve fossil fuel-powered equipment in the long term. The Air Force's Air Conformity Applicability Model (ACAM) was used to analyze the potential air quality impacts associated with the Proposed Action. Results

from ACAM indicate emissions associated with the Proposed Action would not hinder maintenance of the region's National Ambient Air Quality Standards. No significant impacts on air quality are anticipated.

Cumulative Impacts

The EA considered cumulative impacts that could result from the incremental impact of proposed shoreline protection measures in conjunction with effects of other past, present, or reasonably foreseeable future actions occurring in the same ROI. Incremental impacts of the Proposed Action would likely contribute to cumulative impacts on soils, restoration sites, water resources, biological resources, and air quality, when taken into consideration with three planned projects that would occur in the same geographic and temporal scope. Cumulative impacts would be minimized to the extent practicable through implementation of BMPs and adherence to regulatory guidelines under the Proposed Action. No significant cumulative impacts are anticipated.

Mitigations

The EA concluded that no significant impacts to the environment would result from proposed shoreline restoration activities under any of the action alternatives. While impacts on wetlands and floodplains are unavoidable given the nature of the Proposed Action, compliance with all Federal, State, local, and Air Force regulations would ensure impacts are avoided or minimized to the greatest extent practicable. Implementation of standard construction BMPs and low impact development measures would ensure that impacts on the 100-year floodplain, downstream areas, and wetlands remain minimal. Prior to construction, the Air Force would obtain coverage under applicable permits issued by USACE. Adherence to the requirements of applicable permits would minimize harm to wetlands resulting from the Proposed Action to the extent practicable.

In addition, avoidance measures would be implemented to ensure no adverse effect on cultural resources. Archaeological site 44NN0024 would be incorporated as a design constraint on the Limits of Disturbance. Further, protective fencing would be installed to restrict access to the archaeological site. Further, should Alternative C be selected, the Air Force would conduct additional consultation with the Pamunkey Tribe who noted concerns associated with Alternative C's ability to control erosion and conduct periodic site visits to determine if erosion is occurring and mitigate it accordingly.

Public Review

An early public notice was published in the local newspaper, *The Daily Press,* on 23 August 2019, detailing that the Proposed Action would take place in a floodplain and/or wetland, and seeking advanced public comment. No comments were received.

The Draft EA and Draft FONSI/FONPA were made available for public review and comment for 30 days following publication of a Notice of Availability in two local newspapers, *The Daily Press* and the *Peninsula Warrior Base Newspaper*. During the public review period, one response was received from the VDEQ (see Appendix B of the EA). The VDEQ conducted a review of the Proposed Action in coordination with Virginia Department of Game and Inland Fisheries (VDGIF), Virginia Marine Resources Commission (VMRC), Virginia Department of Conservation and Recreation (VDCR), Virginia Department of Health (VDH), and the Hampton Roads Planning District Commission, and concluded that the Proposed Action would be unlikely to have significant effects provided activities are performed in accordance with VDEQ's recommendations. The VDEQ indicated that both the VMRC and VDGIF expressed a preference for Alternative B (Living Shoreline); the VDGIF also noted Alternative A (Marsh Management) as a second choice, while Alternative C (Concrete Bulkhead) is not supported. Further, VDGIF noted the No Action Alternative would leave the shoreline vulnerable to continued erosion.

Comments have been incorporated into the Final EA, as appropriate. No other public comments were received.

Interagency and Intergovernmental Coordination for Environmental Planning

Consultation with agencies and Native American tribes was initiated in 2017. Throughout the development of the EA, the 733rd Civil Engineer Division continued coordination with agencies and Native American tribes to address concerns surrounding the Proposed Action. All agency and tribal responses have been considered and incorporated in the EA, as appropriate. Appendix A of the EA includes records of agency and tribal correspondence.

Findings

Finding of No Practicable Alternative. Because TA1 is within a flood zone and wetlands are present, there is no practicable alternative to implementing shoreline stabilization and erosion protection activities without disturbing the flood zone and wetlands. Pursuant to Executive Orders 11988 and 11990 and taking the above information into account, I find that there is no practicable alternative to this action and that the proposed shoreline stabilization and erosion protection actions include all practicable measures to minimize harm to the environment. This decision has been made after taking into account all submitted information, and considering a full range of practical alternatives that meet project requirements and are within the legal authority of the US Air Force. This finding fulfills both the requirements of the referenced Executive Orders and 32 CFR Part 989 for a FONPA.

Finding of No Significant Impact. After review of the EA prepared in accordance with the requirements of NEPA, CEQ regulations, and 32 CFR Part 989, and which is hereby incorporated by reference, I have determined that the proposed shoreline stabilization and erosion protection actions for JBLE-Eustis TA1 will not have a significant impact on the quality of the human or natural environment. Accordingly, an Environmental Impact Statement is not required. This decision has been made after taking into account all submitted information, and considering a full range of practical alternatives that meet project requirements and are within the legal authority of the US Air Force. The signing of this FONSI/FONPA completes the environmental impact analysis process.

KATZER.DEE.J.1153738854 Digitally signed by KATZER.DEE.J.1153738854 Date: 2021.06.09 13:18:10 -04'00'

09-Jun-2021

DEE JAY KATZER, Colonel, USAF

Date

Chief, Civil Engineer Division

Air Combat Command (ACC/A4C)

Attachment: Environmental Assessment for Training Area 1 Shoreline Stabilization and Erosion Protection at Joint Base Langley-Eustis

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LIST OF ACRONYMS/ABBREVIATIONS

13-RP-19	Regional Permit 19
ACAM	Air Conformity Applicability Model
AFI	Air Force Instruction
AFPD	Air Force Policy Directive
AMSL	Above Mean Sea Level
BCE	Before Common Era
BGEPA	Bald Eagle Protection Act
CAA	Clean Air Act
CAP	Corrective Action Plan
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CGP	Construction General Permit
CWA	Clean Water Act
CY	cubic yard
CZMA	Coastal Zone Management Act
DoD	Department of Defense
EA	Environmental Assessment
ECM	Erosion Control Matting
EFH	Essential Fish Habitat
EIAP	Environmental Impact Analysis Process
EO	Executive Order
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESCP	Erosion and Sediment Control Plan
°F	Fahrenheit
FEMA	Federal Emergency Management Agency
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
GHG	Greenhouse Gas
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
INRMP	Integrated Natural Resource Management Plan
IPaC	Information for Planning and Consultation
IRP	Installation Restoration Program

JBLE	Joint Base Langley-Eustis
JBLE-Eustis	Former Fort-Eustis
LF	linear feet
LWB	Local Wetlands Board
MBTA	Migratory Bird Treaty Act
mg/L	Milligrams per Liter
MHW	Mean High Water
MLW	Mean Low Water
MMRP	Military Munitions Response Program
MTL	Mean-Tide Level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLEB	Northern Long-Eared Bat
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
PCB	Polychlorinated biphenyls
PM	Particulate Matter
RCRA	Resource Conservation and Recovery Act
ROI	Region of Influence
RPA	Resource Protection Area
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SPCC	Spill Prevention, Control, and Countermeasure
SWM	Stormwater Management
SWPPP	Stormwater Pollution Prevention Plan
SY	square yard
T&E	Threatened and Endangered
TA	Training Area
TRADOC	US Army Training and Doctrine Command
TSS	Total Suspended Solids
US	United States
USACE	US Army Corps of Engineers

USAF	United States Air Force
USC	US Code
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	US Geologic Service
VA	The Commonwealth of Virginia
VADHR	Virginia Department of Historic Resources
VDAC	Virginia Department of Agriculture and Consumer Services
VDCR	Virginia Department of Conservation and Recreation
VDEQ	Virginia Department of Environmental Quality
VDGIF	Virginia Department of Game and Inland Fisheries
VDH	Virginia Department of Health
VMRC	Virginia Marine Resource Commission
VOC	Volatile Organic Compounds
VPDES	Virginia Pollutant Discharge Elimination System
VWP	Virginia Water Protection Permit

1.0 PURPOSE AND NEED

1.1 INTRODUCTION

This Environmental Assessment (EA) evaluates the potential environmental impacts associated with shoreline stabilization and erosion protection at the Joint Base Langley-Eustis – Eustis (JBLE-Eustis) Training Area 1 (TA1) in Newport News, VA (also referred to as the "Proposed Action"). This document has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [USC] 4321, et seq.), the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (EIAP) (32 CFR Part 989).

1.2 PROPOSED ACTION LOCATION AND DESCRIPTION

JBLE-Eustis is located in southeastern VA; approximately 30 miles west of the mouth of the James River and its confluence with the Chesapeake Bay, 60 miles southeast of the City of Richmond, 160 miles south of Washington DC, and 20 miles northwest of Norfolk (see **Figure 1-1**). It is situated in the southwest portion of the Hampton Roads metropolitan area, contiguous with the City of Newport News, VA. JBLE-Eustis is bordered on the northwest by James City County, on the northeast by the City of Newport News, on the west and south by the James River, and east by the Warwick River. The United States (US) Army Training and Doctrine Command (TRADOC) is the primary user of the training areas at JBLE-Eustis. TRADOC's mission is to recruit, train, support, and educate Soldiers, civilians, and leaders at JBLE-Eustis to strengthen the Army while integrating a mix of capabilities to ensure the Total Army can deter, fight, and win on any battlefield now and into the future. JBLE-Eustis also hosts the 633rd Air Base Wing and trains its service members in transportation, aviation maintenance, logistics, and deployment doctrine. TA1 is located within JBLE-Eustis, at the western terminus of an east to west trending peninsula that extends along Bailey Creek and into Skiffes Creek (see **Figure 1-2**). TA1 is used by JBLE-Eustis for tactical bivouac, land navigation, military dog handling training, and small unit tactics. Recreational land uses, such as deer hunting and fishing, also occur in TA1. Approximately 1,800 linear feet (LF), or approximately 8 acres, of contiguous peninsula shoreline in TA1 are included in the Proposed Action's Project Area.

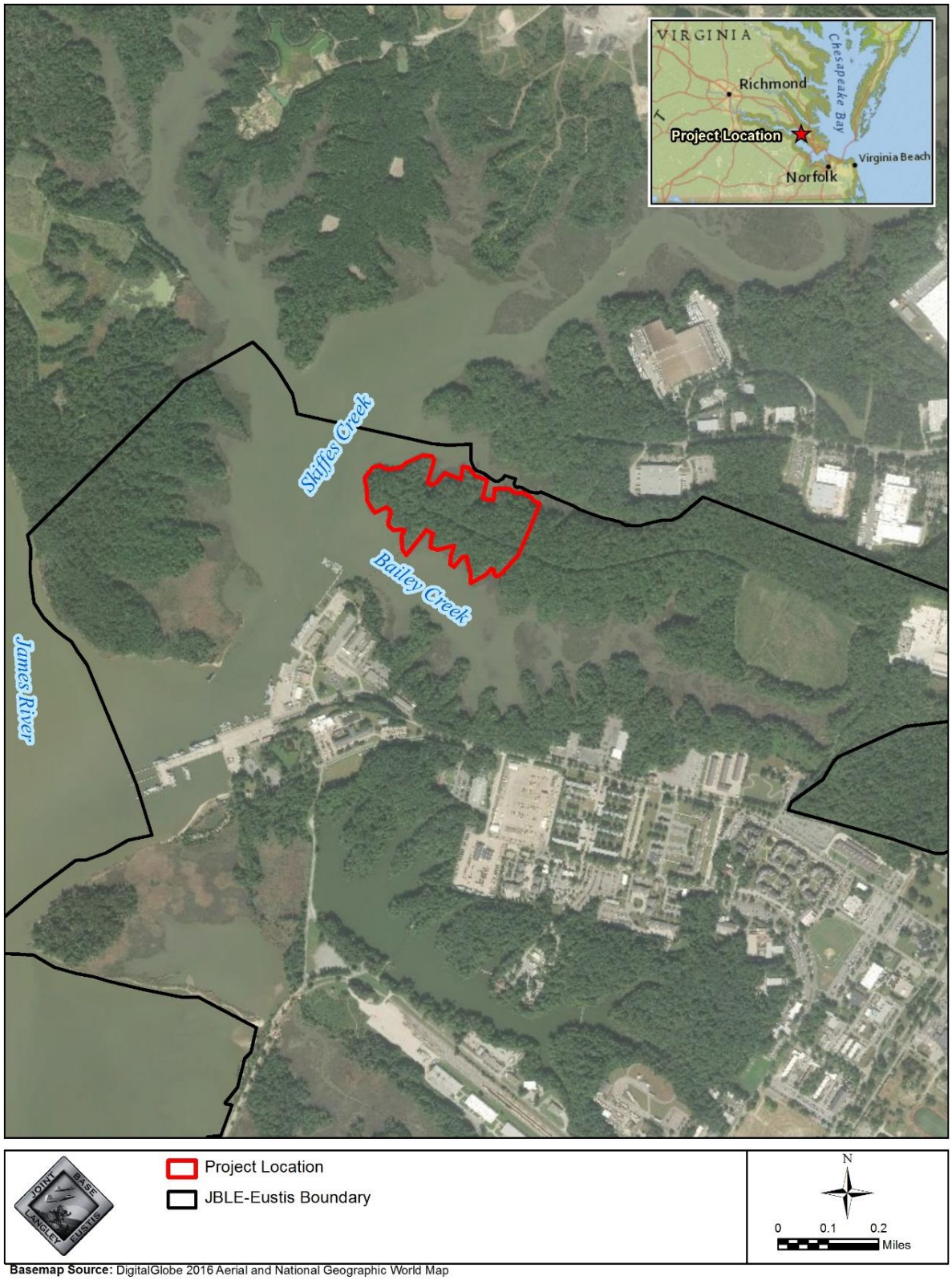
1.3 PURPOSE AND NEED

The purpose and need statement is a declaration of the broad goals and objectives of the Proposed Action. The *purpose* of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land at the TA1 site located at JBLE-Eustis. The loss of land includes associated resources, such as plants and substrate. A site visit by Angler Environmental to the Project Area in October of 2014 noted a loss of marsh grass, root structures, sand substrate, and wildlife habitats. Erosion on the upland bluff causes tree arching and collapse (sometimes into the water), as well as unstable, exposed, and vertical or cantilevered bluff faces. Sand and soil eroded from the bluffs collapse onto the shoreline and subsequently into Skiffes Creek, delivering a substantial amount of sediment into offshore waters (USAF, 2015). In addition to the loss of land and natural resources, the erosion impact is threatening an adjacent archaeological site that may be eligible for listing in the National Register of Historic Places (NRHP).

Figure 1-1: Regional Location

Basemap Source: National Geographic World Map

Figure 1-2: Project Location



Basemap Source: DigitalGlobe 2016 Aerial and National Geographic World Map

The *need* for the Proposed Action is to protect available training land in order to maintain the quality of the training necessary to meet JBLE-Eustis mission and national defense requirements. The primary mission at JBLE-Eustis is to provide mission-ready soldiers, civilians, and leaders to combatant commanders in support of joint and combined operations worldwide. JBLE-Eustis requires appropriate and suitable operational space to host the Army and Air Force to train service members in transportation, aviation maintenance, logistics and deployment doctrine, and applicable Department of Defense (DoD), State, and Federal requirements. TA1 was approximately 50 acres at inception; however, the long-term shoreline erosion loss along Skiffes Creek is estimated to be 0.6 feet per year (though localized erosion rates may be greater) (Virginia Institute of Marine Science, 2010). Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis.

1.4 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

Consistent with the CEQ regulations, the scope of analysis presented in this EA is defined by the potential range of environmental impacts that would result from implementation of the Proposed Action (i.e., shoreline stabilization and erosion protection). This document is "issue-driven" in that it concentrates on those resources that may be affected by implementation of the Proposed Action.

Resources that have a potential for impact were considered in detail in order to determine if implementing the Proposed Action would have a significant impact on those resources. The resources analyzed in detail include land use and aesthetics; geology topography and soils; military munitions and restoration sites; water resources; biological resources; cultural resources; and air quality. The existing affected environment and the potential environmental consequences with implementation of the Proposed Action are described in **Section 3.0** and **Section 4.0**, respectively.

The Proposed Action would result in no or negligible impacts to socioeconomics, environmental justice and protection of children, hazardous materials and waste, transportation, utilities, and noise. The following paragraphs discuss the reasons for not addressing these resources further in this EA.

Socioeconomics. No change in personnel or economic conditions at JBLE-Eustis would be anticipated as a result of the Proposed Action; therefore, no effects to socioeconomics would be expected.

Environmental Justice and Protection of Children. Executive Order (EO) 12898, *Environmental Justice*, directs Federal agencies to identify low-income and minority populations potentially affected because of proposed Federal actions. EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, directs Federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children. As adverse impacts generated from the Proposed Action would be mostly confined to TA1 or JBLE-Eustis, no Environmental Justice communities, if present in nearby Newport News, would be particularly or disproportionately affected. Further, no change in personnel or economic conditions at JBLE-Eustis would be anticipated as a result of the Proposed Action that would impact Environmental Justice populations. No health and safety risks to children are anticipated as the Project Area is remote within JBLE-Eustis and would be inaccessible to the public during construction. The Proposed Action would not have disproportional impacts to low-income, minority, and child populations; therefore, no effects to Environmental Justice or children populations would be expected.

Hazardous Materials and Waste. Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA), as amended, as any solid, liquid, contained gaseous, or semi-solid waste, that poses a potential hazard to human or environmental health. Hazardous materials are defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, as

any substance with physical properties of ignitability, corrosivity, reactivity, or toxicity that might cause an increase in mortality, serious reversible illness, or incapacitating reversible illness. The Project Area does not have an existing presence of storage tanks; transformers, capacitors, or switches containing polychlorinated biphenyls (PCB); medical/biohazardous waste; or radioactive materials. In addition, implementation of the Proposed Action would not disturb potential or known sources of asbestos containing materials, lead based paint, or pesticide storage in TA1. However, during construction activities, small amounts of hazardous materials would be utilized by the contractor, while small quantities of hazardous waste may be generated.

The Air Force, through Air Force Instruction (AFI) 10-2510 and 32-7086, has dictated that all facilities develop and implement Hazardous Materials Management Plans, Hazardous Waste Management Plans, and/or Spill Prevention, Control and Countermeasure (SPCC) Plans. Storage, handling, and transportation of hazardous materials and waste during construction activities would be conducted in accordance with applicable regulations and established procedures, including the Fort Eustis Hazardous Waste Management Plan. Any spills or releases of hazardous materials would be reported to the Virginia Department of Environmental Quality (VDEQ), cleaned up by the contractor, and disposed of at an approved off-base treatment, storage, or disposal facility by JBLE-Eustis (VAC § 62.1-44.34.8 through 9, and 9 VAC 25- 580-10 et seq.). Spills would be handled in accordance with the Fort Eustis SPCC Plan. The Proposed Action would also implement pollution prevention principles (e.g., the reduction, reuse, and recycling of all wastes generated) during the Proposed Action's construction, operation, and maintenance. Because hazardous materials and waste would be managed in accordance with applicable regulations and procedures, impacts from hazardous materials and waste would not be expected. In addition, the VDEQ Division of Land Protection and Revitalization conducted a search of solid and hazardous waste databases (including petroleum releases) to identify waste sites within a 500 ft radius of TA1; no waste sites were identified. A copy of the VDEQ's findings is included in **Appendix B**.

Transportation. An increase in construction-related traffic is anticipated during construction activities; however, the increase would be short-term and minor. No change in the traffic level of service would occur. Therefore, negligible effects to transportation would be expected.

Utilities. Utility service is not available at the Project Area and no change in utility usage at JBLE-Eustis would result from the Proposed Action; therefore, no effects to utilities would be expected.

Noise. There are no sensitive noise receptors (e.g., churches, schools, residential areas) situated near TA1. Noise generated during construction would be intermittent and short-term, primarily occurring within TA1, which is situated in a remote location on JBLE-Eustis. Once construction activities are completed, proposed use of the property is not expected to generate a substantial amount of noise. Therefore, negligible effects from noise would be expected.

1.5 PUBLIC AND AGENCY INVOLVEMENT

1.5.1 Interagency and Intergovernmental Coordination for Environmental Planning

The Air Force has implemented the Federally mandated Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) process for the Proposed Action. Through the IICEP process, the Air Force notified relevant Federal, State, and local agencies about the Proposed Action and invited them to coordinate and consult. IICEP letters were mailed on 27 January 2020 to relevant Federal, State, and local agencies and identified stakeholders, which notified them of the Proposed Action and invited their review and comment. Within the 30-day scoping period, responses were received from five agencies: US Environmental Protection Agency (USEPA), Virginia Marine Resources Commission (VMRC), Virginia

Department of Conservation and Recreation (VDCR), Virginia Department of Health (VDH), and VDEQ. Agency responses have been considered and incorporated in the EA as appropriate.

In 2017, Section 106 consultation was initiated with the State Historic Preservation Office (SHPO) (i.e., the Virginia Department of Historic Resources [VADHR]) regarding archaeological field surveys that would be required prior to the Proposed Action implementation. VADHR responded with concurrence that the field surveys would have no adverse effect on cultural resources, including the resource potentially eligible for NRHP listing (Site #44NN0024). In correspondence dated 4 February 2020, the Air Force submitted the Archaeological Investigation Report for Site #44NN0024 to the VADHR. Based on the findings of this study, the Air Force determined that the Proposed Action would have no adverse effect on the qualities of Site #44NN0024 that make it eligible for the NRHP. No response has been received to date from VADHR in response to this determination.

The Federal, State, DoD, and other agencies/organizations/individuals contacted during preparation of this EA are listed in **Section 7.0** and IICEP materials and comments received for this EA are included in **Appendix A**.

1.5.2 Native American Tribal Consultation

EO 13175, *Consultation and Coordination with Indian Tribal Governments*, directs Federal agencies to coordinate and consult with Native American tribal governments whose interests might be directly and substantially affected by proposed activities on Federally administered lands. To comply with legal mandates, Federally recognized tribes that are affiliated historically with the geographic region are invited to consult on proposed undertakings that have a potential to affect properties of cultural, historical, or religious significance to the tribes. Effective consultation requires identification of tribes based on ethnographic and historical data and not simply a tribe's current proximity to the Project Area. The goal of the tribal consultation process is not to simply consult on a particular undertaking, but also to build constructive relationships with appropriate Native American tribes. In 2017 and in accordance with DoD Instruction 4710.02, *Interactions with Federally Recognized Tribes*, the Air Force initiated Section 106 consultation with four Federally-recognized Tribes: Delaware Nation, Catawba Indian Nation, Delaware Tribe of Indians, and Pamunkey Indian Tribe. The Catawba Indian Nation responded that they would like to be informed if Native American artifacts are found; no other Tribes responded.

In 2018, five additional tribes became Federally recognized in the Commonwealth of Virginia: Chickahominy Indian Tribe, Chickahominy Indians - Eastern Division, Nansemond Indian Nation, Upper Mattaponi Tribe, and Rappahannock Tribe. These five additional tribes, as well as the four tribes originally consulted, were contacted in January and February 2020 to initiate or continue consultation. Three tribes (Delaware Nation, Pamunkey Tribe, and Catawba Indian Nation) responded to this consultation. The Delaware Nation, in a letter dated 25 February 2020, concluded that the Project would not endanger any sites of interests to the Delaware Nation. The Pamunkey Tribe, in a letter dated 25 February 2020, requested to become a consulting party for the Proposed Action. Further, they stated that they preferred Alternative A and B, noting concerns associated with Alternative C's ability to control erosion. Finally, the Catawba Indian Nation concluded that they had no concerns in a letter dated 5 March 2020, but requested to be notified should Native American artifacts and/or human remains be identified during ground disturbance activities.

All Tribes contacted during preparation of this EA are listed in **Section 7.0**. Native American tribal government coordination materials and comments received for this EA are included in **Appendix A**.

1.5.3 Public Involvement

An early public notice was published in *The Daily Press* on 23 August 2019 to disclose that the Proposed Action would take place within a wetland and a floodplain (**Appendix B**). The Air Force requested advanced public comment on the Proposed Action to determine if there are any public concerns regarding potential impacts and solicited public input on potential alternatives. The comment period for public input on this early public notice ended on 22 September 2019. No comments were received.

The Air Force published and distributed the Draft EA for a 30-day public review and comment period from 3 April to 3 May 2020, as announced by a Notice of Availability (NOA) of the Draft EA and Draft Finding of No Significant Impact (FONSI) / Finding of No Practicable Alternative (FONPA) published in *The Daily Press* and the *Peninsula Warrior Base Newspaper*. During the public review period, one response was received from the VDEQ. The VDEQ conducted a review of the Proposed Action in coordination with Virginia Department of Game and Inland Fisheries (VDGIF), VDCR, VMRC, VDH, and the Hampton Roads Planning District Commission, and concluded that the Proposed Action would be unlikely to have significant effects provided activities are performed in accordance with VDEQ's recommendations. The VDEQ indicated that both the VMRC and VDGIF expressed a preference for Alternative B (Living Shoreline); the VDGIF also noted Alternative A (Marsh Management) as a second choice, while Alternative C (Concrete Bulkhead) is not supported. Further, VDGIF noted the No Action Alternative would leave the shoreline vulnerable to continued erosion. Comments have been addressed and considered in the development of the EA, as applicable. A copy of the NOA and public comments received are included in **Appendix B**.

1.6 REGULATORY FRAMEWORK

Prior to initiation of the Proposed Action, the construction contractor would obtain required Federal, State, and local permits. The contractor would cooperate with the Air Force to ensure compliance with applicable Air Force, Federal, State, and local regulations, permits, and/or requirements.

Impacts and encroachments (both temporary and permanent) to tidal wetlands and waters are anticipated as part of the Proposed Action. Therefore, authorizations from the Local Wetlands Board (LWB) and/or VMRC, are required, pursuant to the Virginia Tidal Wetlands Act, and the US Army Corps of Engineers (USACE), pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (CWA). A wetlands permit from the Newport News Wetlands Board would be required for any fill in tidal wetlands, while a submerged bottom land permit would be required from VMRC for structures placed channelward of mean low water. A Tidewater Joint Permit Application would need to be submitted to the VMRC for coordination with the LWB and USACE. It is anticipated the Proposed Action may qualify for authorization under the USACE Regional Permit 19 (13-RP-19). The State Water Control Board has issued unconditional 401 Water Quality Certification for the 13-RP-19. As such, the activities that qualify for 13-RP-19 also meet the requirements of the VDEQ Virginia Water Protection Permit (VWP) Regulation and no additional authorization from VDEQ would be required as long as the Proposed Action meets the terms and conditions of 13-RP-19. In lieu of 13-RP-19, the USACE may also authorize shoreline stabilization projects under Nationwide Permit 13 (Bank Stabilization).

Since the Proposed Action would require USACE authorization, coordination with other supporting agencies would be required to determine potential adverse effects to Cultural Resources under Section 106 of the National Historic Preservation Act (NHPA) and to threatened and endangered (T&E) species under Section 7 of the Endangered Species Act (ESA). Section 106 of the NHPA and its implementing regulations (36 CFR 800, *Protection of Historic Properties*) requires Federal agencies to consider the effects of their proposed actions on historic properties before undertaking a project and allows the SHPO an opportunity to comment on such undertakings. Regarding Section 7, coordination with US Fish and Wildlife Service

(USFWS) would be required in accordance with the recently implemented 4(d) rule for the Northern Long-eared bat (NLEB) (*Myotis septentrionalis*) and for potential occurrence of the Indiana bat (*Myotis sodalis)*. Since the Proposed Action would be located along Skiffes Creek, a tributary to the James River, coordination with the National Oceanic and Atmospheric Administration (NOAA) Fisheries regarding aquatic species presence, particularly the Atlantic sturgeon (*Acipenser oxyrhynchus oxyrhynchus*), would also be required.

A 100-foot Resource Protection Area (RPA) is located along Skiffes Creek and/or the tidal and non-tidal wetlands connected and contiguous to Skiffes Creek. A detailed assessment to determine the RPA limits within the Project Area has not been completed. Although the Chesapeake Bay Preservation Act is administered at the local level and may not apply on Federal lands, additional review and coordination may be needed for proposed work within the RPA.

Coordination with Federal Emergency Management Agency (FEMA) and/or local review would be required for proposed work that occurs within the limits of the 100-year floodplain and to determine the need for a Conditional Letter of Map Revision. In addition, the Proposed Action is located within VA's coastal zone and requires a Federal Consistency Determination in accordance with the Coastal Zone Management Act (CZMA). The CZMA enables states to implement Federally approved coastal programs to protect coastal areas in conjunction with environmental, economic, and human health.

Since the Proposed Action would require land disturbing activities, a Virginia Pollutant Discharge Elimination System (VPDES) Construction General Permit (CGP), Stormwater Pollution Prevention Plan (SWPPP), and Erosion and Sediment Control Plan (ESCP) may be required and would depend on the acreage of land disturbance in the final design.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This section of the EA describes details of the Proposed Action, alternatives considered to meet the purpose and need of the Proposed Action, and how the alternatives were screened against selection standards.

2.2 DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land at TA1. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis.

The Project Area within TA1 is comprised of approximately 1,800 LF of contiguous peninsula shoreline along Bailey Creek and Skiffes Creek. Construction would be conducted over the course of approximately one year, beginning with site preparation, including vegetation clearing and grubbing. Depending on which alternative (as described in **Section 2.5**) is carried forward for implementation, the appropriate stabilization techniques would be constructed, and banks would be graded following installation. After installation, revegetation would occur and the appropriate marsh, shrub zones, and/or bank areas would be planted. Lastly, as part of the vegetation management program, additional stabilization erosion control matting (ECM) would protect the graded areas from erosion and the newly-planted vegetation from waterfowl until the vegetation can become established.

Construction equipment would have to access the bank and shoreline of Bailey Creek and Skiffes Creek in order to execute the design. An existing access road to TA1 would provide construction access to the peninsula; however, additional temporary access roads would need to be cleared in the Project Area to allow for construction equipment access to proposed areas of bank grading and shoreline stabilization. Specific shoreline access routes have not been established and would be finalized during project design.

Temporary soil stockpile area(s) may be necessary, as would a temporary material & equipment storage area to house equipment overnight and when not in use. All temporary stockpile, material, and equipment storage areas would be located in a previously cleared upland area on JBLE-Eustis. Staging areas could occur on an existing access road in TA1 and pull-out areas within TA1.

2.3 ALTERNATIVE SELECTION STANDARDS

NEPA and the CEQ regulations mandate the consideration of reasonable alternatives for the Proposed Action. “Reasonable alternatives” are those that could be utilized to meet the purpose and need of the Proposed Action. Per the requirements of 32 CFR 989, the Air Force EIAP regulations, selection standards are used to identify alternatives for meeting the purpose and need. Selection standards are based on the purpose and need statement (**Section 1.3**) and are used to develop and narrow the range of reasonable alternatives.

Potential alternatives of the Proposed Action were each evaluated based on three selection standards:

- **Standard 1**: The alternative(s) must meet the purpose of and need for the Proposed Action (**Section 1.3**), to stem further erosion and loss of land (and associated resources) at TA1. The alternative(s) must also address the need to host the 633rd Air Base Wing and to train service members in transportation, aviation maintenance, logistics and deployment doctrine and applicable Air Force, State, and Federal requirements.

- **Standard 2**: The alternative(s) must provide long-term stability and durability to represent a sustainable alternative that is reasonable for the Air Force to maintain and would continue to prevent the further loss of land.
- **Standard 3**: The alternative(s) must maintain the natural functionality and connectivity of the ecosystem associated with the tidal shoreline of the Project Area.

2.4 SCREENING OF ALTERNATIVES

Screening is a process that evaluates an alternative's ability to fulfill an action's purpose and need while meeting the Air Force's mission standards. Alternatives are assessed relative to the selection standards, where applicable. Alternatives that met all selection standards were considered reasonable and retained for consideration in this EA. Alternatives that did not meet one or more of the standards were considered unreasonable and were dismissed from further consideration in this EA.

In August 2015, JBLE-Eustis developed a Corrective Action Plan (CAP) to provide an analysis and develop conceptual design options to address the ongoing shoreline erosion and bluff failure located at TA1; the CAP identified three options (USAF, 2015). The development of the CAP was supported by a Phase II Cultural Resources Survey of TA1 in 2014 and 2015, and topographic surveys of the Project Area in February 2015. Based on the screening criteria, all three options identified within the 2015 CAP were carried forward and analyzed in this EA as reasonable alternatives. Detailed descriptions of these three alternatives are provided in **Section 2.5**. As required under the CEQ regulations (40 CFR §1502.14), a No Action Alternative is also considered and described in **Section 2.5**. The CAP is provided in **Appendix C** of this EA.

2.5 ALTERNATIVES CONSIDERED

2.5.1 Alternatives Evaluated

NEPA, CEQ regulations, and Air Force NEPA regulations require a range of reasonable alternatives to be explored and evaluated objectively. As described in **Section 2.5**, the Air Force is considering four proposed alternatives, which includes the No Action Alternative, towards meeting the objectives and goals of the Proposed Action. Detailed descriptions of these alternatives are provided in this section.

2.5.1.1 Alternative A – Marsh Management

Construction of Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. This alternative would be implemented in areas higher than the Mean-Tide Level (MTL) where there is minimal wave action and boat wake. This alternative includes proposed adjacent bank grading, a fiber log, vegetation restoration, and long-term vegetation management, as detailed below.

Under Alternative A, approximately 875 LF of fiber (a coconut fiber, or coir) log would be placed to protect existing and enhanced marsh. The 20-inch coir log would be installed at MTL. Slopes behind the coir log would be graded to between 8:1 and 10:1. The existing offshore area surrounding TA1 is generally naturally within this slope range; however, if necessary, coarse-grained sand fill would be used to achieve the desired slope.

Behind the coir log (i.e., upgradient), existing marsh areas would be enhanced and new marsh areas would be planted. A low-marsh would be established from the coir log to the mean high water (MHW) line, while a high marsh would be established above the MHW to approximately 3 to 4 feet above mean low water (MLW). The low marsh would be planted with smooth cordgrass (*Spartina alterniflora*), and the high marsh would be planted with saltmeadow cordgrass (*Spartina patens*) and saltgrass (*Distichlis spicata*). Beyond the high marsh, a 4-foot wide tidal shrub zone would be planted to help stabilize the toe of the slope. This zone would be planted with native tidal shrubs such as marsh elder (*Iva frutescens*) and groundsel tree (*Baccharis halimifolia*).

Additionally, where necessary, banks would be graded to a slope of 2:1 to repair the steep, unstable banks and prevent future erosion of those banks from impacting enhanced and newly-planted marshes. Permanent stabilization of these banks would be obtained with the installation of 4,480 LF of ECM.

A long-term vegetation management and maintenance program would be necessary to maintain this alternative. Long-term vegetation management would include selective tree pruning and clearing, the removal of shoreline debris (particularly after storm events), visual inspections of the restoration status, maintenance of the coir log as needed, and future, supplemental plantings as deemed necessary.

An illustration of the proposed design for Alternative A is shown on page 3 of the CAP in **Appendix C**. **Table 2-1** shows the construction activities and area of disturbance or work for these activities under Alternative A, as well as for Alternatives B and C.

Table 2-1: Comparison of Construction Activities between Alternatives

Construction Activity	Unit	Alternative A Marsh Management	Alternative B Living Shoreline	Alternative C Concrete Bulkhead	No Action Alternative
Clearing and Grubbing	acre	0.2	1.0	1.0	--
Earthwork Grading	CY	1,200	2,556	1,019	--
Coir Log	LF	875	--	--	--
Stone Sill	LF	--	1,150	200	--
Concrete Bulkhead	LF	--	--	500	--
Marsh Plantings*	Each	4,930	12,975	2,256	--
Tidal Shrub Plantings*	Each	2,345	3,244	510	--
Native Upland Seeding	SY	--	3,227	1,854	--
Stabilization	SF	4,480	--	--	--
Oyster Reef	--	--	To be determined during final design phase.	--	--

*1.5-feet on center plantings
CY = cubic yards; LF = linear feet; SY = square yards

2.5.1.2 Alternative B - Living Shoreline

Alternative B would employ a living shoreline design to create a structural solution that maintains the natural functionality and connectivity of the existing ecosystem. When compared to Alternative A, Alternative B would be suitable for areas that have increased tidal ranges and boat wake. This alternative includes

proposed adjacent bank grading, a stone structure, an oyster reef, vegetation restoration, and long-term vegetation management, as detailed below.

Under Alternative B, approximately 1,150 LF of a stone structure called a “sill” would be constructed. A sill is used to contain sand fill that is placed to support a newly-planted marsh area. Banks behind the sill would be graded to range between slopes of 8:1 and 10:1. The sill would be placed seaward from the existing shoreline in an attempt to balance the cut/fill required as part of the adjacent grading. The sill would be located at an elevation near MLW, with a height between 0 and 1 foot above MHW to allow for regular wave overtopping. Since the total sill length would be greater than 100 feet, tidal gaps would be strategically placed along the sill to allow for the draining of the land areas behind the sill, as well as providing connectivity between ecosystems.

Under Alternative B, a low and high marsh and a tidal shrub zone would be planted in the same manner as Alternative A (**Section 2.5.1.1**). The sand fill would be required to settle for one to two weeks before planting, which would allow verification of accurate tide levels within the planting area and appropriate adjustments to the slope or height of the marsh area as necessary prior to planting. Additionally, Alternative B includes the application of a native upland seed mix to be blended with the existing vegetation, creating a connected ecosystem.

Alternative B would also include the construction of structural, man-made oyster reefs. The oyster reefs would be concrete/granite structures constructed within shallow, near-shore water adjacent to the shoreline. Once complete, the oyster reefs would serve as a barrier between the near- and far-shore, thereby aiding in the protection of the shoreline. The oyster reefs would be installed such that they provide appropriate substrate and habitat for the eastern oyster *(Crassostrea virginica*) and blue crab (*Callinectes sapidus*). These man-made habitat structures intend to promote the recovery and/or enhancement of habitat for these species and promote overall shoreline and near-shore biodiversity.

As with Alternative A, a long-term vegetation management and maintenance program would be necessary to maintain Alternative B. Long-term vegetation management under Alternative B would be the same as described for Alternative A (**Section 2.5.1.1**). Additionally, long-term management of the oyster reefs would be required. This would involve monitoring the oyster reefs’ performance and integrity over time; monitoring the rehabilitation of the eastern oyster, blue crab, and other natural resources; training personnel to perform such assessments; and communicating and recording the successes and challenges of the oyster reefs for potential future implementation at other coastal military installations.

An illustration of the proposed design for Alternative B is shown on page 4 of the CAP in **Appendix C**. **Table 2-1** in **Section 2.5.1.1** shows the construction activities and area of disturbance or work for these activities under Alternative B, as well as for Alternatives A and C.

2.5.1.3 Alternative C – Concrete Bulkhead

Alternative C would include the construction of 500 LF of precast concrete walls, called “bulkheads,” for the purposes of stabilizing sections of eroded shoreline, and focusing on bluff areas that have eroded into steep and unstable banks. Bulkheads would also be constructed in areas where there is frequent navigation as more environmentally preferred designs would preclude or impair navigation use. During construction of Alternative C, bulkheads would be placed in an excavated trench before compacted soil backfill is placed in the trench on top of the rear anchor to hold the bulkhead in place.

Banks adjacent to the bulkhead would be graded. Banks with slope ranges between 6:1 and 3:1 would be the target of the grading; existing, natural topography, adjacent land uses, and potential design

combinations with other shoreline protection measures would also be considered when targeting banks for grading. Unlike Alternatives A and B, a steeply sloped bank could remain in some cases, as upland areas would not be exposed to regular wave action with the implementation of a bulkhead.

In additional to the bulkhead, Alternative C would include a sill on 200 LF of eroded shoreline adjacent to a pedestrian bridge. The sill would be constructed as described in **Section 2.5.1.2** for Alternative B's proposed sill, including the adjacent bank grading to achieve a slope ranging from 8:1 to 10:1. The sill proposed under Alternative C intends to protect the foundation of the existing pedestrian bridge without requiring modifications to the bridge.

Under Alternative C, a low and high marsh and a tidal shrub zone would be planted in the same manner as Alternative A (**Section 2.5.1.1**). However, as with Alternative B, the sand fill would settle for one to two weeks before planting and planting would include the application of a native upland seed mix.

Long-term vegetation management and maintenance program would be necessary to maintain Alternative C and would be the same as described for Alternative A (**Section 2.5.1.1**). An illustration of the proposed design for Alternative C is shown on page 5 of the CAP in **Appendix C**. **Table 2-1** in **Section 2.5.1.1** shows the construction activities and area of disturbance or work for these activities under Alternative C, as well as for Alternatives A and B.

2.5.1.4 No Action Alternative

Under the No Action Alternative, the Air Force would retain the existing conditions of the eroded site. No construction, alteration, improvement/rehabilitation, or planting of vegetation would be performed. The long-term shoreline erosion rate would continue at the documented 0.6 feet of land per year, with potentially greater localized erosion rates (Virginia Institute of Marine Science, 2010). There would be continued vegetation and wildlife habitat loss. Trees along the bluff rim would continue to arch and collapse along the shoreline and into the waterway. The upland bluff would continue to erode, and soil and sediment loss would continue to collapse onto the shoreline and subsequently into Skiffes Creek. In addition to the loss of land and natural resources, erosion would continue to impact an adjacent archaeological site that may be eligible for listing in the NRHP.

Continued erosion would result in the additional loss of land and subsequently continue to impact the quality of training on JBLE-Eustis. While the No Action Alternative would not meet the Proposed Action's purpose and need, it is analyzed in this EA to provide a comparative baseline as required under the CEQ regulations (40 CFR §1502.14).

2.5.2 Alternatives Considered but Eliminated from Further Consideration

Alternative A, B, C and the No Action Alternative are the only alternatives considered by the Air Force. No other alternatives were considered as no other options met the selection standards and screening criteria as described in **Sections 2.3** and **2.4**, respectively.

2.6 OTHER FUTURE ACTIONS IN THE REGION

Cumulative impacts result from "the incremental impact of actions when added to other past, present, and reasonably foreseeable future actions regardless of what agency undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR Parts 1500-1508).

Due to the remote location of TA1, only three other proposed or current construction or development projects have been identified in the region, including a maintenance dredging project proposed by the US Army in the Third Port area of Skiffes Creek to support vessel movement. The US Army projects that this maintenance dredging would occur in the year 2021. Cumulative impacts are further discussed in **Section 4.12**.

2.7 COMPARISON OF ENVIRONMENTAL IMPACTS

Table 2-2 presents a comparative analysis of the alternatives for each resource evaluated in this EA. A detailed discussion of potential effects is presented in **Chapter 4.0**, Environmental Consequences.

Table 2-2: Comparison of Environmental Impacts

Resource Area	Alternative A – Marsh Management	Alternative B – Living Shoreline	Alternative C – Concrete Bulkhead	No Action Alternative
Land Use and Aesthetics (Section 4.2)	*Short-term, less-than-significant adverse* impacts on land use due to temporary closure of TA1; *short-term, less-than-significant adverse* impacts on aesthetics due to construction activities in the viewshed; *long-term beneficial* impacts due to preserved land use and visual quality of the area. **Impacts would be less than Alternatives B and C.**	*Short-term, less-than-significant adverse* impacts on land use due to temporary closure of TA1; *short-term, less-than-significant adverse* impacts on aesthetics due to construction activities in the viewshed; *long-term beneficial* impacts due to preserved land use and visual quality of the area. **Impacts would be greater than Alternative A, but less than Alternative C.**	*Short-term, less-than-significant adverse* impacts on land use due to temporary closure of TA1; *short-term, less-than-significant adverse* impacts on aesthetics due to construction activities in the viewshed; *long-term, less-than-significant adverse* impact to aesthetics due to bulkheads altering the viewshed; *long-term beneficial* impacts due to preserved land use and visual quality of the area. **Impacts would be greater than Alternatives A and B.**	*Short- and long-term, less-than-significant adverse* impacts on land use and aesthetics from continued erosion and degradation of TA1.
Topography, Geology, and Soils (Section 4.3)	*Short-term, less-than-significant adverse* impacts on topography due to grading activities; *long-term beneficial* impacts on topography due to stabilization of slopes and decreased erosion. **Impacts would be less than Alternative B, but greater than Alternative C.**	*Short-term, less-than-significant adverse* impacts on topography due to grading activities; *long-term beneficial* impacts on topography due to stabilization of slopes and decreased erosion. **Impacts would be greater than Alternatives A and C.**	*Short-term, less-than-significant adverse* impacts on topography due to grading activities; *long-term beneficial* impacts on topography due to stabilization of slopes and decreased erosion. **Impacts would be less than Alternatives A and B.**	***Long-term*, potentially *significant adverse*** impacts on soils and topography from continued and increased erosion and sedimentation at TA1.

Table 2-2: Comparison of Environmental Impacts

Resource Area	Alternative A – Marsh Management	Alternative B – Living Shoreline	Alternative C – Concrete Bulkhead	No Action Alternative
Topography, Geology, and Soils (Section 4.3) (Cont.)	*Short-term less-than-significant adverse* impacts on soils from construction disturbance; *long-term beneficial* impacts on soils from prevention of future erosion. **Impacts would be less than Alternatives B and C.** *No impacts* on geology.	*Short-term less-than-significant adverse* impacts on soils from construction disturbance; *long-term beneficial* impacts on soils from prevention of future erosion. **Impacts would be greater than Alternative A, but less than Alternative C.** *No impacts* on geology.	*Short-term less-than-significant adverse* impacts on soils from construction disturbance; *long-term beneficial* impacts on soils from prevention of future erosion. **Impacts would be greater than Alternatives A and B.** *No impacts* on geology.	
Munitions and Restoration Sites (Section 4.4)	*Short- and long-term*, *negligible adverse* impacts on IRP sites from potential risk of contaminant disturbance and accidental discharge to Bailey Creek and from potential release of hazardous materials and waste during construction and maintenance; *no impacts* to MMRP sites. **Impacts would be the same across all Alternatives.**	*Short- and long-term*, *negligible adverse* impacts on IRP sites from potential risk of contaminant disturbance and accidental discharge to Bailey Creek and from potential release of hazardous materials and waste during construction and maintenance; *no impacts* to MMRP sites. **Impacts would be the same across all Alternatives.**	*Short- and long-term*, *negligible adverse* impacts on IRP sites from potential risk of contaminant disturbance and accidental discharge to Bailey Creek and from potential release of hazardous materials and waste during construction and maintenance; *no impacts* to MMRP sites. **Impacts would be the same across all Alternatives.**	*Short- and long-term, less-than-significant adverse* impacts on IRP sites from continued erosion causing potential migration of contaminants.

Table 2-2: Comparison of Environmental Impacts

Resource Area	Alternative A – Marsh Management	Alternative B – Living Shoreline	Alternative C – Concrete Bulkhead	No Action Alternative
Water Resources (Section 4.5)	*Short-term, less-than-significant adverse* impacts to surface water and water quality due to increased sedimentation and turbidity from construction activities; *long-term beneficial* impacts to water quality resulting from the minimized erosion events decreasing sedimentation and reducing turbidity. **Impacts would be less than Alternatives B and C.** *Short- and long-term less-than-significant* impacts to groundwater from potential releases of petroleum or other hazardous products. **Impacts would be the same across all Alternatives.**	*Short-term, less-than-significant adverse* impacts to surface water and water quality due to increased sedimentation and turbidity from construction activities; *long-term beneficial* impacts to water quality resulting from the minimized erosion events decreasing sedimentation and reducing turbidity. **Impacts would be greater than Alternative A, but less than Alternative C.** *Short- and long-term less-than-significant* impacts to groundwater from potential releases of petroleum or other hazardous products. **Impacts would be the same across all Alternatives.**	*Short-term, less-than-significant adverse* impacts to surface water and water quality due to increased sedimentation and turbidity from construction activities; *long-term beneficial* impacts to water quality resulting from the minimized erosion events decreasing sedimentation and reducing turbidity. **Impacts would be greater than Alternatives A and B.** *Short- and long-term less-than-significant* impacts to groundwater from potential releases of petroleum or other hazardous products. **Impacts would be the same across all Alternatives.**	***Long-term, potentially significant adverse*** impacts to surface water quality due to continued erosion of the shoreline.

Table 2-2: Comparison of Environmental Impacts

Resource Area	Alternative A – Marsh Management	Alternative B – Living Shoreline	Alternative C – Concrete Bulkhead	No Action Alternative
Water Resources (Section 4.5) (Cont.)	*Short-term, less-than-significant adverse* impacts to floodplains due to construction activities occurring within the floodplain; *long-term beneficial* impacts on floodplains due to shoreline stabilization methods providing floodplain protection along the shoreline. **Impacts would be less than Alternatives B and C.** Alternative A would be consistent to the maximum extent practicable with enforceable policies of the Virginia CZMP.	*Short-term, less-than-significant adverse* impacts to floodplains due to construction activities occurring within the floodplain; *long-term beneficial* impacts on floodplains due to shoreline stabilization methods providing floodplain protection along the shoreline. **Impacts would be greater than Alternative A, but less than Alternative C.** Alternative B would be consistent to the maximum extent practicable with enforceable policies of the Virginia CZMP.	*Short-term, less-than-significant adverse* impacts to floodplains due to construction activities occurring within the floodplain; *long-term beneficial* impacts on floodplains due to shoreline stabilization methods providing floodplain protection along the shoreline. **Impacts would be greater than Alternatives A and B.** Alternative C would be consistent to the maximum extent practicable with enforceable policies of the Virginia CZMP.	***Long-term, potentially significant adverse*** impacts on groundwater or floodplains.

Table 2-2: Comparison of Environmental Impacts

Resource Area	Alternative A – Marsh Management	Alternative B – Living Shoreline	Alternative C – Concrete Bulkhead	No Action Alternative
Biological Resources (Section 4.6)	*Short-term, less-than-significant adverse* impacts on vegetation due to construction clearing and grubbing; *long-term beneficial* impacts on vegetation due to creation of permanent habitat and new tidal shrub and marsh plantings. **Adverse impacts would be less than Alternatives B and C; beneficial impacts would be less than Alternative B, but greater than Alternative C.** *Short-term, less-than-significant adverse* impacts to both terrestrial and aquatic wildlife due to construction disturbance; *long-term beneficial* impacts to terrestrial or aquatic wildlife due to habitat preservation and increased water quality. **Adverse impacts would be less than Alternatives B and C; beneficial impacts would be less than Alternative B, but greater than Alternative C.**	*Short-term, less-than-significant adverse* impacts on vegetation due to construction clearing, grubbing, and sill placement; *long-term beneficial* impacts on vegetation due to creation of permanent habitat, new tidal shrub and marsh plantings, and new oyster reefs. **Adverse impacts would be greater than Alternative A, but less than Alternative C; beneficial impacts would be greater than Alternatives A and C.** *Short-term, less-than-significant adverse* impacts to both terrestrial and aquatic wildlife due to construction disturbance; *long-term beneficial* impacts to terrestrial or aquatic wildlife due to habitat preservation and increased water quality. **Adverse impacts would be greater than Alternative A, but less than Alternative C; beneficial impacts would be greater than Alternatives A and C.**	*Short-term, less-than-significant adverse* impacts on vegetation due to construction clearing, grubbing, and bulkhead placement; *long-term beneficial* impacts on vegetation due to creation of permanent habitat and new marsh plantings. **Adverse impacts would be greater than Alternatives A and B; beneficial impacts would be less than Alternatives A and B.** *Short-term, less-than-significant adverse* impacts to both terrestrial and aquatic wildlife due to construction disturbance; *long-term beneficial* impacts to terrestrial or aquatic wildlife due to habitat preservation and increased water quality. **Adverse impacts would be greater than Alternatives A and B; beneficial impacts would be less than Alternatives A and B.**	***Short- and long-term, potentially significant adverse*** impacts to biological resources due to increasing loss of land and degradation of aquatic habitats from continued and increased erosion.

Table 2-2: Comparison of Environmental Impacts

Resource Area	Alternative A – Marsh Management	Alternative B – Living Shoreline	Alternative C – Concrete Bulkhead	No Action Alternative
Biological Resources (Section 4.6) (Cont.)	*Short-term, less-than significant adverse* impacts to special status species from construction disturbance; *long-term, beneficial* impacts on special status species from enhanced terrestrial and aquatic habitats. **Adverse impacts would be less than Alternatives B and C; beneficial impacts would be less than Alternative B, but greater than Alternative C.** *Short-term, less-than significant adverse* impacts to sensitive habitats, including wetlands, RPAs, and EFH, due to construction-related disturbances; *long-term beneficial* impacts due to habitat enhancement from stabilization of the shoreline. **Adverse impacts would be less than Alternatives B and C; beneficial impacts would be less than Alternative B, but greater than Alternative C.**	*Short-term, less-than significant adverse* impacts to special status species from construction disturbance; *long-term, beneficial* impacts on special status species from enhanced terrestrial and aquatic habitats. **Adverse impacts would be greater than Alternative A, but less than Alternative C; beneficial impacts would be greater than Alternatives A and C.** *Short-term, less-than significant adverse* impacts to sensitive habitats, including wetlands, RPAs, and EFH, due to construction-related disturbances; *long-term, less-than-significant adverse* impacts due to permanent structural disturbance and loss of habitat; *long-term beneficial* impacts due to habitat enhancement from stabilization of the shoreline. **Adverse impacts would be greater than Alternative A, but less than Alternative C; beneficial impacts would be greater than Alternatives A and C.**	*Short-term, less-than significant adverse* impacts to special status species from construction disturbance; *long-term, beneficial* impacts on special status species from enhanced terrestrial and aquatic habitats. **Adverse impacts would be greater than Alternatives A and B; beneficial impacts would be less than Alternatives A and B.** *Short-term, less-than significant adverse* impacts to sensitive habitats, including wetlands, RPAs, and EFH, due to construction-related disturbances; *long-term, less-than-significant adverse* impacts due to permanent structural disturbance and loss of habitat; *long-term beneficial* impacts due to habitat enhancement from stabilization of the shoreline. **Adverse impacts would be greater than Alternatives A and B; beneficial impacts would be less than Alternatives A and B.**	

Table 2-2: Comparison of Environmental Impacts

Resource Area	Alternative A – Marsh Management	Alternative B – Living Shoreline	Alternative C – Concrete Bulkhead	No Action Alternative
Cultural Resources (Section 4.7)	*No adverse effect* on archaeological resources with implementation of design avoidance; *long-term beneficial* impact on cultural resources from shoreline stabilization and preservation of resources. **Impacts would be the same across all Alternatives.**	*No adverse effect* on archaeological resources with implementation of design avoidance; *long-term beneficial* impact on cultural resources from shoreline stabilization and preservation of resources. **Impacts would be the same across all Alternatives.**	*No adverse effect* on archaeological resources with implementation of design avoidance; *long-term beneficial* impact on cultural resources from shoreline stabilization and preservation of resources. **Impacts would be the same across all Alternatives.**	***Long-term potentially significant adverse*** impacts due to continued erosion degrading the integrity of cultural resources at TA1.
Air Quality (Section 4.8)	*Short-term, less-than-significant adverse* impacts on air quality due to construction-related emissions. **Impacts would be less than Alternatives B and C.**	*Short-term, less-than-significant adverse* impacts on air quality due to construction-related emissions. **Impacts would be greater than Alternatives A and C.**	*Short-term, less-than-significant adverse* impacts on air quality due to construction-related emissions. **Impacts would be greater than Alternative A, but less than Alternative B.**	*No impacts* on air quality.

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3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the existing environmental conditions at JBLE-Eustis TA1 in Newport News, VA. It provides information to serve as a baseline from which to identify and evaluate potential environmental changes associated with implementation of the Proposed Action. Impacts on the resources described in this chapter are presented in **Chapter 4.0**.

The Region of Influence (ROI) is defined for each resource potentially affected by the proposed alternatives. The ROI determines the geographical area to be addressed as the Affected Environment. The ROI is contiguous with the boundary of TA1 for some resources, and may extend beyond those boundaries for other resources.

Resources dismissed from detailed analysis in the EA, and the justification for their dismissal, are presented in **Section 1.4**.

3.2 LAND USE AND AESTHETICS

This section describes the existing land use and aesthetics at or near JBLE-Eustis TA1. Land use and aesthetics generally either refers to human modification of land for residential or economic purposes, or the use of land for preservation or protection of natural resources such as wildlife habitat, vegetation, or unique features. The shoreline of TA1 can be seen from boat traffic along Skiffes Creek; much of the shoreline along Skiffes Creek is heavily forested, thus restricting the viewshed of TA1. The ROI for examining land use and aesthetics includes TA1, the surrounding shoreline, and areas within the viewshed of the Proposed Action area.

Land use within TA1 is split between military training use and recreational use. Military training use includes tactical bivouac, land navigation, military dog handling, and small unit tactics. Recreational land uses include deer hunting and fishing. TA1 is primarily comprised of undeveloped land except for a road that runs down the middle of the peninsula (**Figure 1-2**). TA1, like most training areas at JBLE, is managed by the Integrated Training Area Management program for military training purposes and by JBLE-Eustis wildlife biologists and foresters for fish and wildlife needs, recreational hunting, and commercial timber production (Fort Eustis, 2019)

TA1 is located on the boundary of JBLE-Eustis. Multiple businesses are located within 1 mile to the north-east of JBLE's boundary in the City of Newport News, VA. They include Custom Integrated Technology, Interstate Warehousing, Newport News Industrial Corporation, High Liner Foods, Swisslog Logistics Inc., Advanced Electrical Service Inc., Breeger Media Group, and Harwood & Enterprise. These businesses are mostly technology and manufacturing centered and located along Enterprise Drive. The land to the north and west across Skiffes Creek consists of marsh and undeveloped forest. The land across Skiffes Creek to the west is part of JBLE-Eustis and used as a training area (TA30) for special operations and small unit tactics. To the south across Bailey Creek, is TA27, which is used for landship & crane, terminal cargo handling, vessel management, and operations training (Fort Eustis, 2019).

3.3 TOPOGRAPHY, GEOLOGY, AND SOILS

Topography is the change in elevation over the surface of a land area. An area's topography is influenced by many factors, including human activity, underlying geologic material, seismic activity, climatic conditions, and erosion. Geological resources consist of surface and subsurface materials and their properties. Principal geologic factors influencing the ability to support structural development are seismic properties (i.e., potential for subsurface shifting, faulting, or crustal disturbance), soil stability, and topography. The term *soil,* in general, refers to unconsolidated materials overlying bedrock or other parent material. Soil structure, elasticity, strength, shrink-swell potential, and erodibility all determine the ability for the ground to support man-made structures. Soils typically are described in terms of their complex type, slope, physical characteristics, and relative compatibility or constraining properties with regard to particular construction activities and types of land use.

The ROI for topography, geology, and soils includes the boundary of TA1.

3.3.1 Topography

JBLE-Eustis is located on the Atlantic Coastal Plain Province and is characterized by low and flat terrain. Elevations on the installation range from approximately 5 feet above mean sea level (AMSL) on Mulberry island to approximately 30 feet AMSL on the main cantonment area (Fort Eustis, 2019). Elevations in the Proposed Action area range from approximately 23 feet AMSL in the upland areas to sea level along the shoreline (USGS, 2019), **Figure 3-1**. A slope between 8:1 and 10:1 is typical of the shoreline areas. However, shoreline erosion has caused the bluffs in some areas to slope sharply, particularly on the northern side of the site, where land drops sharply between 2.6 and 13.1 feet (JBLE, 2016).

3.3.2 Geology

JBLE-Eustis lies on the Princess Anne terrace formation, which formed 10,000 to 1.6 million years ago during the Pleistocene. Approximately 2,000 feet of unconsolidated Cretaceous (66 to 144 million years ago) and Tertiary (28 to 66 million years ago) period sediments separated by an unconformity lie between the terrace and the granite basement rock. Virginia is considered to be relatively active seismically, but earthquakes are rarely strong. Since records have been kept, no earthquakes have been centered in the JBLE-Eustis area (Fort Eustis, 2019). No geologic hazards are known to be present at JBLE-Eustis.

3.3.3 Soils

There are seven soil associations on JBLE-Eustis in addition to disturbed or urban soils. The soil associations include two general groups: low river terrace and marsh soils, and low coastal plain upland soils (Fort Eustis, 2019). Soils within the project area are described in **Table 3-1** and illustrated in **Figure 3-2.**

The Farmland Protection Policy Act (FPPA) (7 USC 4201 et seq.) of 1981 states that Federal agencies must "minimize the extent to which Federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses". The resources protected by the FPPA include prime and unique farmland. These lands are categorized by the Natural Resource Conservation Service (NRCS) based on underlying soil characteristics, which would be favorable for production of food, feed, forage, fiber, and oilseed crops. The proposed site does not contain prime farmland; however, one soil type (Nevarc-Uchee complex, 6 to 15 percent slopes) is classified as farmland of statewide importance (**Table 3-1**). Because JBLE is designated and used for Federal government purposes rather than farming practices, the FPPA does not apply to soils within JBLE.

Figure 3-1: Topography at TA1

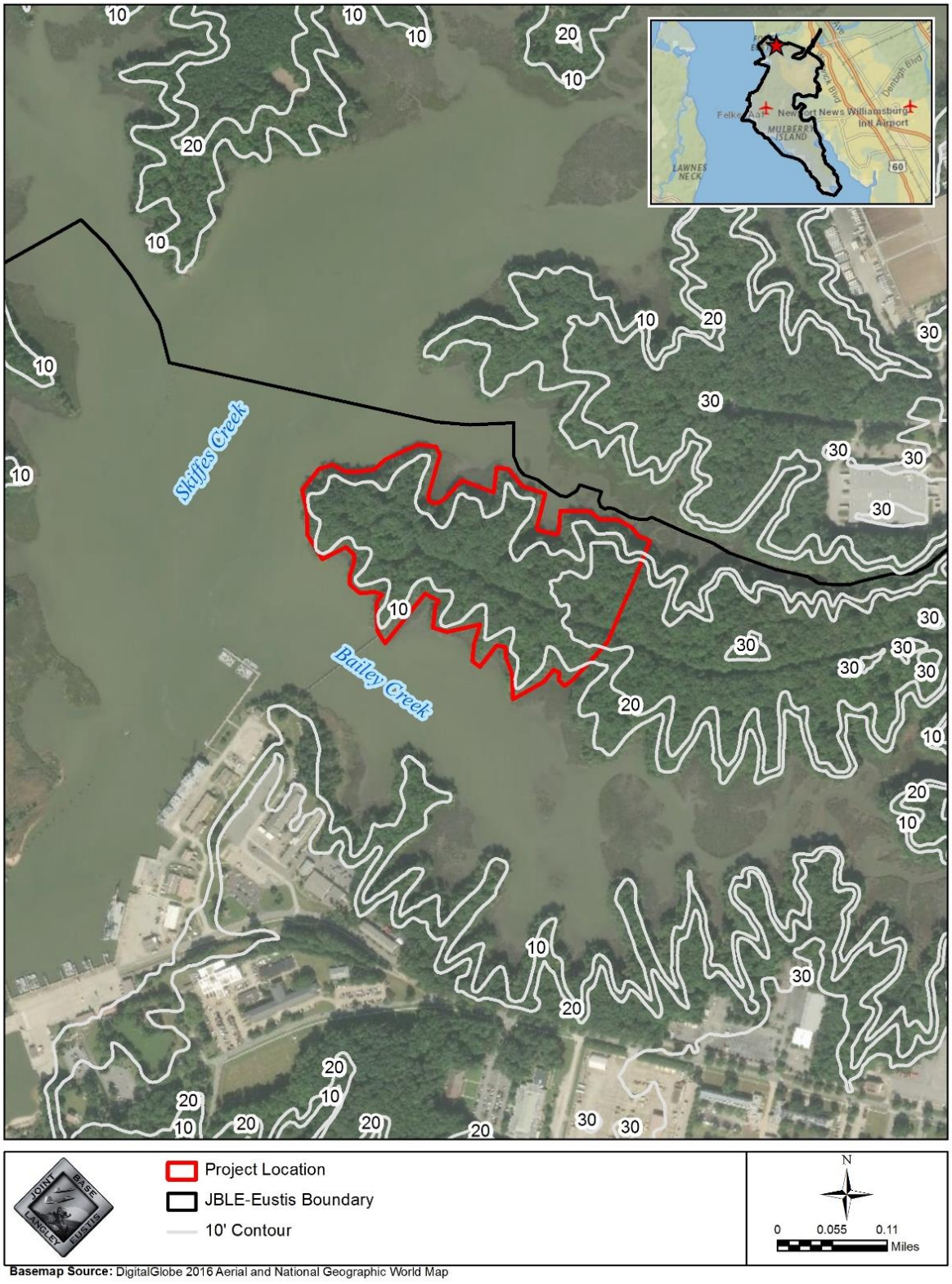
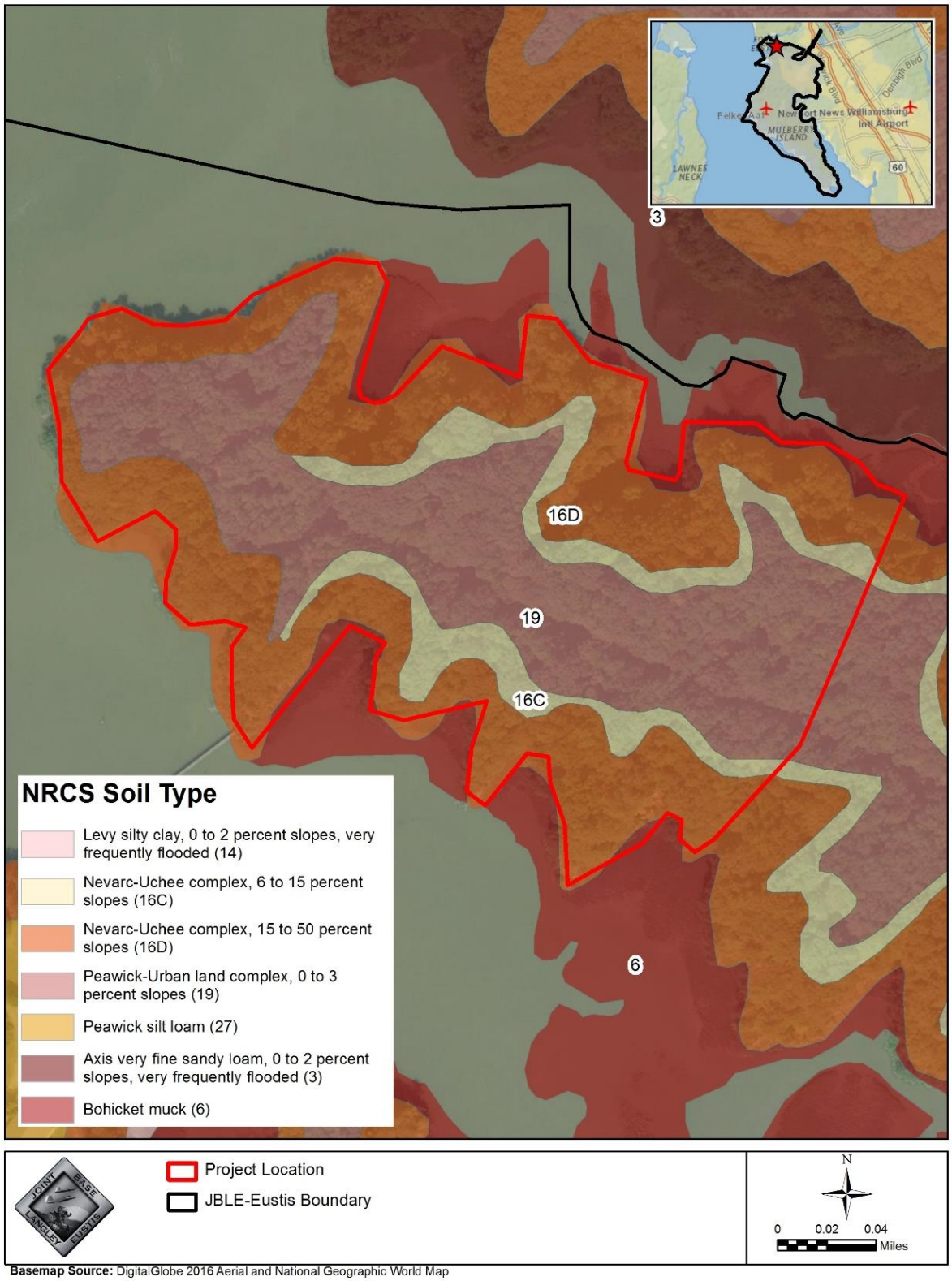


Figure 3-2: Soils at TA1



Hydric soils are defined as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Under natural conditions, these soils are able to support growth and reproduction of hydrophytic vegetation. One soil type at TA1 (Bohicket muck, 0 to 1 percent slopes) is classified as a hydric soil (**Table 3-1**). Presence of hydric soils is one of the criteria used to identify and delineate wetlands. A discussion of wetlands at TA1 is provided in **Section 3.6**.

Table 3-1: Select Soil Characteristics

Soil Type	Acres	Prime Farmland	Hydric	Farmland of Statewide Importance	Landform / Description
Bohicket muck, 0 to 1% slopes, very frequently flooded	2.7	No	Yes	No	Tidal marshes; very poorly drained soils; depth to water table is 0 inches. Depth to bedrock is greater than 80 inches.
Nevarc-Uchee complex, 6 to 15 percent slopes	3.7	No	No	Yes	Marine terraces; moderately well-drained soils; depth to the water table is about 18 to 36 inches. Depth to bedrock is greater than 80 inches.
Nevarc-Uchee complex, 15 to 50 percent slopes	14.7	No	No	No	Marine terraces; moderately well-drained soils; depth to the water table is about 18 to 36 inches. Depth to bedrock is greater than 80 inches.
Peawick-Urban land complex, 0 to 3 percent slopes	12.1	No	No	No	Stream terraces; moderately well drained soils; depth to water table is about 18 to 36 inches

Source: (NRCS, 2019)

3.4 MILITARY MUNITIONS AND RESTORATION SITES

As previously discussed in **Section 1.4**, hazardous materials and waste are not evaluated in this EA as these items would be managed in accordance with applicable regulations and procedures; thus, impacts from hazardous materials and waste would not be expected. This section discusses environmental cleanup programs and existing contamination sites at JBLE-Eustis. The ROI for evaluating military munitions and restoration sites includes the boundary of TA1 and the surrounding shoreline.

The DoD has developed the Environmental Restoration Program (ERP) to facilitate thorough investigation and cleanup of contamination sites located at military installations. Under a Federal Facilities Agreement with the USEPA Region III, ERP conducts remedial actions to address contamination and long-term management of sites governed by CERCLA and applicable Federal, State, local, and DoD requirements (Fort Eustis, 2019). This program, in addition to established legislation, effectively form the “safety net” intended to protect the environment from contamination.

Under the ERP, environmental remediation at JBLE-Eustis is conducted through two subprograms: the Installation Restoration Program (IRP) and the Military Munitions Response Program (MMRP). The IRP addresses the identification and investigation of non-RCRA hazardous substances and pollutants on military lands. IRP conducts remedial actions to achieve acceptable human health and ecological risk, as agreed to by the Air Force, VDEQ, and USEPA Region III (Fort Eustis, 2019). MMRP addresses the identification and investigation of unexploded ordnance, discarded military munitions, and munitions constituents at closed, transferring, or transferred military ranges. Using a process consistent with

CERCLA, MMRP conducts remedial actions to achieve acceptable human health and ecological risk, as agreed to by the Air Force, VDEQ, and USEPA Region III (Fort Eustis, 2019).

In 1994, Fort Eustis was listed on the National Priorities List (Superfund) (USEPA, 2019a). Bailey Creek, which borders the southern shoreline of TA1, is classified as an active IRP site due to high concentrations of polychlorinated biphenyls (PCB) in sediments and clay (**Figure 1-2**) (Fort Eustis, 2019). In 2012, remedial activities were implemented at Bailey Creek in accordance with the *Final Remedial Design/Remedial Action Work Plan* (Kemron, 2011). However, additional investigations conducted in 2014 revealed that PCB concentrations were still above the 1 mg/kg remediation goal threshold in and surrounding the Outfall No. 18 tributary drainage swale (USAF, 2017a). Outfall No. 18 is located on the southern side of Bailey Creek, over 0.5 mile away from TA1. Additional remedial actions for Outfall No. 18 have been recommended to continue minimizing risks to humans and wildlife, as well as reducing PCB concentrations in surface sediments and reducing the potential for further migration of contamination within Bailey Creek (USAF, 2017a; Weston Solutions, Inc., 2019). Currently, Bailey Creek is closed to recreational fishing, swimming, and wading, and is under a fish consumption advisory and shellfish condemnation from the Virginia Department of Health (USAF, 2017a).

No MMRP sites exist on or near the Proposed Action area; the nearest MMRP site is at a shotgun range approximately two miles east (Fort Eustis, 2019).

3.5 WATER RESOURCES

Water resources analyzed in this EA include surface water, groundwater, and floodplains. Natural surface water resources include tidal and non-tidal sources. Groundwater can be defined as subsurface water resources that are interlaid in layers of rock and soil and recharged by surface water seepage. Other issues relevant to water resources include watershed areas affected by existing and potential hazards related to floodplains. Additionally, this EA includes analysis of coastal resources for consistency with the CZMA.

The ROI for water resources consists of TA1 and the surrounding shoreline, as well as Bailey Creek and Skiffes Creek.

3.5.1 Surface Water

The Proposed Action area is a peninsula surrounded by Bailey Creek on one side and Skiffes Creek on two sides (**Figure 3-3**). Because of the predominance of wetlands in the ROI (approximately 4.75 acres), standing surface water is typical throughout much of the area. Wetlands are further discussed in **Section 3.6.4.2**.

Section 303 of the CWA and the State Water Control Law mandate the protection of existing high-quality state waters and provides for the restoration of all other state waters. Water quality standards are typically measured by specific physical, chemical, biological or radiological thresholds necessary to meet and maintain designated uses of waters, such as swimming and other water-based recreation, public water supply, and aquatic habitat.

The waters of the James River, which borders JBLE to the south, does not meet Federal/State water quality standards per the 2018 Virginia Water Quality Assessment (VDEQ, 2019b). Total maximum daily loads have been established for some of the parameters causing impairment within this river. Additionally, Bailey Creek is also listed as impaired for recreation, aquatic life, and fish consumption, due to high levels of

bacteria (e.g., *Escherichia coli*), chemicals (e.g., PCBs and aldrin), and low benthic-macroinvertebrate counts.

3.5.2 Groundwater

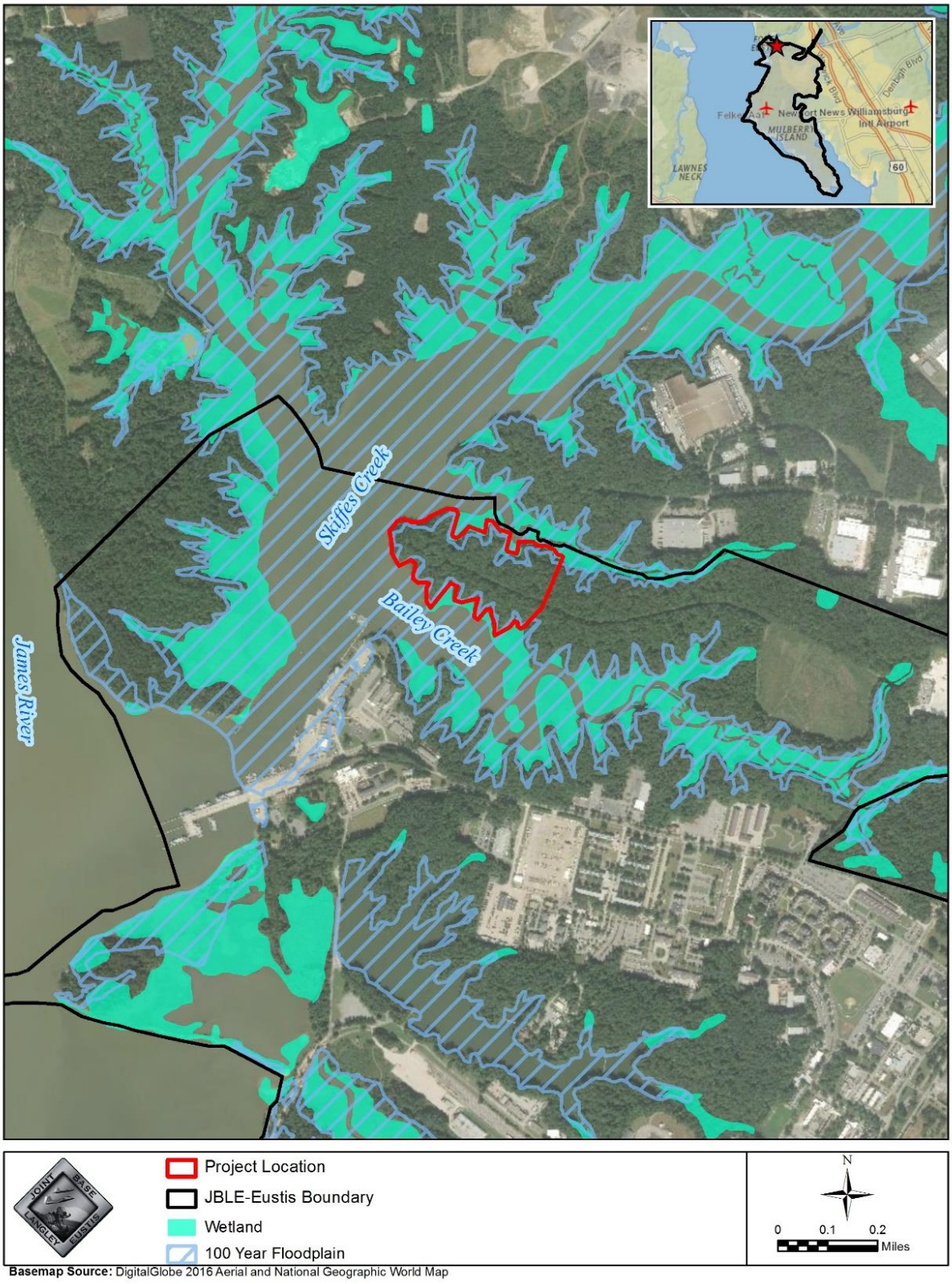
The groundwater at JBLE-Eustis is supported by a system of seven aquifers. The uppermost aquifer is unconfined and is approximately 10 to 15 feet thick. Groundwater from this aquifer discharges into streams, rivers, and lakes. Recharge of the aquifer is through infiltration of precipitation. Groundwater on JBLE-Eustis is pumped from six wells and are mainly used to fill ponds, supply latrines, and water the golf course. The VDH identified two public groundwater wells within 1 mile of JBLE-Eustis (**Appendix A**). No potable water is pumped from groundwater on JBLE-Eustis; the City of Newport News Lee Hall Water Filtration Plant, located approximately 1 mile from the installation, supplies all potable water (Fort Eustis, 2019). TA1 is not located within the watershed of any public surface water intakes.

3.5.1 Floodplains

Floodplains are areas of low-level ground present on one or both sides of a stream channel that are subject to periodic or infrequent inundation by floodwaters. Floodplains are typically the result of lateral erosion and deposition that occurs as a river valley is widened. The porous material that comprises the floodplain is conducive to retaining water that enters the soil during flooding events and at times when the groundwater table is elevated. Floodplains in their natural form are beneficial in reducing the number and severity of floods, minimizing non-point source water pollution, filtering stormwater, providing habitat for plants and animals, and producing aesthetic appeal and outdoor recreation benefits. Inundation dangers associated with development of floodplains have prompted Federal, State, and local legislation to limit floodplain development to recreation, agriculture, and preservation activities. EO 11988, *Floodplain Management*, requires Federal agencies to protect the values and benefits of floodplains and to reduce risks of flood losses by not conducting or allowing activities within floodplains, unless there is no practical alternative.

Flood hazard areas are identified by the FEMA on the Flood Insurance Rate Map as a Special Flood Hazard Area. The Special Flood Hazard Areas are those areas that have a one percent chance of being flooded in any given year. As shown in **Figure 3-3**, approximately 7.37 acres of the Proposed Action area are within the 100-year floodplain (FEMA, 2019; JBLE, 2016).

Figure 3-3: Water Resources at TA1



Basemap Source: DigitalGlobe 2016 Aerial and National Geographic World Map

3.5.2 Coastal Zone Management Act Consistency

The CZMA encourages states to preserve, protect, develop, and where possible, restore or enhance valuable natural coastal resources. Though Federal lands are excluded from State coastal management areas, activities on Federal lands that are reasonably likely to affect any land or water use or the natural resources of designated coastal resources management areas must be consistent with the enforceable policies of the Virginia Coastal resources Management program. Consistency reviews are triggered for all Federal actions inside the coastal zone and for actions outside the coastal zone that have the potential to affect Virginia's coastal uses and resources. All Federal development projects inside the coastal zone are automatically subject to consistency review and require a consistency determination in accordance with 15 CFR 930. JBLE is within the designated coastal resources management area (VDEQ, 2012). Federal Consistency Determinations are submitted to the VDEQ, which then coordinates the document with other State and local agencies. The Federal Consistency Determination for the Proposed Action is available in **Appendix D**.

3.6 BIOLOGICAL RESOURCES

Biological resources include native or naturalized plants, fish, invertebrate organisms, microorganisms, wildlife, and the habitats in which they occur. Sensitive biological resources are defined as those plant, fish, invertebrate organisms, microorganisms, and wildlife species, and their habitats that are Federally and/or State listed as T&E, special concern, or candidate. The ESA protects listed species and habitat against killing, harming, harassment, or any action that may damage their habitat. Federal Species of Concern are not protected by the ESA; however, these species could become listed and protected in the future. The USFWS identifies and lists Federally protected species and habitats. The Commonwealth of Virginia also identifies and lists protected species in accordance with the Virginia ESA (29.1-563 et seq. of the Code of Virginia) and the Virginia Endangered Plant and Insect Species Act (3.2-1000 et. Seq. of the Code of Virginia). The Virginia Department of Agriculture and Consumer Services (VDAC), VDGIF and the Virginia Department of Conservation and Recreation (VDCR) cooperate to provide protection for Virginia's T&E species.

Sensitive habitats include those areas designated by USFWS and/or NOAA's National Marine Fisheries Services (NMFS) as critical habitat protected by the ESA and sensitive ecological areas as designated by State or Federal rulings. Sensitive habitats also include wetlands, sensitive upland communities that are unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migratory routes, breeding areas, feeding/forage areas, crucial summer/winter habitats).

Biological resources addressed in this EA consist of terrestrial and aquatic vegetation, terrestrial and aquatic wildlife, special status species, and sensitive habitats.

3.6.1 Terrestrial and Aquatic Vegetation

The ROI for vegetation consists of TA1 and the surrounding shoreline. Meaningful impacts to vegetation outside of this ROI are not expected to occur. JBLE-Eustis is primarily a loblolly pine (*Pinus taeda*)-hardwood ecosystem that has been managed to favor young loblolly pines (Fort Eustis, 2007). TA1 consists of mixed hardwood forest. Species in the upper canopy include tulip poplar (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), sweetgum (*Liquidambar styraciflua*), and mixed oaks. Prevalent mid-story species include American hornbeam (*Carpinus caroliniana*), dogwood (*Cornus*), American holly (*Ilex opaca*), and red maple (*Acer rubrum*). Shrub/ground cover species include pawpaw (*Asimina trilobal*), christmas fern (*Polystichum acrostichoides*), and rare clubmoss (*Lycopodium obscurum*).

There are approximately 4.75 acres of wetlands within the boundary of TA1. Wetlands at TA1 are classified as Estuarine and Marine (tidal) Wetlands (USFWS, 2019a). Vegetation within these wetlands includes black needlerush (*Juncus roemerianus*), saltmarsh cordgrass (*Spartina alterniflora*), big cordgrass (*Spartina cynosuroides*), saltmeadow cordgrass (*Spartina patens*), and cattails (*Typha*) (Fort Eustis, 2019).

No submerged aquatic vegetation (SAV) are present within TA1 or JBLE-Eustis overall (VIMS, 2020). Water turbidity in the area may be a factor in precluding successful establishment of SAV at JBLE-Eustis (Fort Eustis, 2019).

To date, 24 invasive plants have been identified at JBLE-Eustis. Four of these species have been singled out by JBLE as being of particular concern in terms of impacts on military missions (Fort Eustis, 2019).

- **Common reed (*Phragmites australis*)**: Common reed grows in very thick, tall stands that outcompete native aquatic/wetland vegetation. This causes significant degradation of line of sight, thus impacting force protection as well as impeding movement through certain areas. Additionally, the thick stands can serve as fuel for wildfires.

- **Tree of heaven (*Ailanthus altissmima*)**: Tree of heaven, especially combined with Chinese privet, autumn olive (*Elaeagnus umbellate*), and Japanese honeysuckle (*Lonicera japonica*), are of particular concern to training areas as these plants create thick, impenetrable stands that degrade movement and operations. This degrades the quality of, or in some cases prevents, training tasks such as land navigation, tactical bivouac, and small unit tactics.

- **Kudzu (*Pueraria lobata*)**: Kudzu currently has only minimal effect in training areas but has the potential to expand. It has overwhelmed the northern portion of the installation near the second access gate and has killed or will eventually kill a number of hardwood and pine trees.

- **Johnsongrass (*Sorghum halepense*), tall fescue (*Festuca arundinacea*), and shrubby bushclover (*Lespedeza bicolor*)**: Johnsongrass, tall fescue, and shrubby bushclover adversely affect open areas in portions of IRP sites and some training areas. These plants outcompete native vegetation, degrading natural habitats and aesthetics while impacting restoration efforts.

3.6.2 Terrestrial and Aquatic Wildlife

The ROI for wildlife consists of TA1, the surrounding shoreline, Bailey Creek, and Skiffes Creek. JBLE natural resources staff regularly perform species surveys of the installation. Species captured/observed during these surveys that are likely to occur within the ROI include common mammals such as the white-footed mouse (*Peromyscus leucopus*), groundhog (*Marmota monax*), and beaver (*Castor*); birds such as mourning dove (*Zenaida macroura*), red-headed woodpecker (*Melanerpes erythrocephalus*), and blue jay (*Cyanocitta cristata*); and, reptiles and amphibians such as northern water snake (*Nerodia sipedon*), common snapping turtle (*Chelydra serpentine*), green frog (*Rana clamitans*), and American toad (*Anaxyrus americanus*). Additionally, aquatic species that are likely to occur in Bailey Creek and Skiffes Creek include bay anchovy (*Anchoa mitchilli*), pirate perch (*Aphredoderus sayanus*), bluegill (*Lepomis macrochirus*), blue crabs (*Callinectes sapidus)*, and American oysters (*Haematopus palliates*) (Fort Eustis, 2019).

3.6.3 Special Status Species

3.6.3.1 Federally Listed Species

USFWS and NMFS administer the Federal ESA of 1973, which protects listed species against killing, harming, harassing, or any action that may damage their habitat. The USFWS has primary responsibility for terrestrial and freshwater organisms, while NMFS has jurisdiction over marine wildlife. Federally listed species with potential occurrence in the Proposed Action area are discussed below. Copies of the USFWS ESA Section 7 consultation package and NMFS Section 7 early consultation letter are included in **Appendix A**.

Northern long-eared bat. According to the USFWS's online Information for Planning and Consultation (IPaC) system (accessed 5 July 2019), the Federally threatened NLEB (*Myotis septentrionalis*) may occur within the proposed project area. NLEB is found across much of the eastern and north-central US. The NLEB hibernates in caves and abandoned mines during the winter, and forages in the surrounding wooded areas in autumn. During late spring and summer, the NLEB roosts and forages in upland forests. The primary threats to NLEB include white-nose syndrome, a disease caused by fungus that disturbs hibernation and causes a deadly loss in energy stores, and the degradation of its summer or winter roosting habitat from human activities.

Bat surveys conducted at JBLE-Eustis in May 2016 resulted in the capture of two adult male NLEBs; however, they were not captured in the Proposed Action area and no females were captured. No NLEB winter habitat or roost trees are known to occur anywhere near JBLE-Eustis. The nearest cluster of maternity roosts (summer habitat) has been identified approximately 42 miles south-east in Chesapeake, VA (VDGIF, 2019). No critical habitat is designated in the vicinity of the Proposed Action area.

Indiana bat. Although not identified via IpaC, the Federally endangered Indiana bat (*Myotis sodalis*) was documented via acoustic surveys on JBLE-Eustis during the 2016 bat species survey. The Indiana bat is found over most of the eastern half of the US. Almost all Indiana bats hibernate in caves in southern Indiana. After hibernation, Indiana bats migrate to summer habitat in wooded areas where they roost under loose tree bark on dead or dying trees. The primary threats to the Indiana bat include human disturbance of hibernation habitat, pesticides and environmental contaminants, and white nose syndrome (USFWS, 2019c).

The 2016 bat survey at JBLE identified the Indiana bat during acoustic surveys, in addition to the presence of potential roost trees; however, there was no evidence of these trees being used by any bats at the time. No Indiana bats have been captured on JBLE to date. The USFWS and VDGIF do not currently identify Newport News as a known occurrence area for the Indiana bat. No critical habitat is designated in the vicinity of the Proposed Action area.

Atlantic sturgeon. Based on a search of the NOAA NMFS database, the Federally endangered Atlantic sturgeon (*Acipenser brevirostrum*) has the potential to occur in the vicinity of the Proposed Action. In addition, the James River is designated as critical habitat for the species and supports a current spawning population. Atlantic sturgeons are anadromous and spend most of their lives in nearshore marine and estuarine waters, migrating to freshwater rivers and tributaries to spawn. Spawning is believed to occur upstream, in flowing water between the fall line and salt front. Suitable habitat for spawning includes low salinity (0.0 to 0.5 ppt) waters, high dissolved oxygen levels, depths of 11 – 27 meters, and clean, hard substrate (e.g., rock, gravel, and cobble) for attachment of demersal adhesive eggs (Atlantic Sturgeon Status Review Team, 2007; NOAA Fisheries, 2017).

The VDGIF identified the James River as a Confirmed Anadromous Fish Use Area due to the presence of other anadromous species in addition to Atlantic sturgeon. Skiffes Creek and its tributaries near TA1 have also been designated as a Potential Anadromous Fish Use Area. However, the Atlantic sturgeon is not likely to occur in Bailey or Skiffes Creek near the Proposed Action area, as habitat conditions are not conducive to spawning, foraging, or breeding activities. JBLE-Eustis is located far downstream from where spawning is known to occur in the James River. Water depths near the Proposed Action area are less than 2 meters, and only reach approximately 3 meters in Skiffes Creek (NOAA, 1983). In addition, salinity levels recorded in the James River near Jamestown, approximately 10 miles north of the Proposed Action area, range between 1.0 to 2.5 ppt; and salinity levels recorded near Newport News, approximately 17 miles south of the Proposed Action area, range from 18 to 20 ppt (NOAA, 2019). Furthermore, the shoreline area is comprised of marshes and sediment deposits, lacking the hard substrate necessary for spawning sites.

Shortnose sturgeon. The NOAA NMFS database also identified the potential presence of the Federally endangered shortnose sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the Proposed Action area; specifically, adult shortnose sturgeon may be potentially present in the Proposed Action area for foraging, migrating, and overwintering. Shortnose sturgeons hatch in freshwater areas of rivers and spend most of their time in the estuaries of these rivers. Until recently, the species had not been documented in the freshwater portion of any river of the Chesapeake Bay, except in the Potomac River. On 13 March 2016, a shortnose sturgeon was captured in the freshwater portion of the James River, approximately 17 miles upriver from JBLE-Eustis (Balazik, 2016).

Considering the lack of previous evidence documenting the occurrence of a shortnose sturgeon population in the James River, the one captured individual is not likely to represent a remnant population in the James River and is most likely a colonizing or roaming fish from either the Potomac River or the Delaware River. Further, no shortnose sturgeons have been observed in Skiffes Creek. While potentially suitable foraging habitat exists in the James River, suitable habitat is not expected in Skiffes Creek due to its shallow depths and low salinity conditions.

3.6.3.2 State-Listed Species

VDAC, VDGIF and VDCR cooperate to provide protection for Virginia's T&E species in accordance with the Virginia ESA (29.1-563 et seq. of the Code of Virginia) and the Virginia Endangered Plant and Insect Species Act (3.2-1000 et. Seq. of the Code of Virginia). At the present time, there are 139 State-listed T&E species in Virginia. Both the state listed little brown bat (*Myotis lucifugus*) and tricolored bat (*Perimyotis subflavus*) have been observed on JBLE-Eustis and were identified during 2016 acoustic surveys (Fort Eustis, 2019; Germain, 2016). In a letter dated 27 February 2020, the VDCR responded that no natural heritage resources have been documented within TA1 (**Appendix A**).

3.6.3.3 Bald Eagles

Bald eagles (*Haliaeetus leucocephalus*) are protected under the Bald and Golden Eagle Protection Act (BGEPA), which prohibits the take, possession, transport, or sale of live or dead eagles and their parts, nests, or eggs unless authorized by permit. Habitat for the bald eagle primarily consists of mature forest in proximity to large bodies of open water for foraging. Large, dominant trees are utilized for nesting sites, typically within 1 mile of open water. As of 2017, JBLE-Eustis is believed to be home to ten breeding pairs of bald eagles (Fort Eustis, 2019). While TA1 is located within close proximity to historic and/or active nests and the James River Bald Eagle Concentration and Roost Area, no bald eagle nests have been observed on TA1; however, a nest was observed in 2017 approximately 0.6 mile from TA1 across Skiffes Creek (Fort Eustis, 2019).

3.6.3.4 Migratory Birds

The Migratory Bird Treaty Act (MBTA) is an international agreement among the US, Canada, and Mexico that protects designated migratory species. More than 1,000 species are protected under this act. The MBTA controls the take of these birds, their nests, eggs, parts, or products. Under EO 13186 *Responsibilities of Federal Agencies to Protect Migratory Birds*, the DoD and USFWS established a memorandum of understanding to promote the conservation of migratory bird populations during DoD activities.

Information obtained from the USFWS IPaC database identified 19 birds protected under the MBTA that may occur in the vicinity of the Proposed Action area. Of these, 10 have been observed on JBLE-Eustis (Fort Eustis, 2019). The ROI is used by migratory birds for foraging, nesting, sheltering, and stop over areas. The ROI is located in the Atlantic Flyway, a main migratory route generally following the Atlantic Coast of North America.

3.6.4 Sensitive Habitats

3.6.4.1 Essential Fish Habitat

NMFS regulates Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Based on a query of the NOAA EFH Mapper, designated EFH has been mapped for ten species along the TA1 shoreline, as listed in **Table 3-2**. No Habitat Areas of Particular Concern and no EFH Areas Protected from Fishing were identified in the construction area.

Table 3-2: EFH Species and Life Stages Potentially Found at the TA1 Shorelines

Species	Egg	Larvae	Juvenile	Adult
Atlantic Herring	--	--	✓	✓
Bluefish	--	--	✓	✓
Clearnose Skate	--	--	✓	✓
Little Skate	--	--	--	✓
Red Hake	✓	✓	✓	✓
Summer Flounder	--	✓	✓	✓
Windowpane Flounder	--	--	✓	--
Winter Skate	--	--	--	✓
Black Sea Bass	--	--	✓	✓
Atlantic Butterfish	--	--	✓	✓

Source: (NOAA NMFS, 2019)

3.6.4.2 Wetlands

The USACE defines wetlands as "those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (33 CFR Part 328). Wetlands are protected as a subset of the "waters of the United States" under Section 404 of the CWA. The term "waters of the United States" has

broad meaning under the CWA and incorporates deep water aquatic habitats and special aquatic habitats (including wetlands). Section 401 of the CWA gives the State of Virginia the authority to regulate, through the State water quality certification program, proposed Federally permitted activities that may result in a discharge to water bodies, including wetlands. The VDEQ regulates wetlands under its Water Protection Permit Program.

Wetlands make up 2,788.7 acres of habitat at JBLE-Eustis (Fort Eustis, 2019). There are approximately 4.75 acres of wetlands within the boundary of TA1 and are classified as Estuarine and Marine (tidal) Wetlands (USFWS, 2019a).

3.6.4.3 Resource Protection Areas

The CBPA, enacted by the Virginia General Assembly in 1988, sets limits on development within Chesapeake Bay RPAs. An RPA is defined in the CBPA as a vegetated buffer no less than 100 feet wide located adjacent to and landward of all tidal shores, tidal wetlands, and non-tidal wetlands connected by surface flow, and contiguous to tidal wetlands along water bodies with perennial flow. The purpose of an RPA is to maintain or restore a vegetated buffer between development and tributaries to the Chesapeake Bay, with the assumption that such a buffer traps pollutants in runoff before they reach the Bay. Development in RPAs is restricted to water dependent activities, maintenance of public facilities, passive recreation, water wells, and historic preservation; redevelopment of existing uses is also allowed in RPAs.

JBLE-Eustis recognizes Chesapeake Bay RPAs on the installation (Fort Eustis, 2019).

3.7 CULTURAL RESOURCES

Several Federal laws and regulations have been established to manage cultural resources, including the NHPA of 1966, the Archeological and Historic Preservation Act of 1974, the American Indian Religious Freedom Act of 1978, the Archeological Resource Protection Act of 1979, and the Native American Graves Protection and Repatriation Act of 1990. In addition, DoD Instruction 4710.02, Department of Defense Interactions with Federally-Recognized Tribes (2006), governs DoD interactions with Federally recognized tribes and EO 13175, Consultation and Coordination with Indian Governments (2000), charges Federal departments and agencies with regular and meaningful consultation with Native American tribal officials in the development of policies that have tribal implications. In order for a cultural resource to be considered significant, it generally must be greater than 50 years old and must meet one or more of the following criteria for inclusion on the NRHP:

> "the quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and: 1) that are associated with events that have made a significant contribution to the broad patterns of our history; or 2) that are associated with the lives or persons significant in our past; or 3) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or 4) that have yielded, or may be likely to yield, information important to prehistory or history" (36 CFR 60.4).

For the purposes of this analysis, the term ROI is synonymous with the "area of potential effect" as defined under cultural resources legislation. The ROI for cultural resources is contiguous with the boundary of TA1.

3.7.1 Prehistoric and Historic Archaeological Resources

3.7.1.1 Regional Archaeological Setting

It is well evidenced that humans began to occupy the Chesapeake Bay area at least 12,000 years ago during the Paleoindian period (10,000-8,000 years Before Common Era [BCE]). While most archaeological resources attributed to this period in Virginia occur as isolated artifacts, recent models of Paleoindian subsistence strategies suggest that these early populations moved in small, highly mobile groups of generalist hunter/gatherers. Small, transient camps may have been the most common settlement unit, though Virginia has furnished archaeological examples of much larger Paleoindian basecamps/quarries (Gardner, The Flint Run Paleo-Indian Complex: A Preliminary Report 1971-1973 Seasons., 1974; Gardner, Flint Run Paleo-Indian Complex and Its Implications for Eastern North American Prehistory, 1977; Surovell, 2003). It has been hypothesized that larger basecamps typically would have been located on floodplains near quarries, serving as a nexus for numerous smaller, temporary camps sited on second and third order streams (Gardner 1977).

During the Archaic period (8,000-1,000 BCE), warming climatic conditions and sea level rise produced new and diverse ecosystems replete with broader floral and faunal nutrient resource bases, in turn encouraging regional population growth (William & Harbison, 2000; Barse, Harbison, Wuebber, & Janowitz, 2006; Cleland, 1966). The developing Chesapeake Bay became an important source of food, offering clams, oysters, fish, and other important faunal resources. Archaic peoples increasingly used the Chesapeake Bay and inland portions of its major tributaries in response to rising sea levels, which created vast brackish estuaries and pushed freshwater-spawning fish farther up interior waterways (Mouer, 1991). Over a dozen Archaic Period sites have been found on JBLE-Eustis (USAF, 2018).

During the Woodland period (1,000 BCE-1600 CE), the Chesapeake Bay region continued to be utilized for its abundant resources and many populations exhibited increasingly sedentary settlement strategies and sociopolitical complexity (Turner III, 1992). The introduction of ceramic technology, the expansion of inter-regional trade networks, and the adoption of horticultural and agricultural subsistence practices are some of the broad cultural developments that characterize this period of Mid-Atlantic prehistory (McLearen, 1992; Mouer, 1991). At least two dozen Woodland period sites have been identified on JBLE-Eustis (USAF, 2018).

Permanent European settlement of the Chesapeake Bay area began with the establishment of Jamestown in 1607, approximately 10 miles upstream from the Proposed Action area. In the following decades, European settlements expanded throughout the region and conflicts with Native Americans increased (USAF, 2018). Within the vicinity of the Proposed Action area, tobacco monoculture initially dominated agricultural practices, though diversified grain production and animal husbandry eventually became important economic pursuits (Fesler, 1993). No major Revolutionary War events occurred on what is now JBLE-Eustis, although numerous 18th century sites have been identified on the installation (USAF, 2018).

During the Civil War, elaborate defenses were built by the Confederate Army across the peninsula between Virginia's York and James rivers in an effort to prevent a Union Army attack on Richmond; these earthwork defenses extend onto JBLE-Eustis. Union General George McClellan's Peninsula Campaign in the spring of 1862 brought Union troops to the region; however, none of the fortifications on JBLE-Eustis served any direct combat roles (Fort Eustis, 1968).

Camp Abraham Eustis was established in 1918 as a training center for Coast Artillery Corps units, displacing 200 farming families from Mulberry Island. The installation was renamed Fort Eustis after World

War I and, in 1946, it was transferred to the Army Chief of Transportation as the Transportation Corps Training Center (Monroe & Birkett, 2012; Quarstein & Rouse Jr., 1996). Following Base Realignment and Closing in 2005, Fort Eustis was designated for realignment with Langley Air Force Base to become a Joint Base with the Air Force as the leading Service.

3.7.1.2 Archaeological Resources within the Area of Potential Effects

To date, 234 archaeological sites have been identified on JBLE-Eustis, the majority of them on Mulberry Island. Of these, only 18 sites have been evaluated for NRHP eligibility. Among those evaluated is 44NN0024, located within the footprint of TA1 and partially within the ROI, which comprises the Proposed Action area.

The northwestern portion of 44NN0024 is located inside of the ROI. The VADHR determined 44NN0024 eligible for listing in the NRHP in 2016 (DHR#2016-1148). Site 44NN0024 is primarily a prehistoric base camp and long-term occupation site with components dating to the Early, Middle, and Late Woodland periods as well as a minor 19th century historic component. This site was identified through subsurface testing and pedestrian reconnaissance, which noted the presence of intact shell midden deposits. Prehistoric artifacts found include projectile point fragments and coarse sand-tempered pottery. Additionally, limited historic artifacts were found, including small eroded brick fragments and a machine cut nail (post-1830). While this suggests a former structure at the site, no foundation or structural features were encountered during a previous investigation (Wilkins, Jones, Barr, & Voigt, 2015). In 2019, AECOM investigated the portion of 44NN0024 within the ROI to determine if it contained potentially significant archaeological deposits contributing to the site's NRHP eligibility. As a result, a discrete cluster of intact archaeological deposits was identified, representing a stone tool production area almost certainly affiliated with the site's use during the Woodland period. Located in the center of the ROI, this relatively small, spatially constrained cluster was recommended as a contributing component of the site (Regan, 2019).

3.7.2 Historic Buildings and Structures

The only built improvements within the ROI are modern gravel and dirt roads, parking/staging areas, and drainage ditches; as such, the ROI contains no NRHP-eligible historic built resources. Several historic built resources have been registered with VADHR on JBLE-Eustis, including the Matthew Jones House located approximately 1 mile south of the Proposed Action area. This is the oldest structure on JBLE-Eustis, with the original foundation dating back to 1700. The house was declared a Virginia Historic Landmark in April 1969 and was listed in the NRHP in June of the same year (JBLE, 2012a). Additionally, Fort Crafford (121-0027/44NN0070) is a Civil War earthwork fort built around the site of a nonextant 18th century house. It was listed in the NRHP in May 1974 and is located approximately 3.2 miles south-southwest of the Proposed Action area (JBLE, 2012b).

3.8 AIR QUALITY AND CLIMATE

Air quality impacts can range from localized effects to the dispersal and transport of air pollutants across large geographic areas. Air quality is affected by stationary sources (e.g., boilers, emergency generators, and industrial processes), mobile sources (e.g., motor vehicles, construction equipment, and aircraft), and area sources (e.g., dry cleaners and gas stations). Air quality at a given location is a function of several factors including the quantity and type of pollutants emitted locally and regionally, as well as the dispersion rates of pollutants in the region. Primary factors affecting pollutant dispersal include wind speed and direction, atmospheric stability, climate and temperature, and topography.

The climate within JBLE-Eustis is characterized by moderate winters and long, warm summers. Total precipitation in the area averages 47.3 inches annually, with July receiving the most rainfall (5.3 inches), while April and November receive the least rainfall (2.9 inches). The annual mean temperature at JBLE-Eustis is 58.5 degrees Fahrenheit (°F). Typically, the warmest month is July and the coldest month is January; average daily maximum temperatures for each month are 87°F and 47°F, respectively (Fort Eustis, 2019).

For the purposes of the air quality impact assessment, potential air emissions associated with the Proposed Action Alternatives are quantified and disclosed, compared against any applicable thresholds, and discussed in the context of the airshed and air quality control framework applicable to the ROI. For this EA, the ROI for air quality is the USEPA's Hampton Roads regulatory area, which includes Norfolk, Virginia Beach, and Newport News, VA. However, the nature and magnitude of the Proposed Action Alternatives are expected to create only localized air quality impacts to the area surrounding JBLE within this airshed. Climate impacts are considered on a global scale; therefore the climate impact analysis focuses on comparing potential GHG emissions associated with the Proposed Action Alternatives with applicable thresholds and nationwide GHG emissions.

3.8.1 National Ambient Air Quality Standards

Pursuant to the Clean Air Act (CAA) and its amendments, the USEPA identifies air pollutants that cause or contribute to the endangerment of human health and or environmental welfare and establishes air quality "criteria" that guide the establishment of air quality standards to regulate these pollutants (42 USC §7408 - §7409). National Ambient Air Quality Standards (NAAQS) are provided for six principal pollutants, called "criteria pollutants" (as listed under Section 108 of the CAA): carbon monoxide (CO); lead (Pb); nitrogen oxides (NOx); ozone (O3); particulate matter (PM), divided into two size classes of 1) aerodynamic size less than or equal to 10 micrometers (PM10), and 2) aerodynamic size less than or equal to 2.5 micrometers (PM2.5); and sulfur dioxide (SO2). Current NAAQS are presented in **Table 3-3**. The ambient air quality in an area can be characterized in terms of whether or not it complies with the primary and secondary NAAQS. Areas where monitored outdoor air concentrations are within an applicable NAAQS are considered in attainment of that NAAQS. If sufficient ambient air monitoring data are not available to make a determination, the area is instead deemed as attainment/unclassifiable. Areas where monitored outdoor air concentrations exceed the NAAQS are designated by the USEPA as nonattainment areas. Nonattainment designations for some pollutants (e.g., O3) can be further classified based on the severity of the NAAQS exceedances. Lastly, areas that have historically exceeded the NAAQS, but have since instituted controls and programs that have successfully remedied these exceedances are known as maintenance areas.

State agencies with nonattainment or maintenance areas within their jurisdiction are responsible for developing air quality control plans, called State Implementation Plans (SIP), that include strategies and measures to bring the area back into compliance with the NAAQS by a USEPA-prescribed deadline. SIPs are also devised to maintain compliance with a NAAQS once attainment is achieved.

Table 3-3: National Ambient Air Quality Standards

Pollutant	Averaging Time	Level	Form
CO	8-hour	9 ppm	Not to be exceeded more than once per year
	1-hour	35 ppm	
Pb	Rolling 3-month average	0.15 µg/m^3	Not to be exceeded
NO_2	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, 3-year average
	Annual	53 ppb	Annual mean
O_3	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hr concentration, 3-year average
PM	$PM_{2.5}$ Annual (primary)	12 µg/m^3	Annual mean, 3-year average
	$PM_{2.5}$ Annual (secondary)	15 µg/m^3	Annual mean, 3-year average
	$PM_{2.5}$ 24-hour	35 µg/m^3	98th percentile, 3-year average
	PM_{10} 24-hour	150 µg/m^3	Not to be exceeded more than once per year, 3-year average
SO_2	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, 3-year average
	3-hour	0.5 ppm	Not to be exceeded more than once per year

Notes: ppb = parts per billion; ppm = parts per million; µg/m^3 = micrograms per cubic meter of air.
Source: (USEPA, 2019b)

To gauge compliance with the NAAQS and pursuant to USEPA requirements, the VDEQ has established and maintains a permanent network of ambient air monitors across the state, including areas within and surrounding the Hampton Roads region. The nearest monitoring station is located approximately 5 miles from JBLE-Eustis. **Table 3-4** summarizes data collected over the period of 2016 to 2018 at each station and for each pollutant. The monitoring data demonstrate that concentrations of CO, NO2, NO2, O3, PM2.5, PM10, and SO2 in the area surrounding JBLE are well below applicable NAAQS. No violations of the NAAQS are registered for any pollutants measured.

Table 3-4: Air Monitoring Data Summary

Pollutant	Averaging Time	Level	Form	Concentration (Monitor ID, Distance from Ft. Eustis)
				51-650-0008 11.5 Miles
CO [76 FR 54294, Aug 31, 2011]	8-hour	9 ppm	Not to be exceeded more than once per year	0.6
	1-hour	35 ppm		0.8
Pb [81 FR 71906, October 18, 2016]	Rolling 3 month average	0.15 µg/m^3	Not to be exceeded	--
NO_2 [75 FR 6474, Feb 9, 2010] [77 FR 20218, April 3, 2012]	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years	26.70
	Annual	53 ppb	Annual mean	3.31
O_3 [80 FR 65292, Oct 26, 2015]	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years	0.065
Particle Pollution [78 FR 3085, Jan 15, 2013]	$PM_{2.5}$ Annual (primary)	12 µg/m^3	Annual mean, averaged over 3 years	6.15
	$PM_{2.5}$ Annual (secondary)	15 µg/m^3	Annual mean, averaged over 3 years	
	$PM_{2.5}$ 24-hour	35 µg/m^3	98th percentile, averaged over 3 years	12.93
	PM_{10} 24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years	21

Table 3-4: Air Monitoring Data Summary

Pollutant	Averaging Time	Level	Form	Concentration (Monitor ID, Distance from Ft. Eustis)
				51-650-0008 11.5 Miles
SO_2 [77 FR 20218, April 3, 2012] [75 FR 35520, Jun 22, 2010]	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years	13.9
	3-hour	0.5 ppm	Not to be exceeded more than once per year	0.0237

Source: (VDEQ, 2019c)

3.8.2 Existing Air Quality Conditions

USEPA Region 3 and the VDEQ regulate air quality in Virginia. The Hampton Roads regulatory area is designated in *attainment* for all NAAQS criteria pollutants (USAF, 2019). The area was historically designated *nonattainment* for the 1997 8-hour ozone NAAQS, which was revoked on 6 April 2015. The Air Force has conservatively chosen to treat areas historically in nonattainment with the revoked NAAQS as maintenance areas for the purposes of analyzing air quality impacts from potential projects and actions. Current emissions in the vicinity of the Proposed Action area primarily consist of emissions from vehicles at the site and on nearby roadways, operation of military equipment, and aircraft at the nearby Felker Air Field.

JBLE has a State Operating Permit under 9VAC5-80. This permit requires annual reporting of activity levels (e.g., gallons of fuel used) and the resulting emissions from permitted stationary point and area sources. Permitted sources at the installation consist of diesel emergency power generators, natural gas-fired external combustion equipment (i.e., boilers/heaters), motor vehicle gas dispensing, painting activities, shot blasting activities, fugitive emissions from woodworking shops, landfill off-gassing, and a fire training simulator. **Table 3-5** summarizes JBLE's calendar year 2018 stationary source air emissions report to VDEQ (VDEQ, 2019c).

Table 3-5: Criteria Pollutant Emissions at JBLE - 2018 Annual Emissions Report

Carbon Monoxide (tpy)	Nitrogen Oxides (tpy)	Sulfur Dioxide (tpy)	Volatile Organic Compounds (tpy)	PM_{10}	$PM_{2.5}$
12.52	23.14	0.74	7.1	2.05	0.01

Source: (VDEQ, 2019c)

3.8.2.1 Clean Air Act Conformity

The General Conformity Rule of the Federal CAA mandates that the Federal government not engage, support, or provide financial assistance for licensing or permitting, or approve any activity not conforming to an approved SIP. This rule applies to all Federal actions except highway and transit actions which are instead regulated by the Transportation Conformity Rule. The General Conformity Rule takes into account air pollutant emissions associated with actions that are Federally funded, licensed, permitted, or approved, and ensures that such emissions do not cause or contribute to air quality degradation, thus preventing the achievement of state and Federal air quality goals.

Air Force Policy Directive (AFPD) 32-70, *Environmental Considerations in Air Force Programs and Activities,* mandates that the Air Force comply with all Federal, State, and local environmental laws and standards. In accordance with AFPD 32-70, AFI 32-7040*, Air Quality Compliance and Resource Management*, explains responsibilities and specifics on how to assess, attain, and sustain compliance with the CAA and other Federal, State, and local air quality regulations. This AFI provides further and more specific instruction on the requirements of the Air Force's EIAP for air quality promulgated at 32 CFR 989.30, which mandates that EIAP documents, such as this EA, address General Conformity.

The Air Force considers areas that were historically designated nonattainment or maintenance under the revoked 1997 8-hour ozone NAAQS as maintenance areas. This includes the Hampton Roads regulatory area, and therefore a General Conformity applicability analysis was performed for each of the Proposed Action Alternatives, the results of which are presented in **Section 4.8.**

3.8.3 Greenhouse Gas Emissions

Greenhouse gases (GHGs) are compounds that contribute to the greenhouse effect. The greenhouse effect is a natural phenomenon where gases trap heat within the lowest portion of the earth's atmosphere, causing heating at the surface of the earth. The primary long-lived GHGs directly emitted by human activities are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

The heating effect from these gases is considered the probable cause of the global warming observed over the last 50 years (USEPA, 2009a). Global warming and climate change can affect many aspects of the environment, including air quality. The USEPA has recognized potential risks to public health or welfare and signed an endangerment finding regarding GHGs under Section 202(a) of the CAA (USEPA, 2009b), which finds that the current and projected concentrations of the six key GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) in the atmosphere threaten the public health and welfare of current and future generations. Emissions of GHGs estimated for the Proposed Action is discussed in **Section 4.8** of this EA.

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4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter presents the results of the analysis of potential environmental effects associated with implementing each of the Proposed Action Alternatives as well as the No Action Alternative. Changes to the natural and human environments that may result from each of the Proposed Alternatives were evaluated relative to the existing environment as described in **Chapter 3.0**.

For most resources addressed in this section, potential impacts are described as either short-term (i.e., those that would occur during construction and cease once construction is complete) and long-term (i.e., those that would continue to occur after construction has ceased). Guidelines established by the CEQ (40 CFR 1508.27) specify that significance should be determined in relationship to both context and intensity. Context refers to the location of the Proposed Action and the areal extent of potential meaningful impacts. Intensity of a potential impact refers to its severity and takes into account beneficial and adverse impacts. Potential beneficial impacts are discussed separately from potential adverse impacts. The assessment of potential impacts and the determination of their significance are based on the requirements of 40 CFR 1508.27. Three levels of impact can be identified:

- *No impact* – No measurable adverse impact is predicted;
- *Less than significant impact* – An adverse impact is predicted, but the impact does not meet the intensity/context significance criteria for the specific resource;
- *Significant impact* – An adverse impact is predicted that meets the intensity/context significance criteria for the specific resource; and
- *Beneficial* – Impacts would improve the conditions for a specific resource.

4.2 LAND USE AND AESTHETICS

Determination of land use and aesthetics impacts is based on the degree of land use sensitivity in the area. In general, the Air Force considers a land use impact to be significant if it would 1) be inconsistent or non-compliant with applicable land use plans or policies; 2) preclude an existing land use of concern from continuing to exist; 3) preclude continued use of an area; or 4) be incompatible with adjacent or vicinity land use to the extent that public health or safety is endangered. Impacts to aesthetics would be deemed significant if disturbances could permanently and negatively alter the overall character of the viewshed.

4.2.1 Alternative A – Marsh Management

Construction of Alternative A would involve clearing and grubbing activities within 0.2 acres and the addition of 1,200 CY of course-grained sand to grade the bank to the necessary slope, as well as planting of natural vegetation to enhance existing and create new marshes. As such, construction activities would disturb the existing conditions of the land and require temporary closure of TA1, preventing the area from being used for training during construction. In addition, heavy construction equipment would be visible from the viewshed of TA1. Thus, the Proposed Action would adversely affect the land use and aesthetics of the area; however, these impacts would not be permanent and would cease to exist after construction is complete. *Short-term less-than-significant adverse* impacts to land use and aesthetics would result from construction of Alternative A.

The current land use of TA1 would not change with implementation of Alternative A. TA1 would continue to be utilized for military training and recreation purposes. After construction is complete, new and enhanced marsh areas would maximize the natural erosion protection of the ecosystem and ensure the long-term integrity of the area as a training site. A long-term vegetation management and maintenance program consisting of selective tree pruning and clearing, removal of shoreline debris, visual inspections, and future supplemental plants would be implemented. None of the criteria for a significant impact would be met under Alternative A, and the land use and visual quality of the area would be preserved. Therefore, a *long-term beneficial* impact to land use and aesthetics would occur under Alternative A.

4.2.2 Alternative B – Living Shoreline

Construction of Alternative B would involve a combination of marsh management, similar to Alternative A, and the addition of structural, man-made oyster reefs. An approximately 1,150 LF sill (stone structure) would be constructed along the shoreline to contain sand fill (up to 2,556 CY) that would be brought in to support new marsh plantings and grading behind the sill to the necessary slope. As such, Alternative B would involve the use of heavy equipment to deliver construction materials to the site and carry out grading activities. Short-term impacts to land use and aesthetics resulting from Alternative B would be similar to those described for Alternative A. *Short-term less-than-significant adverse impacts* to land use and aesthetics would result from construction disturbance under Alternative B.

Similar to Alternative A, the current land use of TA1 would not change with implementation of Alternative B. TA1 would continue to be utilized for military training and recreation purposes. After construction is complete, a long-term vegetation management and maintenance program would be implemented similar to the one described under Alternative A. In the long term, Alternative B would protect the structural integrity of TA1 as a training area for the Air Force and preserve the visual quality of the site. None of the criteria for a significant impact would be met under Alternative B, and the land use and aesthetics of TA1 would be protected from erosion-driven degradation. Therefore, *long-term beneficial* impacts to land use and aesthetics would result under Alternative B.

4.2.3 Alternative C – Concrete Bulkhead

Construction of Alternative C would involve the installation of 500 LF of precast concrete bulkheads to stabilize sections of the eroded shoreline, grading efforts, and the planting of a low and high marsh and tidal shrub zone, similar to Alternative A. As such, construction equipment would have to access the bank and shoreline of TA1 in order to execute this design. Construction of Alternative C would interrupt training activities and introduce viewshed disruptions. Impacts on land use and aesthetics resulting from construction activities would be similar to those described under Alternatives A and B. *Short-term less-than-significant adverse* impacts to land use and aesthetics would result from construction of Alternative C

The current land use of TA1 would not change with implementation of Alternative C. TA1 would continue to be utilized for military training and recreation purposes. A long-term vegetation management and maintenance program would be implemented under this alternative similar to the one described in Alternative A. The concrete bulkheads would be visible throughout the viewshed, although they would be anticipated to have a marginal effect on the overall character of the area. As a result, a *long-term less-than-significant adverse* impact to aesthetics would occur under Alternative C. The reduction in erosion and subsequent preservation of land at TA1 resulting under Alternative C would have a *long-term beneficial* impact on land use.

4.2.4 No Action Alternative

As described in **Section 2.5.1.4**, no measures would be taken to combat erosion at the site under this alternative. The long-term soil erosion rate would continue at 0.6 feet of land per year. This additional loss of land would subsequently continue to impact the ability of the land to be used for training activities. While these impacts would be minor in the short-term, the future ability to use TA1 for military training would be put in jeopardy. Thus, *short-term less-than-significant adverse* impacts, and *long-term significant adverse* impacts to land use and aesthetics would occur under the No Action Alternative.

4.3 TOPOGRAPHY, GEOLOGY, AND SOILS

An impact to topography, geology, or soils would be considered significant if implementation of the Proposed Action would: 1) substantially increase potential occurrences of erosion, sedimentation, or geological hazards; 2) incorporate engineering or construction techniques that do not adequately address potential geologic, topographic, or soils related hazards; or 3) expose people or structures to major geological hazards.

As described in **Section 3.3**, depth to bedrock is greater than 80 inches and no geologic hazards are apparent in the proposed site; thus, none would be expected to impact structures or human health as a result of implementation of any Alternatives. Further, the proposed site is located in a low seismic hazard area. As such, no impacts on geology and seismicity are expected to result from implementation of any of the evaluated alternatives. Impacts to topography and soils are discussed in the following sections.

4.3.1 Alternative A – Marsh Management

As described in **Section 2.5.1.1**, construction of Alternative A would require 1,200 CY sand fill to grade the shoreline slopes between 8:1 and 10:1 upgradient of the fiber log, or to a slope of 2:1 for unstable banks. As much of the shoreline topography of TA1 already has a natural slope of between 8:1 and 10:1, grading to a slope of 2:1 would only be required on steep, unstable banks where not modifying the slope would lead to continued significant loss of shoreline. Impacts on topography are necessary to prevent future erosion from occurring on the site. No changes to surface drainage would occur as a result of Alternative A. Therefore, *short-term, less-than-significant adverse* impacts to topography would result from construction of Alternative A. Following construction, stabilization of slopes and reduced future erosion potential would result in *long-term beneficial* impacts to topography.

Construction would remove vegetative cover, disturb the soil surface, and compact the soil. The soil would then be susceptible to erosion by wind and surface runoff. Exposure of soils during construction activities would have the potential to result in increased sedimentation in Bailey Creek and Skiffes Creek. To help minimize these impacts, best management practices (BMPs) would be used to prevent and mitigate potential erosion and sedimentation during construction. Since Alternative A would disturb more than 2,500 square feet of land, an ESCP in accordance with 9VAC25-840-40, as well as a stormwater management (SWM) plan in accordance with 9VAC25-870-55 would be required. Alternative A would disturb less than one acre of land, therefore no SWPPP would be required. Construction crews would adhere to standard BMPs as well as BMPs outlined in the ESCP and SWM plan to reduce erosion and sedimentation. Erosion and sediment controls would be put in place prior to clearing and grading, and maintained in good working order. Impacts resulting in erosion and sedimentation would be temporary and would cease after construction has been completed. Therefore, *short-term*, *less-than-significant adverse* impact to soil erosion and sedimentation would result under Alternative A.

In the long-term, the site would benefit from shoreline stabilization methods described in **Section 2.5.1.1**. Implementation of Alternative A would have a beneficial effect on the Proposed Action area, as it would prevent further loss of land to erosion and prevent sediment from entering Bailey Creek and Skiffes Creek. Thus, *long-term beneficial impacts* to soil erosion and sedimentation would result under Alternative A.

4.3.2 Alternative B – Living Shoreline

Under Alternative B, a total of 2,556 CY sand fill for earthwork grading would be required. Although Alternative B would require 1,356 CY more grading than Alternative A, impacts to topography would be similar as grading would be necessary to protect TA1 from future erosion; no changes in surface drainage would occur. *Short-term, less-than-significant adverse* impacts to topography would result from construction of Alternative B. Following construction, stabilization of slopes and reduced future erosion potential would result in *long-term beneficial* impacts to topography.

Short- and long-term impacts from soil erosion and sedimentation under Alternative B would be similar to those described for Alternative A (**Section 4.3.1**). An ESCP and SWM plan would be implemented under this alternative to minimize erosion and sedimentation effects to the greatest extent practicable during construction. Because Alternative B would disturb 1 or more acres of land, a SWPPP approved by the VDEQ and authorized under the Virginia Stormwater Management Program Regulation (9VAC25-870) would be developed prior to construction. This plan would include erosion control practices, inspection procedures, and other BMPs designed to reduce erosion during the construction process. *Short-term less-than-significant adverse impacts* from soil erosion and sedimentation would result under Alternative B.

In the long-term, the site would benefit from shoreline stabilization methods described in **Section 2.5.1.2**. Implementation of Alternative B would have a beneficial effect on the Proposed Project Area, as it would prevent further loss of land to erosion and keep sediment from entering Bailey Creek and Skiffes Creek. *Long-term beneficial* impacts to soil erosion and sedimentation would result under Alternative B.

4.3.3 Alternative C – Concrete Bulkhead

Under Alternative C, a total of 1,019 CY sand fill would be necessary for earthwork grading, in addition to the installation of concrete bulkheads placed along the shoreline. Similar to Alternatives A and B, upgradient areas would be graded to a slope between 8:1 and 10:1, resulting in permanent topographical changes in the area. Unlike Alternatives A and B, however, steeply sloped banks could sometimes remain in TA1 under Alternative C as they would be protected from wave action by the bulkheads. As such, Alternative C would cause the least impact to topography when compared to Alternatives A and B. Short-term adverse impacts on topography would be *less-than-significant* under Alternative C. Following construction, stabilization of slopes and reduced future erosion potential would result in *long-term beneficial* impacts to topography.

Construction activities would have a greater impact under Alternative C than with the other alternatives due to the presence of additional equipment needed to excavate the trench and place the concrete bulkheads along the shoreline. This additional equipment and excavation would contribute to soil compaction and sedimentation. As with Alternative B, ESCP and SWM plan would be implemented as well as a SWPPP since 1 acre or more of land would be cleared. BMPs outlined in the SWPPP would be followed to minimize impacts from construction activities. Although Alternative C would result in more construction-related impacts than Alternatives A or B, none of the previously identified criteria for significant impact would be met. Therefore, *short-term, less-than-significant adverse* impacts from soil erosion and sedimentation would occur under Alternative C.

In the long-term, the site would benefit from shoreline stabilization methods described in **Section 2.5.1.3**. Implementation of Alternative C would have a beneficial effect on the Proposed Project Area, as it would prevent further loss of land to erosion and keep sediment from entering Bailey Creek and Skiffes Creek. However, compared to Alternatives A and B, Alternative C could have the potential to result in erosion along the sides of and behind the concrete bulkheads. In addition to minimizing erosion through a long-term vegetation management and maintenance program, the Air Force would also conduct periodic site visits to determine if erosion is occurring and mitigate it accordingly. Further, should Alternative C be selected, the Air Force would conduct additional consultation with the Pamunkey Tribe who noted concerns associated with Alternative C's ability to control erosion, in a letter dated 25 February 2020 (see **Appendix A**). With these added measures, *long-term beneficial impacts* to soil erosion and sedimentation would result under Alternative C.

4.3.4 No Action Alternative

As described in **Section 2.5.1.4**, no measures would be taken to combat erosion at the site under this alternative. The long-term soil erosion rate would continue at 0.6 feet of land per year, resulting in topographic changes along the banks. The Proposed Action area would remain as described in **Section 3.3**.

If this alternative is implemented, erosion would continue at approximately 0.6 feet per year. While effects in the short-term may remain at *less-than-significant* levels, over time, this would substantially increase the occurrence of both erosion at the site, and sedimentation into Bailey Creek and Skiffes Creek thus, meeting criteria 1 for a significant impact to geological resources. Therefore, *long-term significant adverse* impacts to soil erosion and sedimentation would be expected under the No Action Alternative.

4.4 MUNITIONS AND RESTORATION SITES

The purpose of the ERP and its subprograms (MMRP and IRP) is to protect human health by creating a "safety net" intended to facilitate cleanup of contaminated sites and prevent further environmental contamination. Bailey Creek, which borders the southern shoreline of TA1, is an active IRP site.

Impacts to munitions and restoration sites would be considered significant if implementation of an alternative would: 1) substantially increase human health risk or environmental exposure; 2) contribute to the degradation of a munitions or restoration site; or 3) prevent the implementation of remedial actions planned as part of the IRP and/or MMRP.

As no MMRP sites exist on or near the Proposed Action Area, no impacts to MMRP sites would be expected under implementation of any action alternatives. Impacts on IRP sites would be the same across all action alternatives and are discussed below.

4.4.1 Alternative A – Marsh Management

Construction of Alternative A would result in *short-term, negligible adverse* impacts on IRP sites. Bailey Creek, which is designated as an IRP site, partially occurs within the Proposed Action area (**Figure 1-2**). While Alternative A would require in-water shoreline improvements that may potentially disturb the shoreline of Bailey Creek, disturbances are unlikely to affect existing contamination sites (Outfall No. 18 and its associated drainage swale), as TA1 is located over 0.5 mile from the outfall. In addition, current land use controls are in place surrounding Bailey Creek to minimize disturbance to the IRP site and existing contaminants. Restricted access to Bailey Creek for official business (e.g., designated support contractors)

is controlled by the JBLE-Eustis Harbor Master and coordinated with the JBLE-Eustis Environmental Restoration Office (USAF, 2017a). This restriction limits the potential for exposure to contaminants during the undertaking of authorized activities within Bailey Creek. JBLE-Eustis also requires appropriate regulatory compliance and permitting to prevent activities that could result in the disturbance of Bailey Creek. Adherence to these land use and regulatory controls would ensure that PCB-contaminated sediments and clays remain undisturbed. Therefore, construction of Alternative A would not likely cause the release or spread of existing contaminants from the IRP site. While there is a risk of accidental discharge and spills into Bailey Creek during land clearing and grubbing activities, implementation of the SPCC and the Installation-specific Hazardous Materials Management Plan, as discussed in **Section 1.4**, would minimize the potential for adverse impacts and releases to the IRP site to the extent practicable.

Operation and maintenance of Alternative A would not require any in-water work aside from vegetation management. Therefore, disturbance to existing contamination and potential release from the IRP site would be unlikely. Potential spills from equipment used to carry out the long-term vegetation management program may increase the level of contamination at the Bailey Creek IRP site, although occurrences, if any, would be rare and immediately addressed. Appropriate controls would be in place to avoid or minimize the spread of any identified contamination. Therefore, potential *long-term, negligible adverse* impacts on IRP sites would be expected under any action alternative.

4.4.2 Alternative B – Living Shoreline

Impacts on IRP sites under Alternative B would be similar to those described under Alternative A (see **Section 4.4.1**). With adherence to appropriate controls and proper permitting and compliance, Alternative B would constitute s*hort- and long-term, negligible adverse* impacts on IRP sites would result from construction of Alternative B.

4.4.3 Alternative C – Concrete Bulkhead

Impacts on IRP sites under Alternative C would be similar to those described under Alternative A (see **Section 4.4.1**). With adherence to appropriate controls and proper permitting and compliance, Alternative C would result in *short- and long-term, negligible adverse* impacts on IRP sites would from construction.

4.4.4 No Action Alternative

Implementation of the No Action Alternative would have *no* impacts with respect to MMRP sites on JBLE-Eustis. *Short- and long-term less-than-significant* impacts on IRP sites would result from potential migration of hazardous materials due to continued erosion of the shoreline. The Proposed Action area would remain as described in **Section 3.3**.

4.5 WATER RESOURCES

An impact to water resources would be significant if implementation of an alternative would: 1) reduce water availability or interfere with the water supply to existing users; 2) create or contribute to the overdraft of groundwater basins or exceed decreed annual yields of water supply sources; 3) adversely affect surface or groundwater quality; 4) threaten or damage unique hydrologic characteristics; or 5) violate established laws or regulations that have been adopted to protect or manage water resources.

4.5.1 Alternatives A – Marsh Management

4.5.1.1 Surface Water

With the amount of grading and earthwork required for Alternative A (1,200 CY of soil), construction would result in increased turbidity and sedimentation from soil disturbance, degrading the water quality in Bailey Creek and Skiffes Creek. Potential effects to the subaqueous bottomlands in Bailey Creek and Skiffes Creek from increased turbidity and sedimentation could occur as well. Standard construction BMPs, such as confining construction activities and/or equipment to upland locations to control runoff, and operating machinery outside of streambed, would be implemented to ensure impacts remain localized and temporary. As more than 2,500 square feet of land disturbance would occur, the Air Force would prepare and adhere to an ESCP and SWM plan, as required by JBLE-Eustis' VPDES Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems. Adherence to the requirements of the CGP and ESCP and SWM plan would manage the quantity and quality of stormwater discharge from land-disturbing activities associated with the Proposed Action and would minimize adverse effects on water quality in receiving waterbodies. The ESCP, once approved by the VDEQ, would be developed to minimize soil exposure and compaction during construction and provide stormwater discharge controls. Authorizations would be required from the LWB and/or VMRC, pursuant to the Virginia Tidal Wetlands Act, and the USACE, pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Sections 404 and 401 of the CWA. Wetlands are further discussed in **Section 4.6**. Implementation of BMPs and permit compliance would mitigate any potential impacts to surface water, resulting in *short-term, less-than-significant adverse* impacts to surface water and water quality.

In the long-term, implementation of Alternative A would minimize erosion events along the TA1 shoreline, decreasing sedimentation and reducing turbidity; thus, resulting in an incremental improvement to water quality in Bailey Creek and Skiffes Creek. Additionally, the marsh plantings under Alternative A would provide shade, which would stabilize water temperature and increase DO levels; therefore, Alternative A would have *long-term, beneficial* impacts to water quality.

4.5.1.2 Groundwater

Potential impacts to groundwater may occur from inadvertent release of contaminants into groundwater during construction activities and vegetation management. Such contaminants could include fuel and other petroleum products or liquids from vehicle and equipment use. **Section 4.4.1** discusses potential pollution (i.e., from chemicals and fuels) impacts attributable to Alternative A. Implementation of BMPs, such as performing daily inspections of equipment, maintaining appropriate spill-containment materials onsite, and complying with all applicable Federal, State, and installation regulations, would minimize potential for groundwater impacts. Alternative A would result in potential *short- and long-term less than significant-adverse* impacts to groundwater.

4.5.1.3 Floodplains

According to FEMA's National Flood Hazard Layer Viewer, 7.37 acres of the Proposed Action area is within the 100-year floodplain (FEMA, 2019). Actions within the floodplain (e.g., grading and marsh planting) would be necessary under Alternative A to protect the current use of TA1 and prevent continued and further erosion. However, Alternative A would not introduce any new habitable structures or obstructions that would impede or divert overland floodwater flow or alter the existing hydrologic regime at JBLE-Eustis such that downstream flood hazards would be increased or newly created. Further, the Air Force would comply with all applicable Federal and State regulations with regard to actions within a floodplain, as well as the local

floodplain administrator and local floodplain ordinance, to ensure impacts are minimized to the extent practicable. In the long-term, implementation of Alternative A would provide floodplain protection along the TA1 shoreline. Therefore, Alternative A would result in *short-term, less-than-significant adverse* impacts and *long-term beneficial* impacts to floodplain management.

As Alternative A requires in-water shoreline improvements, there is no practicable alternative to working in the floodplain that would meet the Air Force's purpose and need. The Air Force has prepared a FONPA, in accordance with EO 11988, explaining its decision to implement the Proposed Action in the 100-year floodplain. The FONPA is included in the Finding of No Significant Impact (FONSI) for this EA.

4.5.1.4 Coastal Zone Management Act Consistency

As described in **Section 3.5.4,** JBLE-Eustis is located within the designated coastal zone that is subject to the requirements of the CZMA. The Air Force has prepared a Federal Consistency Determination analyzing the Proposed Action's consistency with the enforceable policies of the Virginia Coastal Zone Management Program (CZMP). The Federal Consistency Determination is provided in **Appendix D**. Based on this analysis, the Air Force determined that Alternative A would be consistent with all enforceable policies of the Virginia CZMP with implementation of BMPs, adherence to permit conditions, compliance with the Virginia Erosion and Sediment Control Handbook, and appropriate agency coordination. The Federal Consistency Determination was mailed to the VDEQ on 27 January 2020 for review and concurrence with the Air Force's consistency findings. In a letter dated 20 March 2020, VDEQ concurred with the Air Force's findings that the Proposed Action would be consistent to the extent practicable with enforceable policies of the CZMP.

4.5.2 Alternative B – Living Shoreline

4.5.2.1 Surface Water

Impacts on surface water and water quality under Alternative B would be similar to those discussed under Alternative A (**Section 4.5.1.1**). Alternative B would require 2,556 CY sand fill for grading, sill construction, and marsh plantings that, would disturb soils and could result in increased turbidity and sedimentation into Bailey Creek and Skiffes Creek. In addition, the construction and placement of in-water erosion protection measures, such as sills, would have the potential to disturb subaqueous bottomlands in Bailey Creek and Skiffes Creek. Standard BMPs would be implemented to ensure impacts on surface waters remain temporary and localized. Containment booms and sediment curtains would be used during in-water and nearshore work to prevent the migration of disturbed sediment into the water column and to minimize turbidity. Further, the Air Force would coordinate with VMRC as appropriate and obtain a submerged bottomland permit if structures are placed channelward of mean low water. In addition to compliance with ESCP and SWM plan and the VPDES permit, implementation of Alternative B would require a SWPPP as it would result in one acre or more of land disturbance, requiring a CGP for the Discharge of Stormwater from Construction Activities. The SWPPP would include erosion control practices, inspection procedures, and other BMPs that would be required during construction to minimize adverse effects on water quality in receiving waterbodies. Overall, Alternative B would result in *short-term, less-than-significant adverse* impacts to surface water and water quality.

Similar to Alternative A, there would be *long-term, beneficial* impacts on water quality under Alternative B from a reduction in erosion events stabilizing water temperature and increasing DO levels. Furthermore, the man-made oyster reef would provide habitat for the eastern oyster; one adult oyster is known to filter nitrogen and sediment out of water at rates up to 50 gallons a day (Chesapeake Bay Foundation, 2019).

4.5.2.2 Groundwater

Impacts to groundwater from Alternative B would be the same as discussed under Alternative A (**Section 4.5.1.2**). The risk of inadvertent release of contaminants during construction activities and vegetation management would result in *short- and long-term, less-than-significant adverse* impacts on groundwater. Impacts would be minimized and avoided to the greatest extent practicable through implementation of standard construction BMPs.

4.5.2.3 Floodplains

Implementation of Alternative B would result in similar impacts on floodplains as Alternative A (**Section 4.5.1.3**), as construction of shoreline stabilization measures would occur within the floodplain. However, Alternative B's adverse impact on floodplains would be slightly greater than Alternative A as Alternative B requires more clearing (1 acre compared to 0.2 acre under Alternative A), and would also introduce new structures (e.g., sills and oyster reefs) within the floodplain; these structures would not impede or divert overland floodwater flow or alter the existing hydrologic regime at JBLE-Eustis. The Air Force would comply with all applicable Federal, State, and local regulations with regard to actions within a floodplain to ensure impacts are minimized to the extent practicable. In the long-term, implementation of Alternative B would provide floodplain protection along the TA1 shoreline. Therefore, Alternative B would result in *short-term, less-than-significant adverse* impacts and *long-term, beneficial impacts* to floodplain management.

As the proposed shoreline improvement measures must take place within the floodplain in order to protect the current use of TA1 and prevent continued erosion, there is no practicable alternative to working in the floodplain that would meet the Air Force's purpose and need; therefore, a FONPA has been prepared in accordance with EO 11988 and is included in the FONSI for this EA.

4.5.2.4 Coastal Zone Management Act Consistency

As discussed in **Section 4.5.1.4**, the Air Force has prepared a Federal Consistency Determination evaluating the Proposed Action's consistency with the enforceable policies of the Virginia CZMP (provided in **Appendix D**). Similar to Alternative A, the Air Force has determined Alternative B would be consistent to the maximum extent practicable with the enforceable policies of the Virginia CZM Program.

4.5.3 Alternative C – Concrete Bulkhead

4.5.3.1 Surface Water

Construction and operation of Alternative C would result in similar impacts on surface water and water quality as Alternatives A and B (**Sections 4.5.1.1** and **4.5.2.1**). Alternative C would require 1,019 CY of sand fill for grading, in addition to the installation of concrete bulkheads placed along the shoreline. As a result, there would be increased turbidity and sedimentation in Bailey Creek and Skiffes Creek from soil disturbance and erosion, affecting the water quality and subaqueous bottomlands. Alternative C would also require a CGP and SWPPP as it would result in would one acre or more of land disturbance, similar to Alternative B. A submerged bottomland permit would also be required if structures are placed channelward of mean low water. Adherence to the requirements of the CGP and ESCP and SWM plan would manage the quantity and quality of stormwater discharge from land-disturbing activities associated with Alternative C, and would minimize adverse effects on water quality in receiving waterbodies. Alternative C would result in *short-term, less-than-significant adverse* impacts to surface water and water quality during construction, and *long-term, beneficial* impacts on water quality from implementation of erosion protection measures.

4.5.3.2 Groundwater

Impacts to groundwater from Alternative C would be the same as those discussed under Alternatives A and B (**Sections 4.5.1.2** and **4.5.2.2**). The risk of inadvertent release of contaminants during construction activities and vegetation management would result in *short- and long-term, less-than-significant adverse* impacts on groundwater that would be minimized and avoided to the greatest extent practicable through implementation of standard construction BMPs.

4.5.3.3 Floodplains

Impacts on floodplains under Alternative C would be greater than those discussed under Alternatives A and B (**Sections 4.5.1.3** and **4.5.2.3**), as Alternative C would also require the placement of permanent concrete bulkheads within the floodplain. These structures would slightly alter the existing hydrologic regime at JBLE-Eustis; however, downstream flood hazards would not be increased or newly created. In addition, the Air Force would comply with all applicable Federal, State, and local regulations with regard to development within a floodplain to ensure impacts are minimized to the extent practicable. Therefore, Alternative C would result in *short- and long-term, less-than-significant adverse* impacts on floodplains. Same as Alternatives A and B, Alternative C would also provide floodplain protection along the TA1 shoreline, resulting in *long-term beneficial* impacts to floodplain management.

As activities under Alternative C must occur within the floodplain in order to protect the current use of TA1 and prevent continued erosion, there is no practicable alternative to working in the floodplain; therefore, a FONPA has been prepared in accordance with EO 11988 and is included in the FONSI for this EA.

4.5.3.4 Coastal Zone Management Act Consistency

As discussed in **Section 4.5.1.4**, the Air Force has prepared a Federal Consistency Determination evaluating the Proposed Action's consistency with the enforceable policies of the Virginia CZMP (provided in **Appendix D**). Similar to Alternative A, the Air Force has determined Alternative C would be consistent to the maximum extent practicable with the enforceable policies of the Virginia CZM Program.

4.5.4 No Action Alternative

Under the No Action Alternative, shoreline conditions at TA1 would remain as they currently exist for the foreseeable future. The No Action Alternative would result in increased erosion, consequently causing increased water temperatures, decreased levels of DO, and increased turbidity from sedimentation. Continued erosion or loss of the floodplain would also minimize water absorption through soil and other natural flood management controls, potentially resulting in an increased risk of flooding. Therefore, *long-term, potentially significant adverse* impacts to surface water quality and floodplains would result from implementation of the No Action Alternative. Implementation of the No Action Alternative would not result in the potential for impacts to groundwater.

4.6 BIOLOGICAL RESOURCES

Significance criteria used in assessing impacts to biological resources are based on 1) the importance (i.e., commercial, recreational, ecological, or scientific) of the resource; 2) the proportion of the resource that would be affected relative to its occurrence in the region; 3) the sensitivity of the resource to proposed activities; and 4) the duration of ecological ramifications. Impacts to biological resources would be significant if implementation of the alternative would adversely affect a T&E species; greatly diminish habitat

for a plant or animal species; greatly diminish habitat for a plant or animal species; substantially diminish a regionally or locally important plant or animal species; interfere with wildlife movement or reproductive behavior; and/or result in an infusion of exotic plant or wildlife species.

4.6.1 Alternative A – Marsh Management

4.6.1.1 Vegetation

Construction of Alternative A would result in minimal disruption to vegetation communities. While vegetation clearing and grubbing of 0.2 acres would be required to prepare the site, namely to establish temporary access points to the shoreline. The required clearing would be negligible in relation to the overall vegetation composition at TA1 and JBLE in general. In addition, these disturbed areas would be replanted with grass, shrubs, and tress, in accordance with the installation's Forest Management Plan and vegetation guidance outlined in the Integrated Natural Resources Management Plan (Fort Eustis, 2007; Fort Eustis, 2019). Native species would be used to the extent practicable; therefore, *short-term, less-than-significant adverse* impacts to vegetation would result from construction of Alternative A.

The marsh and tidal shrub plantings proposed under Alternative A would stabilize the shoreline along Bailey Creek and Skiffes Creek. Improved stability and resiliency of the TA1 shoreline would contribute towards healthy soils and improved drainage, which would indirectly benefit plant growth and reproduction in the long-term. Through use of the coir log along with strategic planting of tidal shrub and marsh vegetation to stabilize the sand substrate, Alternative A would create new permanent marsh habitat, including 4,930 marsh plantings. The new vegetation habitat would be maintained as a part of the long-term vegetation management program that would be implemented under this alternative. Alternative A would prevent further loss of land, and subsequently, minimize the loss and degradation of vegetation communities. Therefore, *long-term beneficial* impacts on vegetation communities would result under Alternative A.

4.6.1.2 Wildlife and Aquatic Resources

Construction of Alternative A would result in the disturbance and displacement of terrestrial wildlife and fragmentation of their habitats. Limited clearing for site preparation would occur and the transport of construction equipment would generate disruptive noise and vibrations. Construction activities would occur over a small area relative to the amount of suitable habitat available for wildlife. Mobile terrestrial species would be able to avoid construction areas and utilize more favorable habitats nearby. However, construction of Alternative A may potentially cause loss of life to less mobile terrestrial species during clearing activities. Overall, physical disturbance would be temporary and localized in nature. The Air Force would minimize areas for clearing to the extent practicable to retain natural corridors and habitats.Similarly, in-water construction work, such as the placement of the coir log, would temporarily increase underwater noise and vibrations. There would also be potential disturbance to bottom sediments that would cause a temporary increase in suspended sediments and turbidity in Bailey Creek and Skiffes Creek. An increase in turbidity could interfere with foraging and shelter behaviors, as well as affect fish respiration. Mobile species would be expected to move to more suitable areas to avoid localized construction sites, while less mobile species, such as benthic invertebrates and larvae, may experience loss of life. Total suspended sediment concentrations created by beach nourishment operations along an open coastline are expected to be between 34.0-64.0 milligrams per liter (mg/L), lower than levels shown to have adverse effect on fish (580.0 mg/L for the most sensitive species) and benthic communities (390.0 mg/L) (NOAA, 2018). The amount of sand required for fill under Alternative A would be considerably less than that required for beach nourishment. In addition, coarse sands would be used, which would allow turbidity plumes to settle rapidly

and not affect large areas. In-water disturbance would be temporary and localized in nature; erosion and sediment controls would be implemented.

Therefore, construction of Alternative A would result in *short-term, less-than-significant adverse* impacts to both terrestrial and aquatic wildlife and their habitats.

In the long-term, Alternative A would enhance both terrestrial and aquatic habitat along Bailey Creek and Skiffes Creek. The placement of the coir log and marsh and scrub plantings would provide long-term protection, restoration, and enhancement of vegetated shoreline habitats that would result in the protection of available foraging, shelter, and breeding opportunities for terrestrial species. To minimize potential wildlife entanglements resulting from use of synthetic/plastic erosion and sediment control matting , the Air Force would use matting made from natural/organic materials.For aquatic animals, enhancement of the existing marsh and creation of new marsh areas would provide shade and shelter, while increasing DO levels and stabilizing water temperatures. Alternative A would minimize erosion events along the shoreline, reducing sedimentation and decreasing turbidity, resulting in an incremental improvement to water quality. Improved water quality would benefit aquatic habitats and species; therefore, *long-term beneficial* impacts to terrestrial or aquatic wildlife would result under Alternative A.

4.6.1.3 Special Status Species

Listed Species

As discussed in **Section 3.6.3**, there is potential for the Federally threatened NLEB and endangered Indiana bat to occur in TA1. Potential effects to the Federally threatened NLEB (*Myotis septentrionalis*) and Indiana Bat (*Myotis sodalis*) may occur as a result of shoreline stabilization activities under Alternative A. Trees in the project area could potentially serve as maternal roosting and pupping habitat for the NLEB and Indiana bat. To protect any potential maternal roosting and pupping habitat in the project area, the Air Force would adhere to a seasonal restriction on tree cutting during the maternal roost and pup season (15 April to 15 September). Therefore, implementation of Alternative A *may affect* the NLEB and the Indiana bat and impacts would be short-term and *less than significant.* The same level of impact would be expected for the State listed bat species.

In the long term, implementation of Alternative A would reduce erosion, stabilize shoreline vegetation, and create new marsh habitat. Enhanced terrestrial habitats would potentially provide increased shelter, foraging, and reproductive opportunities for bats. Therefore, operation of Alternative A would result in *long-term, beneficial* impacts to listed bat species.

As previously discussed in **Section 3.6.3**, suitable habitat for the Atlantic sturgeon and shortnose sturgeon are not present within TA1; therefore, these species are not likely to occur. However, since Skiffes Creek and its tributaries near TA1 have been designated as a Potential Anadromous Fish Use Area, the Air Force would implement the revegetation measures discussed in **Section 4.6.1.1** and sedimentation and water quality controls discussed in **Sections 4.3** and **4.5** to protect anadromous fish. In addition, the Air Force would adhere to a time-of-year restriction from 15 February through 30 June for instream work, to the extent feasible, and aim to conduct instream activities during low- or no-flow conditions.

The USFWS indicated no concerns with the Air Force's determination regarding Federally listed species (**Appendix A**).

Bald Eagles

Bald eagles are protected under the MBTA and the BGEPA; they are known to occur in the ROI. Construction of Alternative A may result in noise and vibration disturbance to bald eagles. The National Bald Eagle Management Guidelines require a minimum 330-foot buffer to be maintained around any nests in order to minimize impacts. A Bald Eagle Take Permit may be required from the USFWS if a tree with an eagle nest would need to be removed. However, based on current data provided by the VDGIF and JBLE-Eustis (VDGIF, 2019; JBLE-Eustis, 2017), no eagle nests currently exist on TA1; the nearest nest is approximately 0.6 mile from TA1 across Skiffes Creek. While bald eagles may be temporarily disturbed by construction activities, they would not experience permanent impacts and construction would remain localized; therefore, *short-term, less-than-significant adverse* impacts are anticipated under Alternative A.

In the long term, implementation of Alternative A would reduce erosion, stabilize shoreline vegetation, and create new marsh habitat. Enhanced terrestrial habitats would potentially provide increased shelter, foraging, and reproductive opportunities for bald eagles. Therefore, operation of Alternative A would result in *long-term, beneficial* impacts to bald eagles.

Migratory Birds

A total of 19 migratory birds protected under the MBTA are known to occur in the ROI (USFWS, 2019b). Under EO 13186 *Responsibilities of Federal Agencies to Protect Migratory Birds*, the DoD and USFWS established a memorandum of understanding to promote the conservation of migratory bird populations during DoD activities. Suitable nesting habitat for a variety of birds under the protection of the MBTA also exists within the ROI. Land disturbing activities can have direct impacts on migratory birds and other ground nesting birds during the breeding season due to potential stressors, such as the use of heavy machinery, vegetation removal, and increased noise. Indirect impacts on birds could also result from the permanent or temporary loss of habitat. However, given the limited amount of vegetation removal under Alternative A, adverse effects on migratory birds would be anticipated to be negligible. Individual birds would be able to leave the Proposed Action area during land clearance activities. Of the 19 species with potential occurrence, 10 have been observed at JBLE-Eustis, including the clapper rail (*Rallus crepitans*), red-headed woodpecker (*Melanerpes erythrocephalus*), and prairie warbler (*Setophaga discolor*) (Fort Eustis, 2019). Adherence to time-of-year restrictions on tree clearing from 15 March through 15 August to avoid the breeding season for migratory birds would make the take of any nests, eggs, or juveniles unlikely. Therefore, *short-term, less-than-significant adverse* impacts to species protected under the MBTA would result under implementation of Alternative A.

In the long term, implementation of Alternative A would reduce erosion, stabilize shoreline vegetation, and create new marsh habitat. Enhanced terrestrial habitats would provide increased shelter, foraging, and reproductive opportunities for migratory birds. Therefore, operation of Alternative A would result in *long-term, beneficial* impacts to migratory birds.

4.6.1.4 Sensitive Habitats

Essential Fish Habitat

Construction of the Proposed Action could potentially affect EFH and EFH species from increased turbidity and sedimentation, as well as the placement of in-water structures. Water conditions surrounding TA1 are not conducive to supporting EFH; therefore, EFH species are not likely to occur or would occur in limited numbers. Additionally, mobile species would be able to avoid construction areas and move to more suitable

areas during construction. S*hort-term less-than-significant adverse* impacts on EFH would potentially occur under Alternative A.

Operation of Alternative A would reduce erosion and minimize sedimentation in Bailey Creek and Skiffes Creek. As a result, water quality would improve and contribute toward healthier habitats for EFH. Shoreline improvements would also stabilize shoreline vegetation and incorporate strategic planting to create permanent marsh habitat, benefitting aquatic wildlife utilizing these shoreline areas. Enhanced aquatic habitats would provide increased shelter, foraging, and reproductive opportunities for EFH in the long term. Therefore, *long-term, beneficial* impacts to EFH would result under Alternative A.

Wetlands

Impacts and encroachments (both temporary and permanent) on tidal wetlands and waters are anticipated under Alternative A. Therefore, authorizations would be required from the LWB and/or VMRC, pursuant to the Virginia Tidal Wetlands Act, and the USACE, pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the CWA. A Tidewater Joint Permit Application (JPA) would need to be submitted to the VMRC for coordination with the LWB and USACE. It is anticipated the Proposed Action may qualify for authorization under the USACE Regional Permit 19 (13-RP-19). The State Water Control Board has issued unconditional 401 Water Quality Certification for the 13-RP-19. As such, the activities that qualify for 13-RP-19 also meet the requirements of the VDEQ VWP Regulation. In lieu of 13-RP-19, the USACE may also authorize shoreline stabilization projects under Nationwide Permit 13 (Bank Stabilization). The Air Force would limit construction activities and disturbance within wetlands to that necessary to position/secure in-water erosion protection measures. Prior to construction, the Air Force would conduct a final site reconnaissance to verify that the limits of disturbance minimize impacts on wetlands to the greatest extent practicable. The Air Force would implement BMPs, such as placing heavy equipment and stockpiled equipment on mats in wetland areas and operating machinery outside of wetlands, to minimize impacts to the extent practicable. Measures would also be implemented in accordance with applicable permit requirements, as noted above, as well as all applicable Federal, State, and local regulations. If determined necessary through consultation with the VDEQ and other applicable regulatory agencies, the Air Force would submit a Joint Permit Application (JPA) for review and/or authorization from the VMRC, VDEQ, and/or LWB to work in the tidal waters and wetlands of Bailey Creek and Skiffes Creek.

In the long-term, tidal wetlands in the vicinity of the Proposed Action would benefit from the improved stability and resiliency of the TA1 shoreline, as Alternative A would result in the protection of existing wetland habitats from shoreline erosion and degradation. Additionally, the strategic planting of tidal shrub and marsh vegetation would further contribute to the enhancement of existing wetland habitats. Therefore, *short-term, less-than-significant* adverse impacts to wetlands would result under Alternative A. *Long-term beneficial* impacts would occur from the improved stability and resiliency of the TA1 shoreline, and the enhancement and creation of marshland through 4,930 plantings.

Resource Protection Areas

Vegetation clearing and soil disturbance during construction of Alternative A would disturb RPAs within the TA1 site. While this would be an adverse impact, it would be mitigated through the tidal shrub and marsh plantings that would be conducted under this alternative. The Air Force would minimize land disturbance and clearing to the extent practicable in order to retain existing vegetation. Further, consistency with the CZMA and compliance with an ESCP and SWM plan would minimize impacts on RPAs. No ongoing or permanent activities with the potential to disturb RPAs would be established by Alternative A. In the long-term, RPAs would benefit from the newly planted vegetation as well as from increased stability of the shoreline. Therefore, *short-term, less-than-significant adverse* impacts to RPAs would result under

Alternative A while *long-term beneficial* impacts would occur from stabilized and improved shoreline conditions.

4.6.2 Alternative B – Living Shoreline

4.6.2.1 Vegetation

Under Alternative B, 1 acre of land would require clearing and grubbing to prepare the site for construction. More land would be disturbed under Alternative B than under Alternative A because additional heavy construction equipment would be necessary to place the sill and construct the man-made oyster reefs. Similar to Alternative A, construction disturbance would be temporary and cleared areas would be replanted with grass, shrubs, and tress, in accordance with the installation's Forest Management Plan and vegetation guidance outlined in the INRMP (Fort Eustis, 2007; Fort Eustis, 2019). *Short-term less-than-significant adverse* impacts to vegetation communities would be expected under Alternative B.

The man-made oyster reefs and stone sill along with the newly planted marsh and tidal shrub areas would stabilize the shoreline of Bailey Creek and Skiffes Creek. Improved stability and resiliency of the TA1 shoreline would contribute towards healthy soils and improved drainage, which would indirectly benefit plant growth and reproduction in the long-term. Through the use of the stone sill in combination with marsh vegetation plantings, a significant amount of new permanent marsh habitat would be created (i.e., 12,975 plantings compared to 4,930 and 2,256 under Alternatives A and C, respectively), as well as tidal shrub and upland plantings. This new vegetation habitat would be monitored and maintained as a part of the long-term vegetation management program that would be implemented under this alternative. Alternative B would prevent further loss of land, and subsequently, minimize the loss and degradation of vegetation communities. Therefore, *long-term beneficial* impacts on vegetation communities would result under Alternative B.

4.6.2.2 Wildlife and Aquatic Resources

Construction of Alternative B would result in disturbance of slightly more terrestrial habitat (1 acre) compared to Alternative A (0.2 acre). However, construction activities would still occur over a small area relative to the amount of suitable wildlife habitat in the area. Short-term impacts on terrestrial wildlife would be less-than-significant and further minimized with implementation of construction BMPs, although marginally greater than those described for Alternative A (see **Section 4.6.1.1**). Due to the increased length and weight of the stone sill, as well as construction of the man-made oyster reefs, in-water construction would cause slightly more disturbance to wildlife than construction under Alternative A. However, impacts would still be below thresholds for the aforementioned significance criteria. Therefore, *short-term, less-than-significant adverse* impacts to both terrestrial and aquatic wildlife would result under Alternative B.

In the long-term, Alternative B would enhance both terrestrial and aquatic habitat along Bailey Creek and Skiffes Creek. The placement of the stone sill, marsh, and scrub plantings would provide long-term protection, restoration, and enhancement of vegetated shoreline habitats that would improve available foraging, shelter, and breeding opportunities for terrestrial species. For aquatic animals, enhancement of the existing marsh and creation of new marsh areas would provide shade and shelter, while increasing DO levels and stabilizing water temperatures. Additionally, the man-made oyster reef would provide ideal habitat for the regionally important eastern oyster and blue crab. Oysters filter the water for food, removing sediment and nitrogen from the water (Chesapeake Bay Foundation, 2019). Similar to the creation and enhancement of marsh areas, the oyster reef would provide shade and shelter for aquatic animals while the presence of oysters would have beneficial effects on local water quality. Alternative B would minimize

erosion events along the shoreline, reducing sedimentation and decreasing turbidity, resulting in an incremental improvement to water quality. Improved water quality and construction of the man-made oyster reef would significantly benefit aquatic habitats and species. Therefore, *long-term beneficial* impacts on terrestrial or aquatic wildlife would occur under Alternative B.

4.6.2.3 Special Status Species

Impacts to special status species under Alternative B would be similar to those described under Alternative A (see **Section 4.6.1.3**), although impacts would be greater due to more land disturbance and tree clearance. With adherence to seasonal restrictions, Alternative B would minimize and maintain impacts at less-than-significant levels. Therefore, *short-term, less-than-significant adverse* impacts to special status species would result from construction of Alternative B, while *long-term, beneficial impacts* would occur from stabilized and improved habitats.

4.6.2.4 Sensitive Habitats

Essential Fish Habitat

Impacts to EFH species and their suitable habitats under Alternative B would be similar to those described under Alternative A (see **Section 4.6.1.4**). While in-water activities associated with placement of the stone sill and construction of man-made oyster reefs would cause a greater increase in turbidity and physical disturbance to aquatic species and habitats compared to Alternative A, overall impacts would be short-term and *less-than-significant* due to the temporary nature of construction and mobility of EFH species. Similarly, long-term impacts under Alternative B would be the same as those described for Alternative A. Oyster reefs would provide an added benefit by increasing shelter, foraging, and reproductive opportunities for EFH species in the long term. Overall, impacts would be long-term and *beneficial*.

Wetlands

Compared to Alternative A (see **Section 4.6.1.4**), impacts to wetlands during construction of Alternative B would be greater due to additional clearing and grubbing required to install the stone sill. However, these impacts would still occur at less-than-significant levels. Permits and authorizations for described for Alternative A would also be required under Alternative B. In the long-term, wetlands would benefit not only from shoreline stabilization and decreased erosion but also from the 8,045 additional marsh plantings planned under Alternative B when compared to Alternative A. *Short-term, less-than-significant adverse* impacts to wetlands would result from construction of Alternative B while *long-term beneficial* impacts would occur from stabilized and improved shoreline conditions.

Resource Protection Areas

Impacts to RPAs under Alternative B would be greater than those described for Alternative A (see **Section 4.6.1.4**) due to additional clearing and grubbing required to install the stone sill. However, these impacts would be temporary and would still occur at less-than-significant levels. In the long-term, the stone sill would introduce a permanent structure within the RPA, resulting in a small disturbance. However, shoreline protection measures would substantially improve the quality of disturbed portions of the RPA, resulting in a negligible net loss in RPA size and function. Further, as design of the Proposed Action continues, RPAs on TA1 would be delineated to determine their precise locations. As discussed in **Section 4.6.2.1**, cleared areas would be replanted to the extent practicable to replace lost vegetation and restore the functional value of RPAs. The Air Force would comply with the requirements of the *Virginia Erosion and Sediment Control Handbook*, and satisfy stormwater management criteria consistent with water quality protection

provisions of the Virginia Stormwater Management Regulations to minimize impacts on RPAs. In general, shoreline protection measures would benefit the overall quality and integrity of RPAs in the ROI. Therefore, *short- and long-term, less-than-significant adverse* impacts to RPAs would result from construction and operation disturbance, while *long-term beneficial* impacts would occur from stabilized and improved shoreline conditions.

4.6.3 Alternative C – Concrete Bulkhead

4.6.3.1 Vegetation

Construction impacts to vegetation under Alternative C would be similar to those under Alternative B, as Alternative C would require clearing and grubbing of 1 acre of land to prepare the site and provide heavy equipment access to the shoreline. However, Alternative C would include the placement of a concrete bulkhead which would result in a larger long-term structural footprint and greater impact compared to Alternative B. With adherence to the Installation's Forest Management Plan and vegetation guidance outlined in the INRMP, impacts on vegetation under Alternative C would be minimized and maintained at less-than-significant levels (Fort Eustis, 2007; Fort Eustis, 2019). *Short-term less-than-significant adverse* impacts to vegetation communities would be expected under Alternative C.

In the long-term, the concrete bulkheads, along with placement of the stone sill and new plantings, would stabilize the shoreline of Bailey Creek and Skiffes Creek. Similar to Alternatives A and B, improved stability and resiliency of the TA1 shoreline under Alternative C would contribute towards healthy soils and improved drainage, which would indirectly benefit plant growth and reproduction in the long-term. Alternative C would prevent further loss of land, and subsequently, minimize the loss and degradation of vegetation communities. Therefore, *long-term beneficial* impacts on vegetation communities would result under Alternative C, although benefits would be slightly less compared to Alternatives A and B, as Alternative C would have a greater structural footprint and would implement the least amount of marsh plantings (2,256 compared to 4,930 and 12,975 under Alternatives A and B).

4.6.3.2 Wildlife and Aquatic Resources

Short-term impacts to both terrestrial and aquatic wildlife would be similar to those described for Alternative B (see **Section 4.6.2.2**). In order to secure the bulkheads, excavation of a trench would be necessary for placement of the bulkheads rear anchor. Compacted soil backfill would be placed on top of the trench to anchor the bulkheads in place. As such, Alternative C would have greater impacts on turbidity and aquatic conditions in Bailey Creek and Skiffes Creek compared to Alternative B. However, these impacts would be temporary and remain below the significance threshold. Implementation of standard construction BMPs would further minimize potential effects. Therefore, *short-term less-than-significant* impacts to terrestrial and aquatic wildlife would result under Alternative C.

Similar to Alternatives A and B, in the long-term, Alternative C would result in *long-term beneficial impacts* on terrestrial or aquatic wildlife from enhanced habitat along Bailey Creek and Skiffes Creek. For aquatic species, enhancement of the existing marsh and creation of new marsh areas would provide shade and shelter, while increasing DO levels and stabilizing water temperatures. The placement of the concrete bulkheads and stone sill, as well as marsh and scrub plantings would provide long-term protection, restoration, and enhancement of vegetated shoreline habitats that would result in the protection of available foraging, shelter, and breeding opportunities for terrestrial species. However, as Alternative C would introduce more structural components (e.g., concrete bulkheads and sills) and have a larger structural footprint in the ROI, its beneficial impacts would be slightly less than benefits under Alternatives A and B.

4.6.3.3 Special Status Species

Impacts to special status species under Alternative C would be similar to those described under Alternative A (see **Section 4.6.1.3**), although impacts would be greater due to more land disturbance and tree clearance. With adherence to seasonal restrictions, Alternative C would minimize and maintain impacts at less-than-significant levels. Therefore, *short-term, less-than-significant adverse* impacts to special status species would result from construction of Alternative C, while *long-term, beneficial impacts* would occur from stabilized and improved habitats.

4.6.3.4 Sensitive Habitats

Essential Fish Habitat

Impacts to EFH species and their suitable habitats under Alternative C would be similar to those described under Alternative A (see **Section 4.6.1.4**). While in-water activities associated with excavation and filling of the trench to anchor the bulkheads and placement of the stone sill would cause a greater increase in turbidity and physical disturbance to aquatic species and habitats compared to Alternative A, overall impacts would be short-term and *less-than-significant* due to the temporary and localized nature of construction and mobility of EFH species. Similarly, long-term impacts under Alternative C would be the same as those described for Alternative A. Overall, impacts would be long-term and *beneficial*.

Wetlands

Compared to Alternative A (see **Section 4.6.1.4**) impacts to wetlands during construction of Alternative C would be greater due to additional clearing and grubbing required to install the concrete bulkheads. However, these impacts would still occur at less-than-significant levels. Permits and authorizations for described for Alternative A would also be required under Alternative C. In the long-term, wetlands would benefit from shoreline stabilization and erosion prevention, although the lower number of tidal shrub and marsh plantings planned under Alternative C would result in less of a beneficial impact than those expected under Alternative A and Alternative B. Therefore, *short-term, less-than-significant adverse* impacts to wetlands would result from construction of Alternative C while *long-term beneficial* impacts would occur from stabilized and improved shoreline conditions.

Resource Protection Areas

Impacts to RPAs under Alternative C would be greater than those described for Alternative A (see **Section 4.6.1.4**) due to additional clearing and grubbing required to install the bulkheads. However, these impacts would be temporary and would still occur at less-than-significant levels. In the long-term, impacts would be similar to those described under Alternative B, as Alternative C would place permanent structures within the RPA, resulting in a small loss of RPA in the long term. However, shoreline protection measures would improve the overall quality and integrity of RPAs in the ROI, and cleared areas would be replanted to the extent practical. Therefore, *short- and long-term, less-than-significant adverse* impacts to RPAs would result from construction and operation disturbance, while *long-term beneficial* impacts would occur from stabilized and improved shoreline conditions.

4.6.4 No Action Alternative

4.6.4.1 Vegetation

Under the No Action Alternative, shoreline conditions at TA1 would remain as they currently exist for the foreseeable future. Continued erosion would cause nutrient loss in soils, adversely affecting the health of vegetation communities at the TA1 shoreline. Erosion would also lead to the physical loss of soils, preventing plants from laying down extensive root systems. Changes in vegetation root depth and stability would weaken vegetation communities as a whole and leave plants vulnerable to uprooting during storm, flood, and wind events. Since riparian vegetation along the TA1 shoreline can help combat erosion events, the weakening of plant life would lead to continued and increased erosion. Therefore, *long-term, potentially significant adverse impacts* on terrestrial and aquatic vegetation communities would result under the No Action Alternative.

4.6.4.2 Wildlife and Aquatic Resources

Under the No Action alternative, shoreline conditions at TA1 would remain as they currently exist for the foreseeable future. As previously discussed, continued erosion would result in vegetation decline. A loss in vegetation would reduce foraging resources and opportunities to shelter for terrestrial wildlife. Many of the terrestrial species commonly found at TA1 rely on dense vegetation for protection and habitat. The loss of forest cover, wetland communities, and riparian vegetation due to erosion and shoreline degradation would adversely affect breeding and foraging behaviors of terrestrial wildlife.

For aquatic wildlife, the No Action Alternative would result in increased erosion that would have adverse effects on water quality, and consequently aquatic wildlife. Resulting effects, such as increased water temperatures, decreased levels of DO, and increased turbidity from sedimentation, would impact aquatic wildlife dependent on healthy water habitats. Polluted waterways could cause algal blooms, which are toxic to fish, contributing to a loss of life as well as an impact to predator food sources. Therefore, *significant long-term adverse* impacts to both terrestrial and aquatic wildlife would result under the No Action Alternative.

4.6.4.3 Special Status Species

Under the No Action Alternative, erosion would continue to cause tree arching and collapse thus reducing habitat for Federal- and State-listed species, as well as for species protected under the MBTA that may occur in the Proposed Action area. However, as previously discussed, ample comparable wooded habitat exists within the ROI. Therefore, long-term *less-than-significant adverse* impacts to Federal- and State-listed species, as well as to birds protected under the MBTA, would be expected under the No Action Alternative.

In addition, no active bald eagle nests were identified along the TA1 shoreline that could be affected by shoreline erosion; thus, *no impacts* would occur to bald eagles under the No Action Alternative.

4.6.4.4 Sensitive Habitats

Implementation of the No Action Alternative would result in degradation to EFH, wetlands, and RPAs due to continued erosion and destabilization of the shoreline at TA1. EFH would be significantly degraded due to increased turbidity and sedimentation resulting from erosion and destabilization of the shoreline. Erosion

would encroach on wetland and RPAs and decrease their footprint over time. Therefore, *long-term significant adverse* impacts on sensitive habitats would result under the No Action Alternative.

4.7 CULTURAL RESOURCES

An adverse effect to cultural resources is defined under 36 CFR 800.5(a) as occurring "when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register [of Historic Places]" (US Department of Interior, 2004). As noted in **Section 3.7**, cultural resources greater than 50 years of age may achieve significance if the resource is associated with significant historic events (Criterion A); if it is associated with the life of a significant person (Criterion B); if it embodies distinctive construction qualities or otherwise exemplifies an eminent entity (Criterion C); and/or if it may be likely to yield information important to prehistory or history (Criterion D).

The VADHR has determined 44NN0024, partially located within the ROI, is eligible for listing in the NRHP under Criterion D following the recommendations of Wilkins et al. (2015). In 2019, a survey team evaluated the portion of the site within the ROI to determine if it contains archaeological resources that contribute to the site's NRHP eligibility (Regan, 2019). These efforts resulted in the identification of intact archaeological deposits discretely clustered in the center of the ROI and which are indicative of a prehistoric activity area recommended as a contributing component of the site's NRHP eligibility. Given these considerations, a significant adverse effect would result if ground disturbing activities associated with Alternatives A through C, or continued erosion resulting from the No Action Alternative, impinged upon the discrete artifact cluster identified in the center of the ROI.

4.7.1 Alternative A – Marsh Management

Alternative A would include ground disturbance during construction. The construction activities most likely to impact upland portions of the ROI where archaeological resources are located include bank grading, and clearing for the temporary access road and the construction staging area. While bank grading would require the loss of upland ground surfaces in select locations, these are restricted to isolated areas along the peninsula's perimeter. Further, significant or potentially significant archaeological deposits have not been identified in areas of proposed bank grading. Heavy equipment access and materials staging is required for Alternative A as noted in **Section 2.2**. Creation of the construction access road and staging area may occur anywhere within the ROI (scope and extent of these activities have not been defined) and can be reasonably expected to include grading, tree removal, and heavy equipment traffic. It is likely that these activities would exceed the minimum depth to encounter intact archaeological deposits within the ROI (less than 0.33 feet in many places), including 44NN0024. However, mitigation through project design would be implemented to avoid impacts. The access road would be designed in a manner to ensure that there would be no effect to any archaeological resources. The location of this cluster, its relatively small size, and its sharply bounded nature would allow for avoidance during construction and use of access roads and staging areas. This cluster would be incorporated as a design constraint on the Limits of Disturbance; protective fencing would be installed to restrict access. With implementation of design avoidance activities, Alternative A would have *no adverse effect* on 44NN0024 under 36 CFR 800.5(a) as it would not impact elements of the site that contribute to its NRHP eligibility.

Should archaeological materials or human remains be inadvertently discovered during ground disturbing activities, all work shall cease immediately and the proper authorities would be notified.

Operation of Alternative A would have *long-term beneficial* impacts on archaeological deposits by stabilizing the shoreline. A reduction in erosion events would prevent the potential loss or degradation of existing or undiscovered cultural resources, and help protect and preserve the integrity of cultural resources at TA1.

4.7.2 Alternative B – Living Shoreline

Impacts to cultural resources under Alternative B would be similar to those described under Alternative A (see **Section 4.7.1**). With implementation of design avoidance, Alternative B would constitute *no adverse effect* to 44NN0024 under 36 CFR 800.5(a) as construction and operation activities would not impact elements of the site that contribute to its NRHP eligibility. Should archaeological materials or human remains be inadvertently discovered during ground disturbing activities, all work shall cease immediately and the proper authorities would be notified.

Alternative B would result in the same *long-term beneficial impacts* on cultural resources as Alternative A.

4.7.3 Alternative C – Concrete Bulkhead

Impacts to cultural resources under Alternative C would be similar to those described under Alternative A (see **Section 4.7.1**). With implementation of design avoidance, Alternative C would constitute *no adverse effect* to 44NN0024 under 36 CFR 800.5(a) as construction and operation activities would not impact elements of the site that contribute to its NRHP eligibility. Should archaeological materials or human remains be inadvertently discovered during ground disturbing activities, all work shall cease immediately and the proper authorities would be notified. Further, should Alternative C be selected, the Air Force would conduct additional consultation with the Pamunkey Tribe who noted concerns associated with Alternative C's ability to control erosion, in a letter dated 25 February 2020 (see **Appendix A**).

Alternative C would result in similar *long-term beneficial impacts* on cultural resources as Alternatives A and B.

4.7.4 No Action Alternative

Under the No Action Alternative, shoreline conditions at TA1 would remain as they currently exist for the foreseeable future. No construction, alteration, improvement/rehabilitation, or planting of vegetation would be performed. While this would avoid any short-term impacts to significant archaeological deposits arising from ground disturbing activities, continued erosion within the ROI may eventually lead to the loss of significant deposits. Since these deposits are located near the center of the ROI, impacts arising from the No Action Alternative would occur in the long-term given the localized erosion rate. Thus, *long-term significant adverse* impacts would result under the No Action Alternative.

4.8 AIR QUALITY AND CLIMATE

The air quality impact analysis follows the EIAP Air Quality Guidelines (Solutio Environmental, 2017) for criteria pollutants and GHG emissions. The Air Force's Air Conformity Applicability Model (ACAM) was used to analyze the potential air quality impacts associated with the Proposed Action, in accordance with the AFI 32-7040, the EIAP, and the General Conformity Rule (40 CFR 93 Subpart B). The General Conformity Rule applies to Air Force actions at JBLE because the Hampton Roads regulatory area was historically designated nonattainment for the revoked 1997 8-hour ozone NAAQS. The potential for impacts was evaluated with respect to context (e.g. short-term versus long-term) and intensity (e.g. beneficial or adverse).

Impacts on air quality would be deemed significant if total net change in emissions would exceed one or more of the NAAQS or threaten the attainment status of the region. Additionally, impacts to air quality could be considered significant if peak-year emissions from a Proposed Project Alternative would be expected to exceed General Conformity *de minimis* levels for one or more pollutants.

4.8.1 Alternative A – Marsh Management

Construction of Alternative A would result in *short-term, less-than-significant adverse effects* on air quality. Construction activities would temporarily generate fugitive dust from grading and clearing, and criteria pollutant emissions (e.g., Volitile Organic Compounds (VOC) and NO_X [as precursors of O_3], CO, PM_{10}, and $PM_{2.5}$ [including its precursor SO_2], and GHG emissions) from use of diesel-powered and gas-powered equipment. The workforce commute would also contribute to a short-term increase in emissions as well. Construction period emissions typically depend on expected material quantities, such as clean fill import and off-site disposal of excess excavated material, and equipment/vehicle utilization requirements for each project component. The majority of air emissions associated with Alternative A would be temporary in nature (limited to the duration of and construction activities) and would be caused by fuel combustion in vehicles and construction equipment, and by dust generated from grubbing, clearing, grading, and vehicle travel over unpaved areas. Construction emissions would not exceed regulatory thresholds. Further, the Air Force would implement standard construction BMPs to minimize emissions and fugitive dust, such as using appropriate dust suppression methods (e.g., application of water) and promptly removing spilled or tracked dirt. After construction has been completed, only emissions associated with implementation of the vegetation management program under Alternative A would occur. Emissions would result from personnel accessing the site via vehicles to carry out vegetation management as well as from light equipment (e.g., chainsaws and limb cutters) used for selective tree clearing and pruning. Emissions from these activities are expected to be negligible and would not represent an increase from the current conditions. In the long term, *no adverse impacts* on air emissions would be anticipated.

The change in climate conditions caused by GHGs resulting from the burning of fossil fuels from activities associated with Alternative A is a global effect; therefore, the disclosure of localized incremental emissions has no weight to impact climate change. Consequently, given the minimal increase predicted for temporary construction and steady state activities, Alternative A would have no impact on overall global or regional GHG emissions and global climate change. The implementation of Alternative A, however, would protect against future erosion and sedimentation that may occur from changes in sea level rise and tidal flooding resulting from climate change.

Alternative A's estimated emissions and applicability to the General Conformity Rule is further discussed below.

Emission Results

As mentioned, the construction emissions resulting from the Proposed Action was calculated using ACAM. These emissions are "netted" on an annual basis. The impact analysis must consider the greatest annual emissions associated with the Proposed Action. All construction activities for Alternative A would be expected to be completed in a single calendar year, therefore total annual emissions would also represent total project emissions. Alternative A would be expected to have the lowest emission rates of the alternatives considered, because it would require the least amount of total area to be graded (0.2 acre versus 1 acre for Alternatives B and C) and because installation of the fiber log would require less equipment activity than would the other alternatives requiring structural improvements.

Table 4-1 depicts total annual construction phase emissions for Alternative A. See **Appendix E** for the Record of Air Analysis and ACAM detailed emissions reports generated for this analysis.

Table 4-1 Alternative A, 2020 Construction Phase Emissions

Pollutant	Proposed Action Emissions (ton/yr)	NEPA Significance Threshold (ton/yr)	NEPA Exceedance (Yes or No)	General Conformity De Minimis Threshold (ton/yr)	General Conformity Applicability (Yes or No)
Regulatory Area: Norfolk-Virginia Beach-Newport News (Hampton Roads), VA - 1997 8-hour Ozone NAAQS					
VOC	0.045	100	No	100	No
NO_x	0.294	100	No	100	No
CO	0.266	100	No	n/a	n/a
SO_x	0.001	100	No	n/a	n/a
PM_{10}	0.161	100	No	n/a	n/a
$PM_{2.5}$	0.012	100	No	n/a	n/a
Pb	0	25	No	n/a	n/a
NH_3	0	100	No	n/a	n/a
CO_2e	69.1	--	--	--	--

Notes: CO_2e = Carbon Dioxide Equivalent, n/a = Not Applicable
Source: ACAM, run on 01 October 2019.

A General Conformity applicability analysis was performed for each of the Action Alternatives, comparing construction related emissions of precursors to ozone, including VOCs and NO_x, to General Conformity *de minimis* thresholds. As demonstrated in **Table 4-1**, Alternative A project emissions of VOC and NO_x (as precursors to ozone) would be expected to total 0.045 tons/year and 0.294 tons/year respectively, both well below the 100 tons/year *de minimis* threshold for General Conformity. Therefore, no additional General Conformity analysis is required for Alternative A.

As outlined in the EIAP Guide, the General Conformity *de minimis* thresholds are used as NEPA significance indicators for air quality in attainment areas. General Conformity *de minimis* threshold values are the maximum net change an action can acceptably emit in nonattainment and maintenance areas. These threshold values would also be a conservative indicator that an action's emissions within an attainment area would also be acceptable (i.e., if the threshold is acceptable in nonattainment areas, it will also be acceptable in attainment areas). For Alternative A, all attainment criteria pollutants are below the

significance indicators presented in **Table 4-1**; therefore, the potential air quality impact from all criteria pollutants is insignificant.

The estimated increase of GHG emissions associated with construction of Alternative A would produce approximately 69 metric tons of carbon dioxide equivalent (CO_2e) in 2020, which is the lowest expected rate of GHG emissions among the Action Alternatives (129 tons of CO_2e and 95 tons of CO_2e, under Alternatives B and C, respectively). As noted previously, emissions generated from operation of Alternative A are expected to be negligible.

4.8.2 Alternative B – Living Shoreline

Construction of Alternative B would result in similar impacts on air emissions as Alternative A (**Section 4.8.1**). However, *short-term, less-than-significant adverse* impacts during construction would be slightly greater under Alternative B due to the clearing of 1 acre (compared to 0.2 acre) and additional use of equipment for installing the sill and sand fill. Alternative B would also require the most marsh plantings compared to the other two Alternatives, which would generate more air emissions. Impacts would be temporary and emissions would not exceed regulatory thresholds.

Same as Alternative A, no *long-term, adverse impacts* on air emissions would be anticipated during implementation of Alternative B as emissions from vegetation management would be negligible and would not represent an increase from current conditions. Localized incremental GHG emissions from Alternative B would have no impact on overall global or regional GHG emissions and global climate change. The implementation of Alternative B, however, would protect against future erosion and sedimentation that may occur from changes in sea level rise and tidal flooding resulting from climate change.

Alternative B's estimated emissions (calculated using ACAM) and applicability to the General Conformity Rule is further discussed below.

Emission Results

All construction activities for Alternative B would be expected to be completed in a single calendar year, therefore total annual emissions would also represent total project emissions. Emissions from Alternative B would be expected to be somewhat greater than those from Alternatives A and C, due to more bank grading and additional construction activity for sill installation and sand fill.

Table 4-2 depicts total annual construction phase emissions for Alternative B. See **Appendix E** for the Record of Air Analysis and ACAM detailed emissions reports generated for this analysis.

Table 4-2: Alternative B, 2020 Construction Phase Emissions

Pollutant	Proposed Action Emissions (ton/yr)	NEPA Significance Threshold (ton/yr)	NEPA Exceedance (Yes or No)	General Conformity De Minimis Threshold (ton/yr)	General Conformity Applicability (Yes or No)
Regulatory Area: Norfolk-Virginia Beach-Newport News (Hampton Roads), VA - 1997 8-hour Ozone NAAQS					
VOC	0.083	100	No	100	No
NO_x	0.549	100	No	100	No
CO	0.476	100	No	n/a	n/a
SO_x	0.001	100	No	n/a	n/a
PM_{10}	0.573	100	No	n/a	n/a
$PM_{2.5}$	0.023	100	No	n/a	n/a
Pb	0.000	25	No	n/a	n/a
NH_3	0.000	100	No	n/a	n/a
CO_2e	129.1	--	--	--	--

Notes: CO_2e = Carbon Dioxide Equivalent, n/a = Not Applicable
Source: ACAM, run on 01 October 2019.

As demonstrated in **Table 4-2**, Alternative B project emissions of VOC and NO_x (as precursors to ozone) would be expected to total 0.083 tons/year and 0.549 tons/year respectively, both well below the 100 tons/year *de minimis* threshold for General Conformity. Therefore, no additional General Conformity analysis is required for Alternative B. In addition, all attainment criteria pollutants are below the significance indicators presented in **Table 4-2**. Therefore, the potential air quality impact from all criteria pollutants is insignificant.

The estimated increase of GHG emissions associated with Alternative B construction activities would produce about 129 metric tons of carbon dioxide equivalent (CO_2e) in 2020, which is the highest expected rate of GHG emissions among the Action Alternatives (compared to 69 tons and 95 tons, from Alternatives A and C, respectively). As noted previously, emissions generated from operation of Alternative B are expected to be negligible and not represent an increase over current emissions.

4.8.3 Alternative C – Concrete Bulkhead

Construction of Alternative C would result in similar impacts on air emissions as Alternative A (**Section 4.8.1**). However, *short-term, less-than-significant adverse* impacts during construction would be slightly

greater under Alternative C due to the clearing of 1 acre of land and additional use of equipment for installing the concrete bulkhead. Compared to Alternative B, emissions generated from Alternative C would be slightly less, as less bank grading would be required. Impacts would be temporary and emissions would not exceed regulatory thresholds.

Same as Alternatives A and B, *no long-term, adverse* impacts on air emissions would be anticipated during implementation of Alternative C as emissions from vegetation management and maintenance activities would be negligible and would not represent an increase from current conditions. Localized incremental GHG emissions from Alternative C would have no impact on overall global or regional GHG emissions and global climate change. The implementation of Alternative C, however, would protect against future erosion and sedimentation that may occur from changes in sea level rise and tidal flooding resulting from climate change.

Alternative C's estimated emissions (calculated using ACAM) and applicability to the General Conformity Rule is further discussed below.

Emission Results

All construction activities for Alternative C would be expected to be completed in a single calendar year, therefore total annual emissions would also represent total project emissions. Alternative C would be expected to have slightly higher emissions than Alternative A and slightly lower emissions than Alternative B, as Alternative C would require slightly more overall bank re-grading than Alternative A, but considerably less than Alternative B. **Table 4-3** depicts total annual construction phase emissions for Alternative C. See **Appendix E** for the Record of Air Analysis and ACAM detailed emissions reports generated for this analysis.

Table 4-3: Alternative C, 2020 Construction Phase Emissions

Pollutant	Proposed Action Emissions (ton/yr)	NEPA Significance Threshold (ton/yr)	NEPA Exceedance (Yes or No)	General Conformity De Minimis Threshold (ton/yr)	General Conformity Applicability (Yes or No)
Regulatory Area: Norfolk-Virginia Beach-Newport News (Hampton Roads), VA - 1997 8-hour Ozone NAAQS					
VOC	0.063	100	No	100	No
NO_x	0.413	100	No	100	No
CO	0.365	100	No	n/a	n/a
SO_x	0.001	100	No	n/a	n/a
PM_{10}	0.192	100	No	n/a	n/a
$PM_{2.5}$	0.017	100	No	n/a	n/a

Table 4-3: Alternative C, 2020 Construction Phase Emissions

Pollutant	Proposed Action Emissions (ton/yr)	NEPA Significance Threshold (ton/yr)	NEPA Exceedance (Yes or No)	General Conformity De Minimis Threshold (ton/yr)	General Conformity Applicability (Yes or No)
Pb	0.000	25	No	n/a	n/a
NH_3	0.000	100	No	n/a	n/a
CO_2e	95.4	--	--	--	--

Notes: CO_2e = Carbon Dioxide Equivalent, n/a = Not Applicable
Source: ACAM, run on 01 October 2019.

As demonstrated in **Table 4-3**, Alternative C project emissions of VOC and NO_x (as precursors to ozone) would be expected to total 0.063 tons/year and 0.413 tons/year respectively, both well below the 100 tons/year *de minimis* threshold for General Conformity. Therefore, no additional General Conformity analysis is required for Alternative C. In addition, all attainment criteria pollutants are below the significance indicators presented in **Table 4-3**. Therefore, the potential air quality impact from all criteria pollutants is insignificant.

The estimated increase of GHG emissions associated with Alternative C construction activities would produce about 95 metric tons of carbon dioxide equivalent (CO_2e) in 2020, which is greater than the expected GHG emission rate from Alternative A (69 tons), but less than the expected rate from Alternative B (129 tons). As noted previously, emissions generated from operation of Alternative C are expected to be negligible and not represent an increase over current emissions.

4.8.4 No Action Alternative

Under the No Action Alternative, there would be no impact to air quality as none of the Action Alternatives would be implemented and air emission conditions in and surrounding the Proposed Action area would remain the same. No new impacts to air quality would occur with implementation of the No Action Alternative.

4.9 COMPATIBILITY OF THE PROPOSED ACTION WITH OBJECTIVES OF FEDERAL, STATE, REGIONAL, AND LOCAL LAND USE PLANS AND POLICIES

The Proposed Action would not adversely affect Federal, State, regional, or local land use plans and policies, and are compatible with adjacent land uses. The Proposed Action would engage and cooperate with communities and other Federal agencies, whenever possible, during construction on Federal property to ensure compatibility.

4.10 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

The Proposed Action and alternatives would not affect the long-term productivity of the environment because no significant environmental impacts are anticipated. Any short-term uses of the environment are expected to yield long-term beneficial results, stabilizing the TA1 shoreline to enable continued use for military training and recreational purposes.

4.11 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitment refers to the use of nonrenewable sources and the effects these resources would have on future generations. Irreversible effects would result primarily from the consumption or destruction of a resource that could not be reversed. Irretrievable resource commitments would involve a loss or gain in the value of an affected resource that could not be reversed.

The Proposed Action and alternatives would not result in a significant irreversible or irretrievable commitment of resources. Each alternative would represent a change in the commitment of resources, including labor, fuel, and building materials used and discarded.

4.12 CUMULATIVE ENVIRONMENTAL CONSEQUENCES

This section analyzes the potential cumulative effects of the Proposed Action in combination with other past, present, and reasonably foreseeable actions within the same ROI. A cumulative effects analysis determines if a proposed action would be likely to result in adverse impacts when combined with other projects in the study area.

In accordance with 40 CFR § 1508.7, and as detailed in CEQ guidance entitled Considering Cumulative Effects Under the National Environmental Policy Act (1997) and Memorandum: Guidance on the Considerations of Past Actions in Cumulative Effects Analysis (24 June 2005), the Air Force must analyze the potential cumulative effects that may occur when considering a proposed action "when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." Each of these actions has the potential to affect resources in the same time and space as a proposed action; as such, these potential combined effects need to be analyzed.

Cumulative effects may be accrued over time and/or in conjunction with other pre-existing effects from other activities in the ROI (40 CFR § 1508.25). Therefore, previous impacts and multiple smaller impacts should also be considered.

Overall, assessing cumulative effects involves defining the scope of the other actions and their interrelationship with a proposed action to determine if they overlap in space and time. The NEPA and CEQ Regulations require the analysis of cumulative environmental effects of a proposed action on resources that may often be manifested only at the cumulative level, such as air quality, biological resources, water resources, and others. Cumulative effects can result from individually minor, but collectively significant, actions occurring at the same location, over time.

4.12.1 Past, Present, and Reasonably Foreseeable Future Projects

While the term “past, present, and reasonably foreseeable future” projects is used in this analysis to describe all considered actions that may interact with the Proposed Action, the cumulative effects analysis focuses on ongoing and reasonably foreseeable future projects. Past projects have been assessed in the establishment of the environmental baseline and are already considered in the Alternatives’ impact analysis presented in **Sections 3.0** and **4.0** of this EA. Past projects are only considered in this cumulative effects analysis if their long-term and operational impacts would occur to similar resource areas at the same time as the Proposed Action, contributing to cumulative impacts.

The cumulative effects analysis considers past, present, and reasonably foreseeable future projects occurring within TA1 and the surrounding shoreline of Skiffes Creek and Bailey Creek, as well as hydrologically connected upstream and downstream areas. The temporal scope of the cumulative effects analysis focuses on projects planned for the next 5 years to include the construction and early operation phases of the shoreline restoration and take into account any delays. Projects were identified through Air Force consultation and review of the JBLE Installation Development Plan (May 2017) and publicly available information sources (e.g., local master plans, news articles, validated internet sources, and pertinent agency databases). No past projects with potential to contribute to cumulative impacts were identified. Projects considered in this cumulative analysis include planned channel maintenance, transportation, and utility projects, and are summarized as follows:

- Dredge Skiffes Creek (USAF, 2017b; Fort Eustis, 2019): The Air Force periodically dredges the channel at the Third Port of Embarkation every 5 years to allow for efficient vessel movement and port operations. The site for dredge spoils was de-vegetated and cleared in January 2019 to accommodate dredging that will occur in the near future. Topographic surveys will be required to determine the volume of dredge the site is able to hold. Dredge activities would impact benthic species in the short- and long-term, potentially causing loss of life and changes to benthic communities and habitats. Dredge activities would also degrade water quality from suspended sediment and increased turbidity levels, although these impacts would be short-term as dredging would be temporary and sediment plumes would rapidly disperse and settle. In addition, barge vessels required for dredging may present visual interruptions to the aesthetic landscape and nearby viewsheds.

- Skiffes Creek Connector (VDOT, 2019; VDOT, 2018): The Virginia Department of Transportation (VDOT) is planning to connect Route 60 and Route 143 via a one-mile, two-lane roadway, located approximately 2 miles north of the Proposed Action area, to improve local connectivity, provide efficient vehicular movement, and enhance emergency evacuation capabilities. A Finding of No Significant Impact (FONSI) was issued in March 2019 and the project is currently in design. Construction is anticipated to begin in the spring of 2020. Construction of the project would likely impact air quality, soils, and hazardous materials, although impacts would be temporary and minimized through construction BMPs and standard preventative practices. In the long term, the project would affect water quality from the increase in impervious surface, as well as vegetation, wildlife habitat, and wetlands from permanent clearing. Impacts would be minimized to the extent practicable and would not be significant.

- Surry-Skiffes Creek Transmission Line (USACE, 2019; Vogelsong, 2019): The District of Columbia Court of Appeals is hearing challenges to the USACE permit awarded to Dominion Energy to construct 7.7 miles of new overhead transmission lines from the Surry Nuclear Power Plant to the newly built Skiffes Creek Switching Station. The project was constructed and energized in February

2019 and makes a 4.1-mile crossing of the James River, placing 17 towers and related infrastructure within and above the river bed. If the USACE permit is overturned, the transmission line may need to be decommissioned and demolished. A Notice of Intent to prepare an Environmental Impact Statement was recently posted in June 2019. Removal of the transmission line and associated structures would likely disturb subaqueous lands and wetlands, wildlife and habitat, and infrastructure in the long term, and aesthetics and visual quality in the short term.

4.12.2 Cumulative Impacts under the Proposed Action

Cumulative impacts would be the same across all alternatives to implementing the Proposed Action. Implementation of the Proposed Action would not cumulatively significantly impact any resource area discussed within this EA. Incremental effects of the Proposed Action, when taken into consideration with effects of past, present, and reasonably foreseeable future projects, would contribute *short-term, less-than-significant adverse cumulative impacts* to aesthetics, soils, IRP sites, water resources, biological resources, and air quality. Construction activities would require clearing and ground-disturbing activities that would temporarily increase erosion and impact terrestrial wildlife, including special status species, and vegetation in the ROI. Construction equipment and vehicles required for the Proposed Action and past, present, and reasonably foreseeable future projects (e.g., excavators and barges), would also cumulatively impact the surrounding visual quality of the James River, while collectively producing air emissions. These cumulative impacts would not exceed the significance thresholds defined in **Section 3.0** and would be *temporary and less-than-significant.*

Aquatic species and habitats would be cumulatively impacted as well from the Proposed Action and in-water projects (e.g., Skiffes Creek Dredging and Surry-Skiffes Creek Transmission Line), due to increased noise and vibration in underwater environments, and increased sedimentation and turbidity that would disrupt foraging, sheltering, and breeding behaviors. The placement of sills and bulkheads, in addition to dredging activities and removal of the transmission line may also cause loss of life with benthic species or less mobile individuals, resulting in a *long-term, less-than-significant adverse cumulative impact* on wildlife. Construction of in-water activities would also result in a cumulative increase in the risk of accidental release of hazardous materials into the IRP site at Bailey Creek. As construction effects would be temporary and localized to the immediate vicinity of the construction site, they would be minimal and would not have a significant adverse impact.

Under the Proposed Action, adverse impacts would be further minimized to the extent practicable with implementation of standard BMPs and avoidance/minimization measures, thus curtailing potentially significant adverse cumulative impacts and maintaining cumulative impacts at less-than-significant levels.

4.12.3 Cumulative Impacts under the No Action Alternative

Under the No Action Alternative, the Air Force would not implement a shoreline restoration plan to combat erosion at TA1. The long-term soil erosion rate would continue at 0.6 feet of land per year and current conditions would continue for the foreseeable future. There would be no Proposed Action-related changes and, consequently, no incremental impacts on the resource areas from the No Action Alternative; therefore, no cumulative impacts would occur.

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7.0 DISTRIBUTION LIST

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Newport News Wetland Board
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Fort Eustis, VA 23604

Grissom Library
366 Deshazor Dr
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Department of the Air Force
Headquarters AFCEC/CZN
3515 S. General McMullen, Building 171
JBSA Lackland, TX 78236-2018

APPENDIX A

CONSULTATION LETTERS

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

23 January 2020

Ms. Barbara Rudnick
U.S. Environmental Protection Agency (USEPA), Region 3
1650 Arch Street
Philadelphia, PA 19103-2029

Dear Ms. Rudnick

The United States (US) Air Force is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with shoreline stabilization and erosion protection at the Joint Base Langley-Eustis - Eustis (JBLE-Eustis) Training Area 1 (TA1) in Newport News, Virginia (Proposed Action). TA1 is used by JBLE-Eustis for tactical bivouac, land navigation, military dog handling training, and small unit tactics. Recreational land uses, such as deer hunting and fishing, also occur in TA1. A map of JBLE-Eustis pinpointing the location of TA1 is provided at Atch 1 and a more specific site map is at Atch 2.

The purpose of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land (and associated resources) at JBLE-Eustis TA1. The need for the Proposed Action is to protect available training land in order to maintain the quality of the training necessary to meet JBLE-Eustis mission and national defense requirements. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis. In addition to the loss of land and natural resources, erosion would continue to impact an adjacent archaeological site (44NN0024) that has been determined eligible for listing in the National Register of Historic Places.

The EA will analyze the potential range of environmental impacts that would result from the Proposed Action. The US Air Force is considering four proposed alternatives (Alternatives A-C and the No Action Alternative) towards meeting the objectives and goals of the Proposed Action. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated.

The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, *et seq.*), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-

1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989). As part of this EA, we request your assistance in identifying any potential areas of environmental impact to be assessed in this analysis.

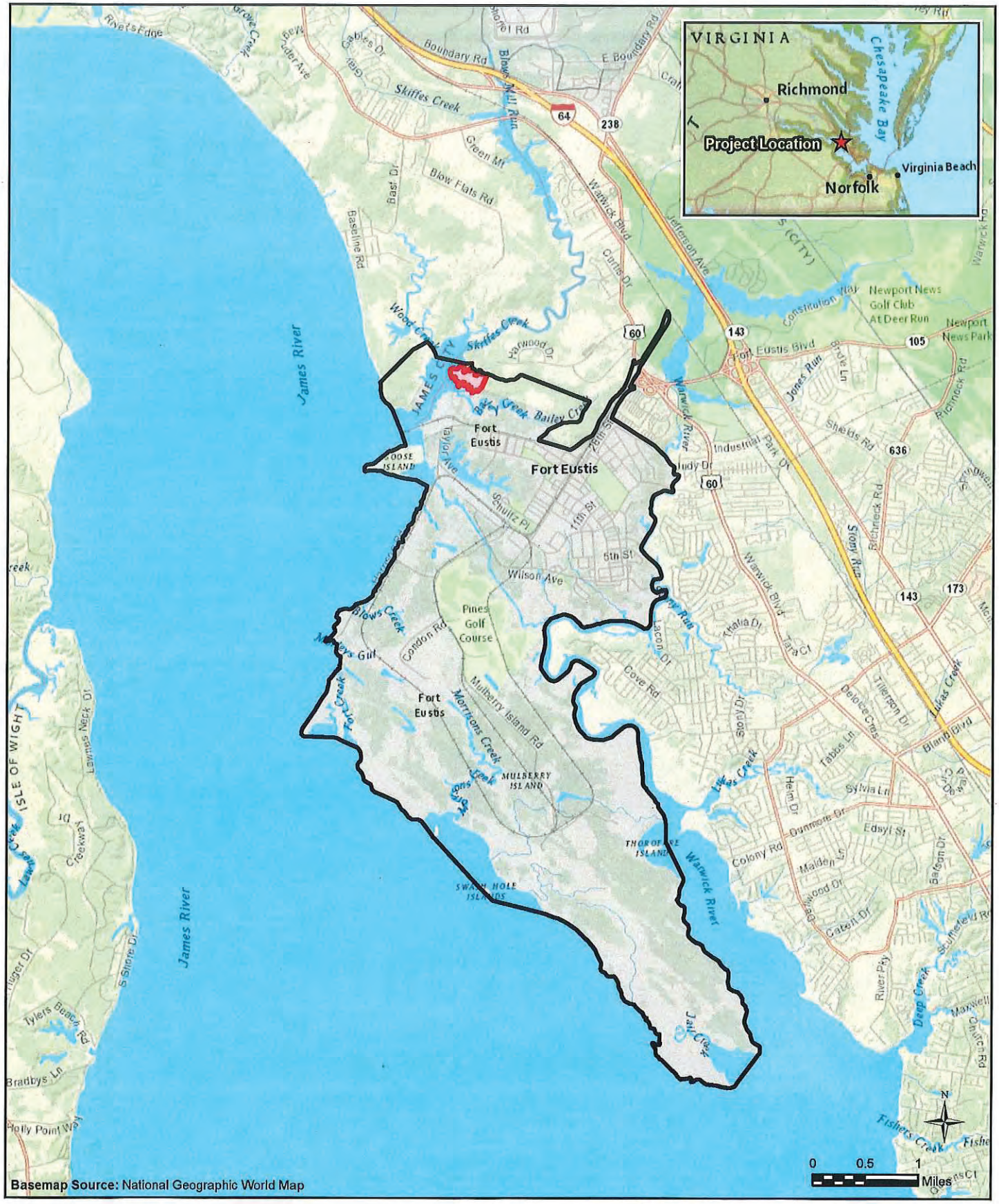
Please forward any comments or questions about this proposal to the Environmental Element (733 CED/CEIE), 1407 Washington Blvd, Fort Eustis, VA 23604, or by email to donald.w.calder.civ@mail.mil, within 30 days of receipt of this letter.

Sincerely

CALDER.DONALD.W.JR.1021845686 Digitally signed by CALDER.DONALD.W.JR.1021845686 Date: 2020.01.24 08:10:48 -05'00'

DONALD W. CALDER, JR.
Chief, Environmental Element
733d Civil Engineer Division

2 Attachments:
1. Figure 1-1, Regional Map
2. Figure 1-2, Site Map



LEGEND

- Fort Eustis Boundary
- Project Location

Regional Map
Joint Base Langley-Eustis, VA

Figure 1-1

LEGEND

Project Location

Fort Eustis Boundary

URS

Project Location Map
Joint Base Langley-Eustis, VA

Figure 1-2

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

23 January 2020

Ms. Karen Greene
Mid-Atlantic EFH Coordinator
NOAA Fisheries Service
55 Great Republic Drive
Gloucester, MA 01930

Dear Ms. Greene

The United States (US) Air Force is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with shoreline stabilization and erosion protection at the Joint Base Langley-Eustis - Eustis (JBLE-Eustis) Training Area 1 (TA1) in Newport News, Virginia (Proposed Action). TA1 is used by JBLE-Eustis for tactical bivouac, land navigation, military dog handling training, and small unit tactics. Recreational land uses, such as deer hunting and fishing, also occur in TA1. A map of JBLE-Eustis pinpointing the location of TA1 is provided at Atch 1 and a more specific site map is at Atch 2.

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The EA will analyze the potential range of environmental impacts that would result from the Proposed Action. The US Air Force is considering four proposed alternatives (Alternatives A-C and the No Action Alternative) towards meeting the objectives and goals of the Proposed Action. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated.

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Please forward any comments or questions about this proposal to the Environmental Element (733 CED/CEIE), 1407 Washington Blvd, Fort Eustis, VA 23604, or by email to donald.w.calder.civ@mail.mil, within 30 days of receipt of this letter.

Sincerely

CALDER.DONALD.W.JR.1021845686 Digitally signed by CALDER.DONALD.W.JR.1021845686 Date: 2020.01.24 08:57:53 -05'00'

DONALD W. CALDER, JR.
Chief, Environmental Element
733 Civil Engineer Division

2 Attachments:
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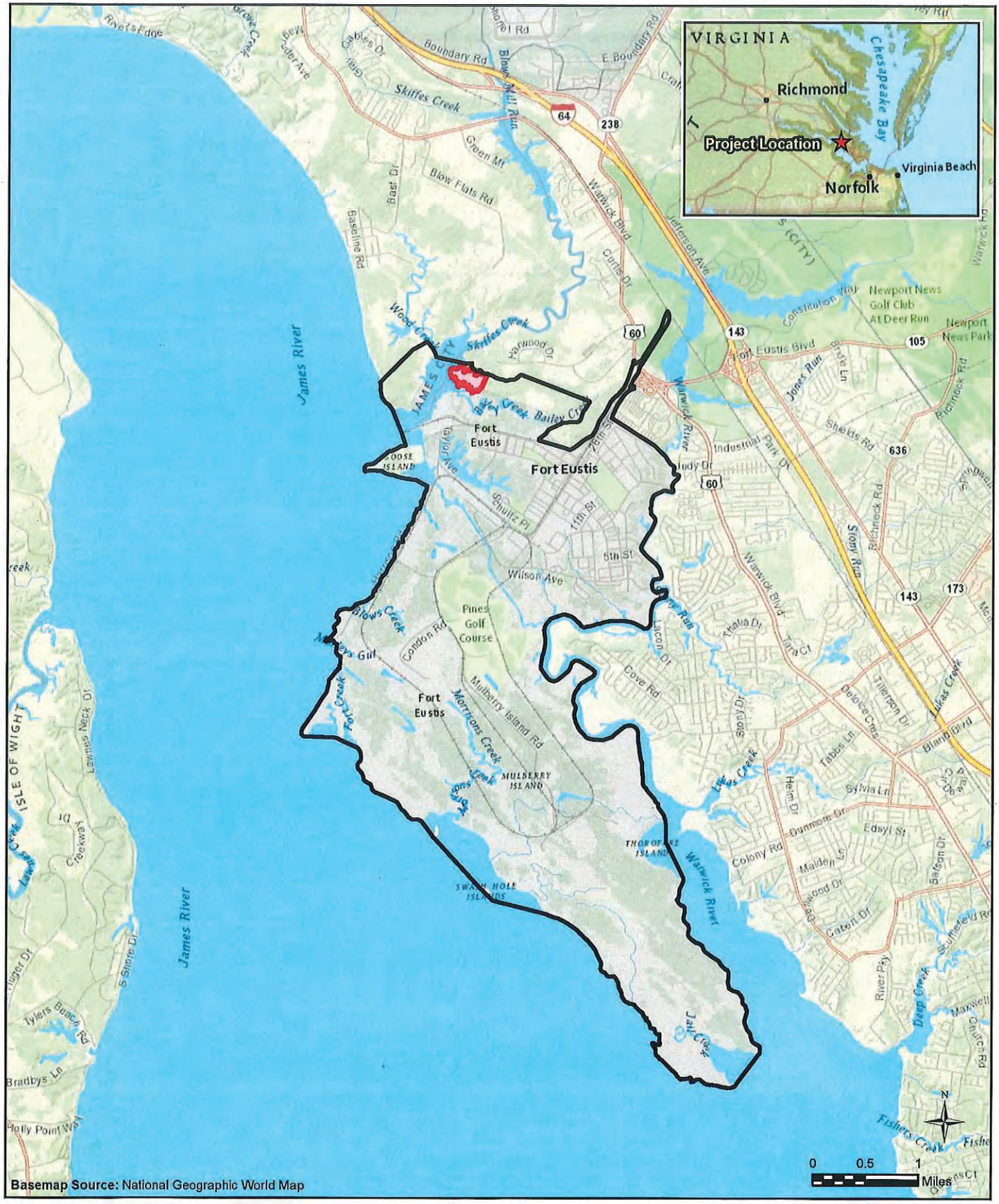

LEGEND

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Regional Map
Joint Base Langley-Eustis, VA

Figure 1-1

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Fort Eustis Boundary

Project Location Map
Joint Base Langley-Eustis, VA

Figure 1-2

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

23 January 2020

U.S. Army Corps of Engineers (USACE), Norfolk District
803 Front Street
Norfolk, VA 23510

Dear NEPA Program Manager

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DONALD W. CALDER, JR.
Chief, Environmental Element
733d Civil Engineer Division

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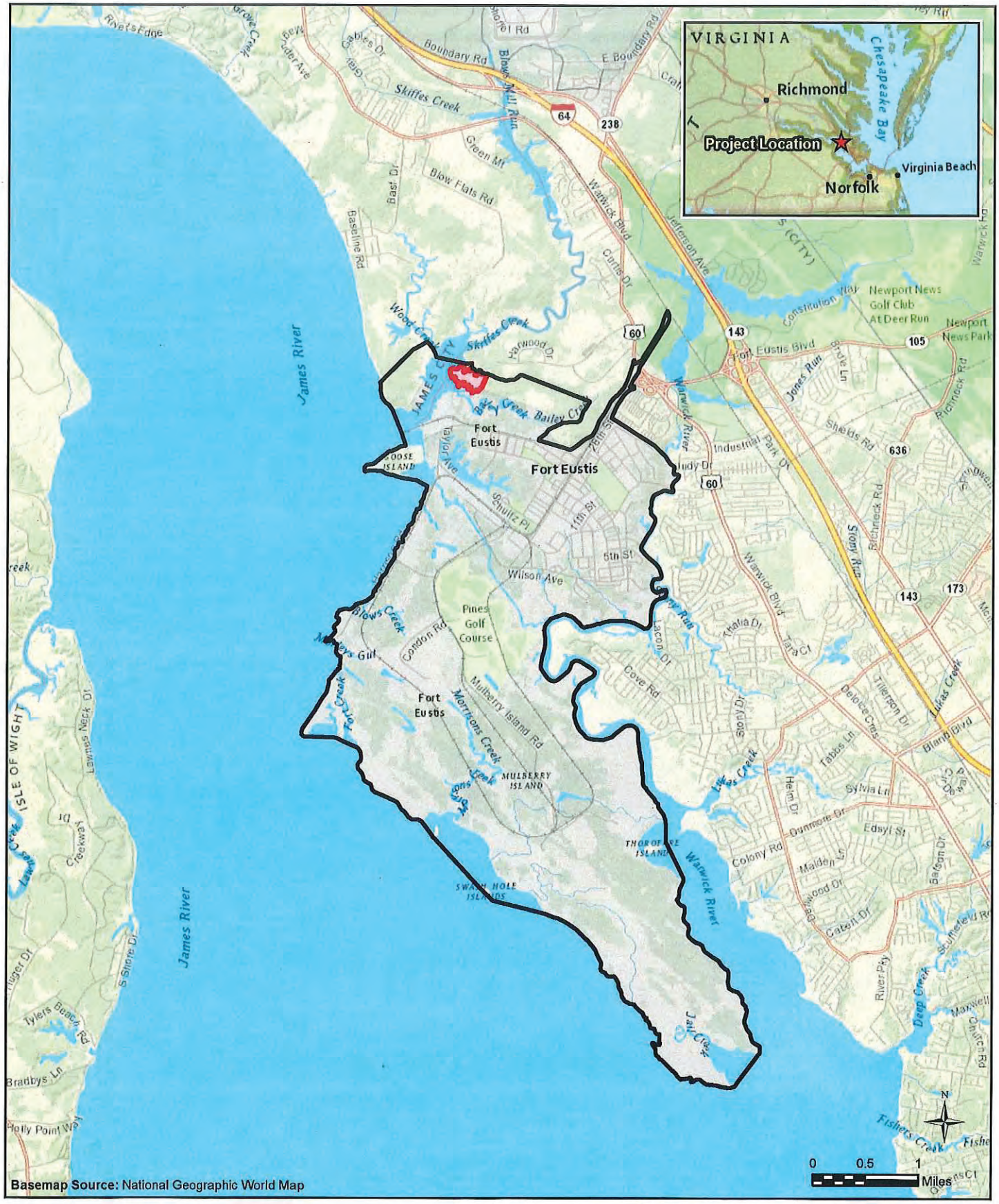

LEGEND

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Regional Map
Joint Base Langley-Eustis, VA

Figure 1-1

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Fort Eustis Boundary

Project Location Map
Joint Base Langley-Eustis, VA

Figure 1-2

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

23 January 2020

Mr. Gary LeCain
U.S. Geological Survey (USGS), Environmental Affairs Program
John W. Powell Building
12201 Sunrise Valley Dr.
Reston, VA 20192

Dear Mr. LeCain

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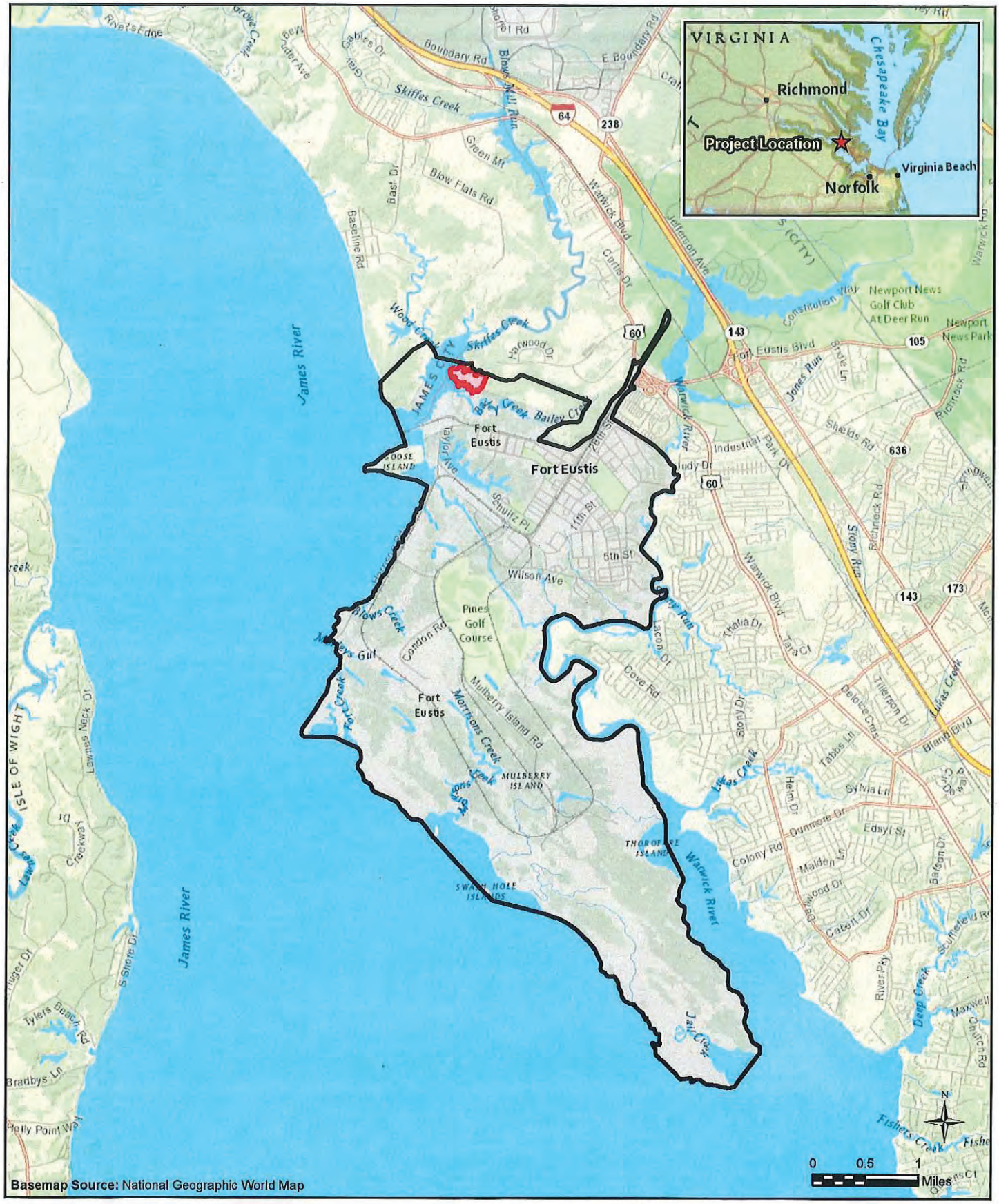
DONALD W. CALDER, JR.
Chief, Environmental Element
733d Civil Engineer Division

2 Attachments:
1. Figure 1-1, Regional Map
2. Figure 1-2, Site Map



LEGEND

- Fort Eustis Boundary
- Project Location

Regional Map
Joint Base Langley-Eustis, VA

Figure 1-1

LEGEND

Project Location

Fort Eustis Boundary

Project Location Map
Joint Base Langley-Eustis, VA

Figure 1-2

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

Civil Engineering Division

5 March 2020

Ms. Cynthia Schulz
U.S. Fish and Wildlife Service
Virginia Field Office
6669 Short Ln
Gloucester, VA 23061

SUBJECT: Endangered Species Act (ESA) Section 7 Consultation for Shoreline Stabilization and Erosion Protection for Training Area 1 at Joint Base Langley-Eustis (JBLE), Virginia

Dear Ms. Schulz:

The United States (US) Air Force is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with shoreline stabilization and erosion protection at the JBLE-Fort Eustis (JBLE-Eustis) Training Area 1 (TA 1) in Newport News, Virginia (Proposed Action). The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, *et seq.*), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989). As part of this EA, we request your assistance in identifying potential areas of environmental impact to be assessed in the study.

The purpose of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land (and associated natural resources) at JBLE-Eustis TA 1. The need for the Proposed Action is to protect available training land in order to maintain the quality of the training necessary to meet JBLE mission and national defense requirements. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE

The EA will analyze the potential range of environmental impacts that would result from the Proposed Action. The US Air Force is considering four proposed alternatives (Alternatives A-C and the No Action Alternative) towards meeting the objectives and goals of the Proposed Action. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated.

We have reviewed the referenced project using the Virginia Field Office's online project review process and have followed all guidance and instructions in completing the review. We completed our review on 5 July 2019 and are submitting our project review package in accordance with the instructions for further review.

This project review is needed for compliance with Section 7 of the ESA. According to the US Fish and Wildlife Service's online Information for Planning and Consultation (IPaC) system (accessed 5 July 2019), the federally threatened northern long-eared bat (*Myotis septentrionalis*) may occur within the proposed project area. In addition, during the 2016 bat species survey on JBLE-Eustis, two male northern long-eared bats were captured; however, they

were not captured in the Proposes Action area. No females were captured. The Virginia Department of Game and Inland Fisheries (VDGIF) has no data on northern long-eared bat maternal roosts in the vicinity of Fort Eustis. The assisted determination key for the northern long-eared bat final 4d rule was completed via IPaC on 5 July 2019 and is included in the enclosure. The US Air Force would not remove any trees between April 15 and September 15 under the Proposed Action. Given this information, the US Air Force concludes the Proposed Action ***may affect*** the northern long eared bat.

Although not identified via IPaC, the US Air Force documented the federally endangered Indiana bat (*Myotis sodalis*) via acoustic surveys on JBLE-Eustis during the 2016 bat species survey. During the survey, the US Air Force also identified potential roost trees for the Indiana bat; however, there was no evidence of the identified trees being used by any bats at the time. To date, the Indiana bat has not been captured during mist net surveys on JBLE-Eustis. The USFWS and VDGIF do not currently identify Newport News as a known occurrence area for the Indiana bat. The US Air Force would not remove any trees between April 15 and September 15 under the Proposed Action. (Note: IPaC's assisted determination key was unable to be completed for the Indiana bat because the Indiana bat was not identified via IPaC.) Given this information, the US Air Force concludes the Proposed Action ***may affect*** the Indiana bat.

The enclosed project review package provides the information about the species, critical habitat, and bald eagles considered in our review, and the species conclusions table included in the package identifies our determinations for the resources that may be affected by the project. We request that you review our finding and determination and provide your concurrence if you agree. If there is anything we need to do to facilitate the Proposed Action without negatively impacting federally listed species or critical habitat that is not mentioned in this letter, please let us know.

If you have any specific items of interest about this proposal, please contact Ms. Tracey Sugg, Civil Engineer Division, Environmental Element (CED-CEIE), 1407 Washington Blvd, Fort Eustis, VA 23604, by email to tracey.l.sugg.civ@mail.mil, or by phone at (757)878-7315 within 30 days of receipt of this letter.

Sincerely,

CALDER.DONALD.W.JR.1021845686 Digitally signed by CALDER.DONALD.W.JR.1021845686 Date: 2020.01.24 08:10:48 -05'00'

DONALD W. CALDER, JR.
Chief, Environmental Element
733d Civil Engineer Division

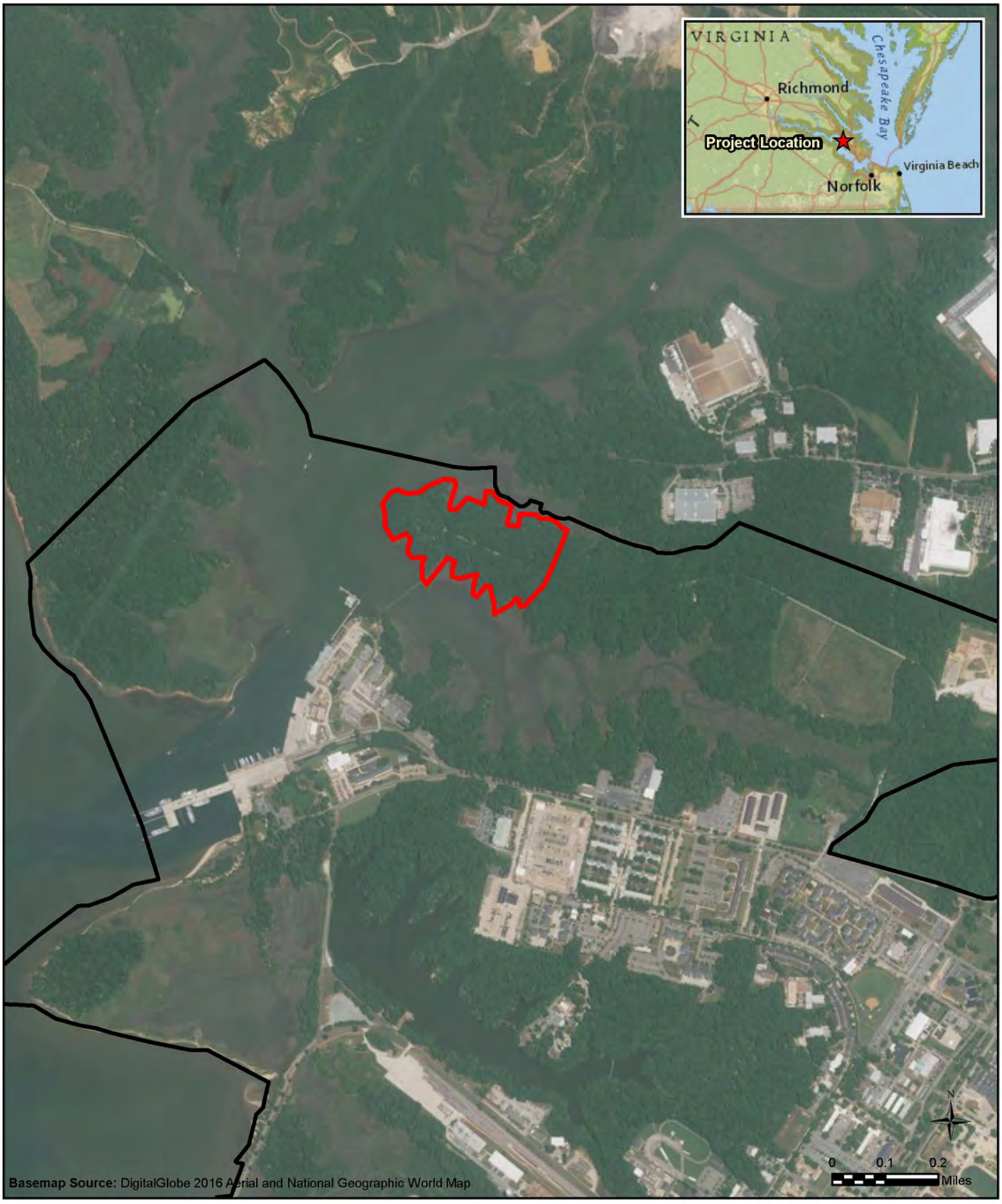
Enclosure

LEGEND

- Fort Eustis Boundary
- Project Location

Regional Map
Joint Base Langley-Eustis, VA

Figure 1-1



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LEGEND

Project Location

Fort Eustis Boundary

Project Location Map
Joint Base Langley-Eustis, VA

Figure 1-2

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032
http://www.fws.gov/northeast/virginiafield/

In Reply Refer To: July 05, 2019
Consultation Code: 05E2VA00-2019-SLI-5074
Event Code: 05E2VA00-2019-E-12314
Project Name: Shoreline Stabilization and Erosion Protection for Training Area 1 at Joint Base Langley-Eustis

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to

utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
(804) 693-6694

Project Summary

Consultation Code: 05E2VA00-2019-SLI-5074

Event Code: 05E2VA00-2019-E-12314

Project Name: Shoreline Stabilization and Erosion Protection for Training Area 1 at Joint Base Langley-Eustis

Project Type: SHORELINE / BEACH PROTECTION / RENOURISHMENT

Project Description: The EA will analyze the potential range of environmental impacts that would result from the Proposed Action. The US Air Force is considering four proposed alternatives (Alternatives A-C and the No Action Alternative) towards meeting the objectives and goals of the Proposed Action. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/37.17363676164065N76.5980754096816W

Counties: James City, VA | Newport News, VA

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032
http://www.fws.gov/northeast/virginiafield/

In Reply Refer To: July 05, 2019
Consultation Code: 05E2VA00-2019-TA-5074
Event Code: 05E2VA00-2019-E-12315
Project Name: Shoreline Stabilization and Erosion Protection for Training Area 1 at Joint Base Langley-Eustis

Subject: Verification letter for the 'Shoreline Stabilization and Erosion Protection for Training Area 1 at Joint Base Langley-Eustis' project under the January 5, 2016, Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-eared Bat and Activities Excepted from Take Prohibitions.

Dear Benjamin Obenland:

The U.S. Fish and Wildlife Service (Service) received on July 05, 2019 your effects determination for the 'Shoreline Stabilization and Erosion Protection for Training Area 1 at Joint Base Langley-Eustis' (the Action) using the northern long-eared bat (Myotis septentrionalis) key within the Information for Planning and Consultation (IPaC) system. This IPaC key assists users in determining whether a Federal action is consistent with the activities analyzed in the Service's January 5, 2016, Programmatic Biological Opinion (PBO). The PBO addresses activities excepted from "take"[1] prohibitions applicable to the northern long-eared bat under the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based upon your IPaC submission, the Action is consistent with activities analyzed in the PBO. The Action may affect the northern long-eared bat; however, any take that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o). Unless the Service advises you within 30 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the PBO satisfies and concludes your responsibilities for this Action under ESA Section 7(a)(2) with respect to the northern long-eared bat.

Please report to our office any changes to the information about the Action that you submitted in IPaC, the results of any bat surveys conducted in the Action area, and any dead, injured, or sick northern long-eared bats that are found during Action implementation. If the Action is not completed within one year of the date of this letter, you must update and resubmit the information required in the IPaC key.

If the Action may affect other federally listed species besides the northern long-eared bat, a proposed species, and/or designated critical habitat, additional consultation between you and this Service office is required. If the Action may disturb bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act is recommended.

---

[1]Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct [ESA Section 3(19)].

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Shoreline Stabilization and Erosion Protection for Training Area 1 at Joint Base Langley-Eustis

2. Description

The following description was provided for the project 'Shoreline Stabilization and Erosion Protection for Training Area 1 at Joint Base Langley-Eustis':

> The EA will analyze the potential range of environmental impacts that would result from the Proposed Action. The US Air Force is considering four proposed alternatives (Alternatives A-C and the No Action Alternative) towards meeting the objectives and goals of the Proposed Action. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated.

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/37.17363676164065N76.5980754096816W

Determination Key Result

This Federal Action may affect the northern long-eared bat in a manner consistent with the description of activities addressed by the Service's PBO dated January 5, 2016. Any taking that may occur incidental to this Action is not prohibited under the final 4(d) rule at 50 CFR §17.40(o). Therefore, the PBO satisfies your responsibilities for this Action under ESA Section 7(a)(2) relative to the northern long-eared bat.

Determination Key Description: Northern Long-ear ed Bat 4(d) Rule

This key was last updated in IPaC on May 15, 2017. Keys are subject to periodic revision.

This key is intended for actions that may affect the threatened northern long-eared bat.

The purpose of the key for Federal actions is to assist determinations as to whether proposed actions are consistent with those analyzed in the Service's PBO dated January 5, 2016.

Federal actions that may cause prohibited take of northern long-eared bats, affect ESA-listed species other than the northern long-eared bat, or affect any designated critical habitat, require ESA Section 7(a)(2) consultation in addition to the use of this key. Federal actions that may affect species proposed for listing or critical habitat proposed for designation may require a conference under ESA Section 7(a)(4).

Determination Key Result

This project may affect the threatened Northern long-eared bat; therefore, consultation with the Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.) is required. However, based on the information you provided, this project may rely on the Service's January 5, 2016, Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions to fulfill its Section 7(a)(2) consultation obligation.

Qualification Interview

1. Is the action authorized, funded, or being carried out by a Federal agency?

   Yes

2. Have you determined that the proposed action will have "no effect" on the northern long-eared bat? (If you are unsure select "No")

   No

3. Will your activity purposefully Take northern long-eared bats?

   No

4. Is the project action area located wholly outside the White-nose Syndrome Zone?

   Automatically answered

   No

5. Have you contacted the appropriate agency to determine if your project is near a known hibernaculum or maternity roost tree?

   Location information for northern long-eared bat hibernacula is generally kept in state Natural Heritage Inventory databases – the availability of this data varies state-by-state. Many states provide online access to their data, either directly by providing maps or by providing the opportunity to make a data request. In some cases, to protect those resources, access to the information may be limited. A web page with links to state Natural Heritage Inventory databases is available at www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html.

   Yes

6. Will the action affect a cave or mine where northern long-eared bats are known to hibernate (i.e., hibernaculum) or could it alter the entrance or the environment (physical or other alteration) of a hibernaculum?

   No

7. Will the action involve Tree Removal?

   Yes

8. Will the action only remove hazardous trees for the protection of human life or property?

   No

9. Will the action remove trees within 0.25 miles of a known northern long-eared bat hibernaculum at any time of year?

   No

10. Will the action remove a known occupied northern long-eared bat maternity roost tree or any trees within 150 feet of a known occupied maternity roost tree from June 1 through July 31?

    No

Project Questionnaire

If the pr oject includes forest conversion , report the appr opriate acr eages below. Otherwise, type '0' in questions 1-3.

1. Estimated total acres of forest conversion:

0

2. If known, estimated acres of forest conversion from April 1 to October 31

0

3. If known, estimated acres of forest conversion from June 1 to July 31

0

If the pr oject includes timber harvest, r eport the appr opriate acr eages below. Otherwise, type '0' in questions 4-6.

4. Estimated total acres of timber harvest

0

5. If known, estimated acres of timber harvest from April 1 to October 31

0

6. If known, estimated acres of timber harvest from June 1 to July 31

0

If the pr oject includes pr escribed fir e, report the appr opriate acr eages below. Otherwise, type '0' in questions 7-9.

7. Estimated total acres of prescribed fire

0

8. If known, estimated acres of prescribed fire from April 1 to October 31

0

9. If known, estimated acres of prescribed fire from June 1 to July 31

0

If the pr oject includes new wind turbines, r eport the megawatts of wind capacity below. Otherwise, type '0' in question 10.

10. What is the estimated wind capacity (in megawatts) of the new turbine(s)?
0

Species Conclusions Table

Project Name: Shoreline Stabilization and Erosion Protection for Training Area 1

Date: 13 August 2019

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act	Notes / Documentation
Northern Long Eared Bat	Suitable habitat present	May Affect	IPaC; determination key; 2016 bat species survey at JBLE-Eustis
Indiana Bat**	Suitable habitat present	May Affect	2016 bat species survey at JBLE-Eustis
Critical Habitat	No Critical Habitat Present	No Effect	
Bald Eagle	Unlikely to disturb nesting bald eagles	No Eagle Act Permit Required	No nests within 660'
Bald Eagle	Does not intersect with eagle concentration area	No Eagle Act Permit Required	Not within an eagle concentration area
**Note: IPaC's assisted determination key was unable to be completed for the Indiana bat because the Indiana bat was not identified via IPaC			

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

23 January 2020

Virginia Department of Conservation and Recreation
Virginia Natural Heritage Program
600 East Main Street; 24th Floor
Richmond, VA 23219

Dear Virginia Natural Heritage Program Manager

The United States (US) Air Force is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with shoreline stabilization and erosion protection at the Joint Base Langley-Eustis - Eustis (JBLE-Eustis) Training Area 1 (TA1) in Newport News, Virginia (Proposed Action). TA1 is used by JBLE-Eustis for tactical bivouac, land navigation, military dog handling training, and small unit tactics. Recreational land uses, such as deer hunting and fishing, also occur in TA1. A map of JBLE-Eustis pinpointing the location of TA1 is provided at Atch 1 and a more specific site map is at Atch 2.

The purpose of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land (and associated resources) at JBLE-Eustis TA1. The need for the Proposed Action is to protect available training land in order to maintain the quality of the training necessary to meet JBLE-Eustis mission and national defense requirements. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis. In addition to the loss of land and natural resources, erosion would continue to impact an adjacent archaeological site (44NN0024) that has been determined eligible for listing in the National Register of Historic Places.

The EA will analyze the potential range of environmental impacts that would result from the Proposed Action. The US Air Force is considering four proposed alternatives (Alternatives A-C and the No Action Alternative) towards meeting the objectives and goals of the Proposed Action. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated.

The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, *et seq.*), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-

1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989). As part of this EA, we request your assistance in identifying any potential areas of environmental impact to be assessed in this analysis.

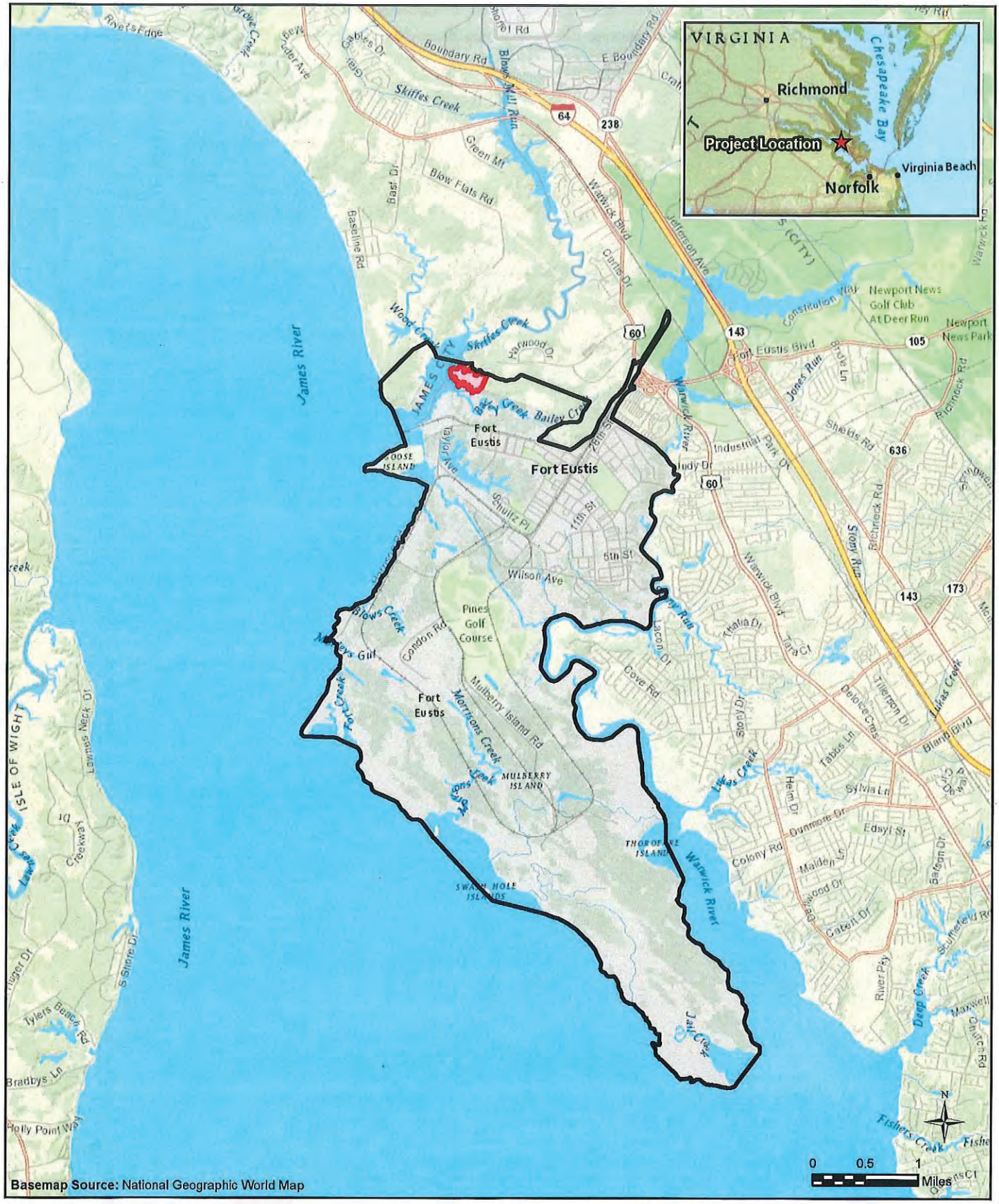
Please forward any comments or questions about this proposal to the Environmental Element (733 CED/CEIE), 1407 Washington Blvd, Fort Eustis, VA 23604, or by email to donald.w.calder.civ@mail.mil, within 30 days of receipt of this letter.

Sincerely

CALDER.DONALD.W.JR.1021845686 Digitally signed by CALDER.DONALD.W.JR.1021845686 Date: 2020.01.24 09:00:01 -05'00'

DONALD W. CALDER, JR.
Chief, Environmental Element
733d Civil Engineer Division

2 Attachments:
1. Figure 1-1, Regional Map
2. Figure 1-2, Site Map



LEGEND

- Fort Eustis Boundary
- Project Location

Regional Map
Joint Base Langley-Eustis, VA

Figure 1-1

LEGEND

Project Location

Fort Eustis Boundary

Project Location Map
Joint Base Langley-Eustis, VA

Figure 1-2

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

23 January 2020

Ms. Valerie Fulcher
Office of Environmental Impact Review
Virginia Department of Environmental Quality
P.O. Box 1105
Richmond, VA 23218

Dear Ms. Fulcher

The United States (US) Air Force is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with shoreline stabilization and erosion protection at the Joint Base Langley-Eustis - Eustis (JBLE-Eustis) Training Area 1 (TA1) in Newport News, Virginia (Proposed Action). TA1 is used by JBLE-Eustis for tactical bivouac, land navigation, military dog handling training, and small unit tactics. Recreational land uses, such as deer hunting and fishing, also occur in TA1. A map of JBLE-Eustis pinpointing the location of TA1 is provided at Atch 1 and a more specific site map is at Atch 2.

The purpose of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land (and associated resources) at JBLE-Eustis TA1. The need for the Proposed Action is to protect available training land in order to maintain the quality of the training necessary to meet JBLE-Eustis mission and national defense requirements. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis. In addition to the loss of land and natural resources, erosion would continue to impact an adjacent archaeological site (44NN0024) that has been determined eligible for listing in the National Register of Historic Places.

The EA will analyze the potential range of environmental impacts that would result from the Proposed Action. The US Air Force is considering four proposed alternatives (Alternatives A-C and the No Action Alternative) towards meeting the objectives and goals of the Proposed Action. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated.

The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, *et seq.*), the Council of Environmental

Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989). As part of this EA, we request your assistance in identifying any potential areas of environmental impact to be assessed in this analysis.

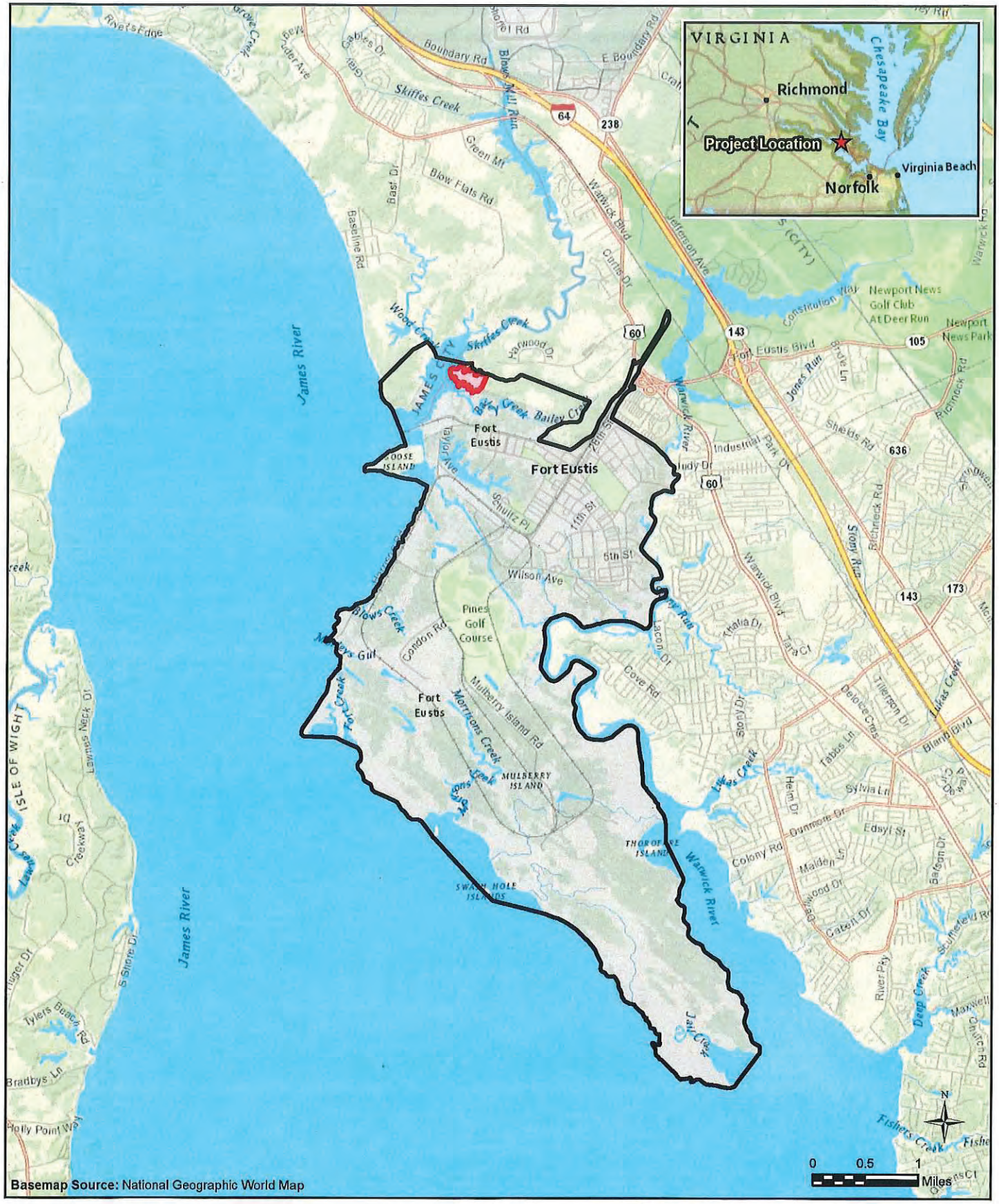
Please forward any comments or questions about this proposal to the Environmental Element (733 CED/CEIE), 1407 Washington Blvd, Fort Eustis, VA 23604, or by email to donald.w.calder.civ@mail.mil, within 30 days of receipt of this letter.

Sincerely

CALDER.DONALD.W.JR.1021845686 Digitally signed by CALDER.DONALD.W.JR.1021845686 Date: 2020.01.24 09:01:50 -05'00'

DONALD W. CALDER, JR.
Chief, Environmental Element
733d Civil Engineer Division

2 Attachments:
1. Figure 1-1, Regional Map
2. Figure 1-2, Site Map



LEGEND

- Fort Eustis Boundary
- Project Location

Regional Map
Joint Base Langley-Eustis, VA

Figure 1-1

LEGEND

Project Location

Fort Eustis Boundary

Project Location Map
Joint Base Langley-Eustis, VA

Figure 1-2

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

23 January 2020

Mr. Gary Martel
Acting Executive Director
Virginia Department of Game and Inland Fisheries
Director's Office
P.O. Box 90778
Henrico, VA 23228

Dear Mr. Martel

The United States (US) Air Force is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with shoreline stabilization and erosion protection at the Joint Base Langley-Eustis - Eustis (JBLE-Eustis) Training Area 1 (TA1) in Newport News, Virginia (Proposed Action). TA1 is used by JBLE-Eustis for tactical bivouac, land navigation, military dog handling training, and small unit tactics. Recreational land uses, such as deer hunting and fishing, also occur in TA1. A map of JBLE-Eustis pinpointing the location of TA1 is provided at Atch 1 and a more specific site map is at Atch 2.

The purpose of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land (and associated resources) at JBLE-Eustis TA1. The need for the Proposed Action is to protect available training land in order to maintain the quality of the training necessary to meet JBLE-Eustis mission and national defense requirements. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis. In addition to the loss of land and natural resources, erosion would continue to impact an adjacent archaeological site (44NN0024) that has been determined eligible for listing in the National Register of Historic Places.

The EA will analyze the potential range of environmental impacts that would result from the Proposed Action. The US Air Force is considering four proposed alternatives (Alternatives A-C and the No Action Alternative) towards meeting the objectives and goals of the Proposed Action. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated.

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Sincerely

CALDER.DONALD.W.JR.1021845686 Digitally signed by CALDER.DONALD.W.JR.1021845686 Date: 2020.01.24 09:03:06 -05'00'

DONALD W. CALDER, JR.
Chief, Environmental Element
733d Civil Engineer Division

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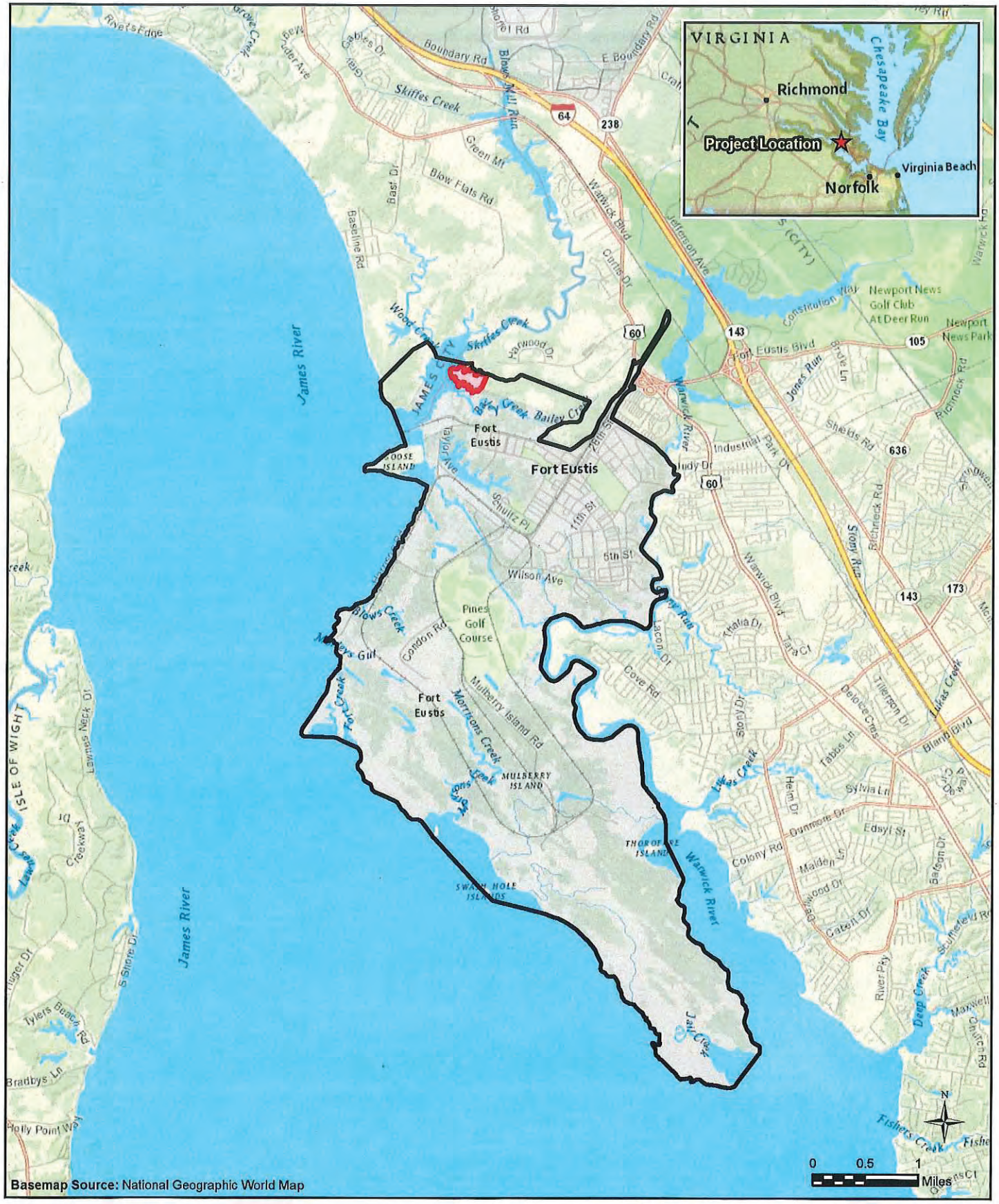

LEGEND

- Fort Eustis Boundary
- Project Location

Regional Map
Joint Base Langley-Eustis, VA

Figure 1-1

LEGEND

Project Location

Fort Eustis Boundary

Project Location Map
Joint Base Langley-Eustis, VA

Figure 1-2

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

23 January 2020

Ms. Cindy Rohlf
City Manager
Newport News City Hall
2400 Washington Ave.
Newport News, VA 23607

Dear Ms. Rohlf

The United States (US) Air Force is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with shoreline stabilization and erosion protection at the Joint Base Langley-Eustis - Eustis (JBLE-Eustis) Training Area 1 (TA1) in Newport News, Virginia (Proposed Action). TA1 is used by JBLE-Eustis for tactical bivouac, land navigation, military dog handling training, and small unit tactics. Recreational land uses, such as deer hunting and fishing, also occur in TA1. A map of JBLE-Eustis pinpointing the location of TA1 is provided at Atch 1 and a more specific site map is at Atch 2.

The purpose of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land (and associated resources) at JBLE-Eustis TA1. The need for the Proposed Action is to protect available training land in order to maintain the quality of the training necessary to meet JBLE-Eustis mission and national defense requirements. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis. In addition to the loss of land and natural resources, erosion would continue to impact an adjacent archaeological site (44NN0024) that has been determined eligible for listing in the National Register of Historic Places.

The EA will analyze the potential range of environmental impacts that would result from the Proposed Action. The US Air Force is considering four proposed alternatives (Alternatives A-C and the No Action Alternative) towards meeting the objectives and goals of the Proposed Action. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated.

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Please forward any comments or questions about this proposal to the Environmental Element (733 CED/CEIE), 1407 Washington Blvd, Fort Eustis, VA 23604, or by email to donald.w.calder.civ@mail.mil, within 30 days of receipt of this letter.

Sincerely

CALDER.DONALD.W.JR.1021845686 Digitally signed by CALDER.DONALD.W.JR.1021845686 Date: 2020.01.24 08:49:06 -05'00'

DONALD W. CALDER, JR.
Chief, Environmental Element
733d Civil Engineer Division

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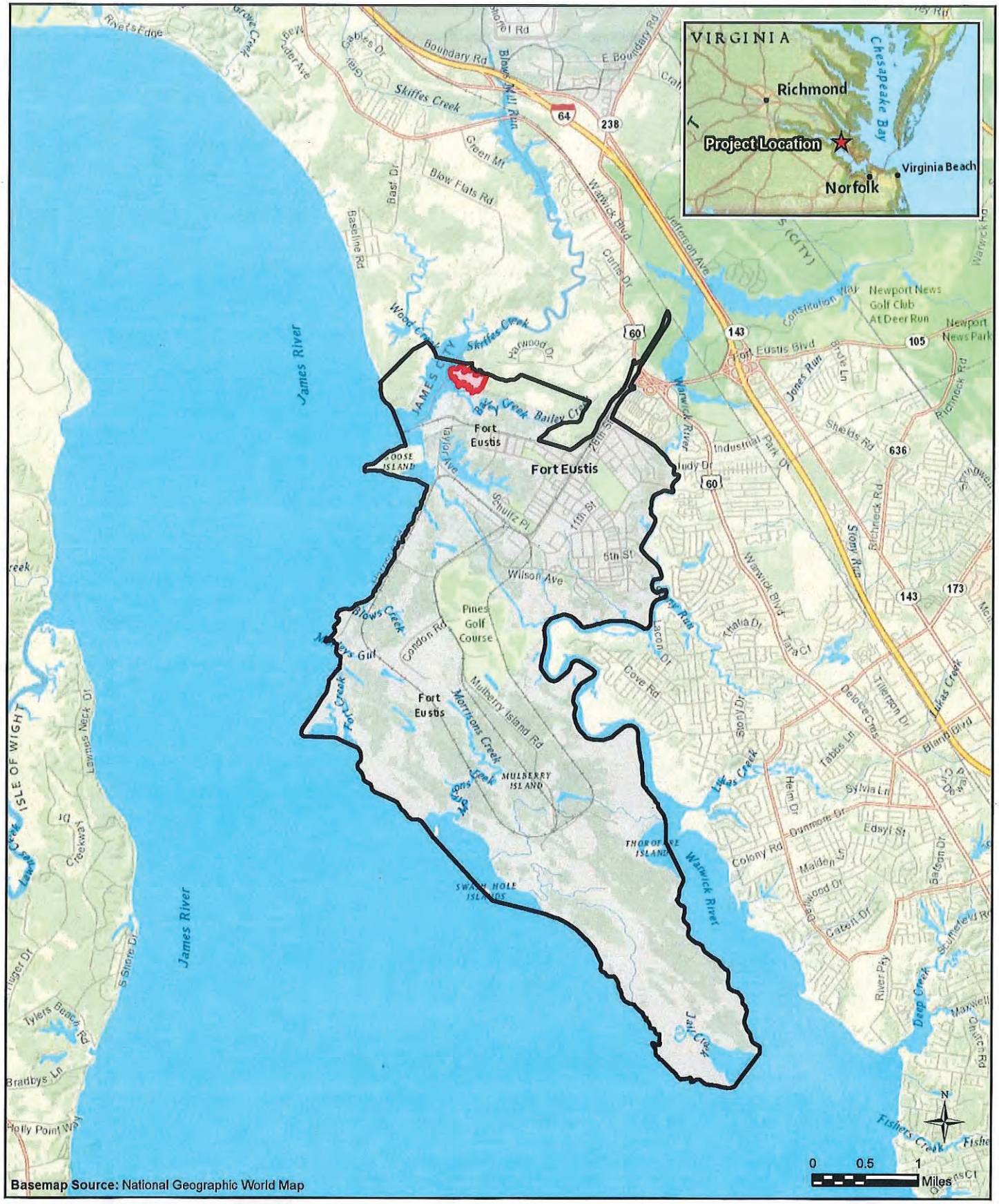

LEGEND

- Fort Eustis Boundary
- Project Location

Regional Map
Joint Base Langley-Eustis, VA

Figure 1-1

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Project Location

Fort Eustis Boundary

Project Location Map
Joint Base Langley-Eustis, VA

Figure 1-2

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

23 January 2020

Newport News Wetland Board
2400 Washington Ave.
Newport News, VA 23607

Dear Chairman

The United States (US) Air Force is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with shoreline stabilization and erosion protection at the Joint Base Langley-Eustis - Eustis (JBLE-Eustis) Training Area 1 (TA1) in Newport News, Virginia (Proposed Action). TA1 is used by JBLE-Eustis for tactical bivouac, land navigation, military dog handling training, and small unit tactics. Recreational land uses, such as deer hunting and fishing, also occur in TA1. A map of JBLE-Eustis pinpointing the location of TA1 is provided at Atch 1 and a more specific site map is at Atch 2.

The purpose of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land (and associated resources) at JBLE-Eustis TA1. The need for the Proposed Action is to protect available training land in order to maintain the quality of the training necessary to meet JBLE-Eustis mission and national defense requirements. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis. In addition to the loss of land and natural resources, erosion would continue to impact an adjacent archaeological site (44NN0024) that has been determined eligible for listing in the National Register of Historic Places.

The EA will analyze the potential range of environmental impacts that would result from the Proposed Action. The US Air Force is considering four proposed alternatives (Alternatives A-C and the No Action Alternative) towards meeting the objectives and goals of the Proposed Action. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated.

The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, *et seq.*), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989). As part of this

EA, we request your assistance in identifying any potential areas of environmental impact to be assessed in this analysis.

Please forward any comments or questions about this proposal to the Environmental Element (733 CED/CEIE), 1407 Washington Blvd, Fort Eustis, VA 23604, or by email to donald.w.calder.civ@mail.mil, within 30 days of receipt of this letter.

Sincerely

CALDER.DONALD.W.JR.1021845686 Digitally signed by CALDER.DONALD.W.JR.1021845686 Date: 2020.01.24 08:56:33 -05'00'

DONALD W. CALDER, JR.
Chief, Environmental Element
733d Civil Engineer Division

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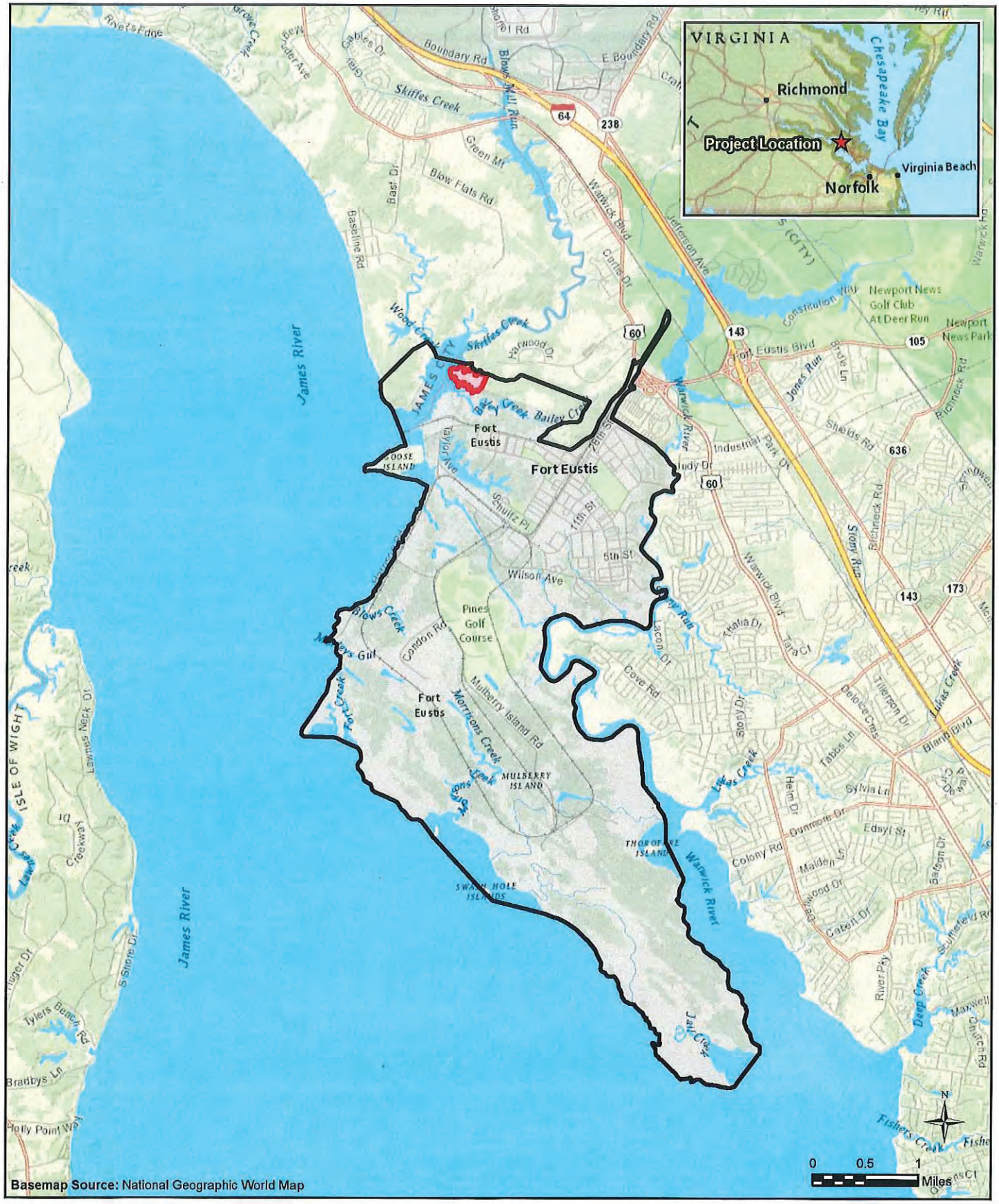

LEGEND

- Fort Eustis Boundary
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Regional Map
Joint Base Langley-Eustis, VA

Figure 1-1

LEGEND

Project Location

Fort Eustis Boundary

Project Location Map
Joint Base Langley-Eustis, VA

Figure 1-2

-----Original Message-----
From: Traver, Carrie [mailto:Traver.Carrie@epa.gov]
Sent: Monday, February 24, 2020 1:27 PM
To: Calder, Donald W Jr CIV USAF 733 MSG (USA) <donald.w.calder.civ@mail.mil>
Cc: Rudnick, Barbara <Rudnick.Barbara@epa.gov>
Subject: [Non-DoD Source] Joint Base Langley-Eustis-Eustis TA1 Stabilization EA

Dear Mr. Calder:

The U.S. Environmental Protection Agency (EPA) received notice that the U.S. Air Force (USAF) at Joint Base Langley-Eustis-Eustis (JBLE-Eustis) is preparing an Environmental Assessment (EA or Study) that will evaluate the impacts of a shoreline stabilizationand erosion protection project at JBLE-Eustis Training Area 1 (TA1). The EA is being done in compliance with the National Environmental Policy Act (NEPA) of 1969, Section 309 and CEQ regulations implementing NEPA. According to your letter, dated January 23,2019, the purpose of the project is to stabilize the existing shoreline and protect from future bluff failure and loss of land at TA1 in order to protect available land for training.

Thank you for notifying us. We have several recommendations for your consideration in the development of the EA:

The EA should include a discussion of the need for the proposal, the alternatives considered, the environmental impacts of the proposed action and alternatives, mitigation as appropriate, and a listing of the agencies and persons consulted.

Purpose and Need
As part of the purpose and need, the specific sources of erosion should be detailed. Existing and modeled impacts from expected sea level rise, subsidence, or other relevant factors should be evaluated.

Alternatives
The four proposed alternatives listed include: the No Action Alternative; Alternative A, a non-structural stabilization approach to enhance and protect the existing marshes; Alternative B, construction of a living shoreline with a sill and man-made oysterreefs; and Alternative C, construction of precast concrete walls. We recommend that combination approaches also be considered; for example, a non-structural marsh enhancement could be coupled with a man-made oyster reef or a living shoreline. In addition, thesealternatives may be implemented in different ways, so that sub-alternatives that capture how these alternatives will be constructed or implemented may need be explored.

Overall, we recommend consideration of alternatives that will provide long-term sustainability while providing additional benefits such as habitat enhancement or water quality improvements. We also recommend that the potential for tradeoffs be thoroughlyevaluated. To support your study, evaluation of other recent studies of shoreline stabilization in Virginia, including Environmental Assessments done by the U.S. Army Corps of Engineers in compliance with NEPA may be helpful.

Impacts
We recommend that the EA provide an assessment of the habitat resources and species present in the study area, including, but not limited to: fauna, such as birds, fish, shellfish, and other aquatic species; submerged aquatic vegetation (SAV); speciesof special concern; wetlands; and any other rare and/or high value resource types present in the study area.

The EA should include a discussion of positive or negative impacts to fauna and their habitat, including disturbance and sedimentation and noise during construction, disturbance to submerged aquatic vegetation, and contribution to or amelioration of waterquality impairments. Permanent or temporary impacts to wetlands for access roads or construction should be evaluated. We also suggest that potential temporary or permanent impacts to any recreational or commercial uses such as boating or fishing should alsobe assessed.

Potential unintended consequences of any stabilization project should be fully examined, including accelerating

erosion in other locations, habitat impacts, any impacts on navigation and/or recreational uses, and other concerns. While we support and recommendthe use of nature-based infrastructure, the specific approach to marsh enhancement should be carefully selected to reduce potential adverse impacts and tradeoffs. For instance, if thin-layer application of dredge material is anticipated as being an enhancementtechnique, a number of factors could influence success including the material, application depth, and timing. Consideration of timing of the dredge placement in relation to lifecycles of key species (migration, spawning, nesting, etc.) can be critical in minimizingand mitigating impacts.

We recommend that coordination with the applicable agencies be documented in the EA, including correspondence regarding state and federal threatened and endangered species.

Invasive Species
As construction may introduce or spread invasive species, the project's potential contribution to the spread of invasive species, including nonnative SAV should be evaluated, and prevention or mitigation measures addressed in the EA.

Cultural Resources
The letter indicates that erosion would "continue to impact" archaeological site 44N0024. We recommend that the EA identify existing impacts to this site and identify measures that may be needed to protect or limit damage to the site in coordination withthe State Historic Preservation Office (SHPO). Any other impacts to historic properties, including viewsheds of the Fort Eustis Historic District or other National Register listed or eligible sites, should be assessed and coordinated with the SHPO. We recommendengagement with Native American tribes to identify any resources of concern. We also recommend that coordination with both the SHPO and tribes be documented in the Study.

Cumulative Effects
As part of the cumulative effects analysis, we also recommend that the EA discuss other measures taken or planned for resiliency, the success of the measures taken to date, and any lessons learned that may inform the current proposal.

Please feel free to reach out to us if you have any questions on the recommended topics above or if we are able to contribute to the analysis. We request that you provide a copy of the EA to EPA when it is available for review.

Thank you,
Carrie Traver

Carrie Traver
Life Scientist
Office of Communities, Tribes, & Environmental Assessment U.S. Environmental Protection Agency, Region 3
1650 Arch Street - 3RA10
Philadelphia, PA 19103
215-814-2772
traver.carrie@epa.gov < Caution-mailto:traver.carrie@epa.gov >

CLASSIFICATION: UNCLASSIFIED

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 1105, Richmond, Virginia 23218
www.deq.virginia.gov

Matthew J. Strickler
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

February 5, 2020

Mr. Donald Calder
Environmental Element (733 CED/CEIE)
1407 Washington Boulevard
Fort Eustis, Virginia 23604

RE: Scoping Request – Shoreline Stabilization, Joint Base Langley-Eustis – Eustis Training Area 1, Newport News, Virginia

Dear Mr. Calder:

This letter is in response to the scoping request for the above-referenced project.

As you may know, the Department of Environmental Quality, through its Office of Environmental Impact Review (DEQ-OEIR), is responsible for coordinating Virginia's review of federal environmental documents prepared pursuant to the National Environmental Policy Act (NEPA) and responding to appropriate federal officials on behalf of the Commonwealth. Similarly, DEQ-OEIR coordinates Virginia's review of federal consistency documents prepared pursuant to the Coastal Zone Management Act which applies to all federal activities which are reasonably likely to affect any land or water use or natural resources of Virginia's designated coastal resources management area must be consistent with the enforceable policies Virginia Coastal Zone Management (CZM) Program.

DOCUMENT SUBMISSIONS

In order to ensure an effective coordinated review of the NEPA document and federal consistency documentation, notification of the NEPA document and federal consistency documentation should be sent directly to OEIR. We request that you submit one electronic to eir@deq.virginia.gov (25 MB maximum) or make the documents available for download at a website, file transfer protocol (ftp) site or the VITA LFT file share system (Requires an "invitation" for access. An invitation request should be sent to eir@deq.virginia.gov.). We request that the review of these two documents be done concurrently, if possible.

The NEPA document and the federal consistency documentation (if applicable) should include U.S. Geological Survey topographic maps as part of their information. We strongly encourage you to issue shape files with the NEPA document. In addition, project details should be adequately described for the benefit of the reviewers.

ENVIRONMENTAL REVIEW UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT: PROJECT SCOPING AND AGENCY INVOLVEMENT

As you may know, NEPA (PL 91-190, 1969) and its implementing regulations (Title 40, *Code of Federal Regulations*, Parts 1500-1508) requires a draft and final Environmental Impact Statement (EIS) for federal activities or undertakings that are federally licensed or federally funded which will or may give rise to significant impacts upon the human environment. An EIS carries more stringent public participation requirements than an Environmental Assessment (EA) and provides more time and detail for comments and public decision-making. The possibility that an EIS may be required for the proposed project should not be overlooked in your planning for this project. Accordingly, we refer to "NEPA document" in the remainder of this letter.

While this Office does not participate in scoping efforts beyond the advice given herein, other agencies are free to provide scoping comments concerning the preparation of the NEPA document. Accordingly, we are providing notice of your scoping request to several state agencies and those localities and Planning District Commissions, including but not limited to:

Department of Environmental Quality:
- DEQ Regional Office*
- Air Division*
- Office of Wetlands and Stream Protection*
- Office of Local Government Programs*
- Division of Land Protection and Revitalization
- Office of Stormwater Management*

Department of Conservation and Recreation
Department of Health*
Department of Agriculture and Consumer Services
Department of Game and Inland Fisheries*
Virginia Marine Resources Commission*
Department of Historic Resources
Department of Mines, Minerals, and Energy
Department of Forestry
Department of Transportation

Note: The agencies noted with a star (*) administer one or more of the enforceable policies of the Virginia CZM Program.

FEDERAL CONSISTENCY UNDER THE COASTAL ZONE MANAGEMENT ACT

Pursuant to the federal Coastal Zone Management Act of 1972, as amended, and its implementing regulations in Title 15, *Code of Federal Regulations*, Part 930, federal activities, including permits, licenses, and federally funded projects, located in Virginia's Coastal Management Zone or those that can have reasonably foreseeable effects on Virginia's coastal uses or coastal resources must be conducted in a manner which is consistent, to the maximum extent practicable, with the Virginia CZM Program.

Additional information on the Virginia's review for federal consistency documents can be found online at
http://www.deq.virginia.gov/Programs/EnvironmentalImpactReview/FederalConsistencyReviews.aspx

DATA BASE ASSISTANCE

Below is a list of databases that may assist you in the preparation of a NEPA document:

- DEQ Online Database: Virginia Environmental Geographic Information Systems

  Information on Permitted Solid Waste Management Facilities, Impaired Waters, Petroleum Releases, Registered Petroleum Facilities, Permitted Discharge (Virginia Pollution Discharge Elimination System Permits) Facilities, Resource Conservation and Recovery Act (RCRA) Sites, Water Monitoring Stations, National Wetlands Inventory:
  - www.deq.virginia.gov/ConnectWithDEQ/VEGIS.aspx

- DEQ Virginia Coastal Geospatial and Educational Mapping System (GEMS)

  Virginia's coastal resource data and maps; coastal laws and policies; facts on coastal resource values; and direct links to collaborating agencies responsible for current data:
  - http://128.172.160.131/gems2/

- MARCO Mid-Atlantic Ocean Data Portal

  The Mid-Atlantic Ocean Data Portal is a publicly available online toolkit and resource center that consolidates available data and enables users to visualize and analyze ocean resources and human use information such as fishing grounds, recreational areas, shipping lanes, habitat areas, and energy sites, among others.

  http://portal.midatlanticocean.org/visualize/#x=-73.24&y=38.93&z=7&logo=true&controls=true&basemap=Ocean&tab=data&legends=false&layers=true

- DHR Data Sharing System.

  Survey records in the DHR inventory:

  - www.dhr.virginia.gov/archives/data_sharing_sys.htm

- DCR Natural Heritage Search

  Produces lists of resources that occur in specific counties, watersheds or physiographic regions:
  - www.dcr.virginia.gov/natural_heritage/dbsearchtool.shtml

- DGIF Fish and Wildlife Information Service

  Information about Virginia's Wildlife resources:
  - http://vafwis.org/fwis/

- Total Maximum Daily Loads Approved Reports
  - https://www.deq.virginia.gov/programs/water/waterqualityinformationtmdls/tmdl/tmdldevelopment/approvedtmdlreports.aspx

- Virginia Outdoors Foundation: Identify VOF-protected land

- http://vof.maps.arcgis.com/home/index.html

- Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Database: Superfund Information Systems

  Information on hazardous waste sites, potentially hazardous waste sites and remedial activities across the nation, including sites that are on the National Priorities List (NPL) or being considered for the NPL:
  - www.epa.gov/superfund/sites/cursites/index.htm

- EPA RCRAInfo Search

  Information on hazardous waste facilities:
  - www.epa.gov/enviro/facts/rcrainfo/search.html

- EPA Envirofacts Database

  EPA Environmental Information, including EPA-Regulated Facilities and Toxics Release Inventory Reports:
  - www.epa.gov/enviro/index.html

- EPA NEPAssist Database

  Facilitates the environmental review process and project planning:
  http://nepaassisttool.epa.gov/nepaassist/entry.aspx

If you have questions about the environmental review process and/or the federal consistency review process, please feel free to contact me (telephone (804) 698-4204 or e-mail bettina.rayfield@deq.virginia.gov).

I hope this information is helpful to you.

Sincerely,

Bettina Rayfield, Program Manager
Environmental Impact Review and Long-Range Priorities

Matthew J. Strickler
Secretary of Natural Resources

Clyde E. Cristman
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

Rochelle Altholz
Deputy Director of Administration and Finance

Russell W. Baxter
Deputy Director of Dam Safety & Floodplain Management and Soil & Water Conservation

Thomas L. Smith
Deputy Director of Operations

February 27, 2020

Donald Calder, Jr.
733 CED/CEIE
1407 Washington Boulevard
Fort Eustis, VA 23604

Re: JBLE-Eustis Training Area 1 Shoreline Stabilization and Erosion Protection

Dear Mr. Calder:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in Biotics, natural heritage resources have not been documented within the submitted project boundary including a 100 foot buffer. The absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources. In addition, the project boundary does not intersect any of the predictive models identifying potential habitat for natural heritage resources.

If tree clearing is proposed in the northeastern corner of the project site, the project may fragment an Ecological Core C4 as identified in the Virginia Natural Landscape Assessment (https://www.dcr.virginia.gov/natural-heritage/vaconvisvnla), one of a suite of tools in Virginia ConservationVision that identify and prioritize lands for conservation and protection.

Ecological Cores are areas of unfragmented natural cover with at least 100 acres of interior that provide habitat for a wide range of species, from interior-dependent forest species to habitat generalists, as well as species that utilize marsh, dune, and beach habitats. Cores also provide benefits in terms of open space, recreation, water quality (including drinking water protection and erosion prevention), and air quality (including carbon sequestration and oxygen production), along with the many associated economic benefits of these functions. The cores are ranked from C1 to C5 (C5 being the least ecologically relevant) using many prioritization criteria, such as the proportions of sensitive habitats of natural heritage resources they contain.

Fragmentation occurs when a large, contiguous block of natural cover is dissected by development, and other forms of permanent conversion, into one or more smaller patches. Habitat fragmentation results in biogeographic changes that disrupt species interactions and ecosystem processes, reducing biodiversity and habitat quality due to limited recolonization, increased predation and egg parasitism, and increased invasion by weedy species.

Therefore minimizing fragmentation is a key mitigation measure that will reduce deleterious effects and preserve the natural patterns and connectivity of habitats that are key components of biodiversity. DCR recommends efforts to minimize edge in remaining fragments, retain natural corridors that allow movement between fragments and designing the intervening landscape to minimize its hostility to native wildlife (natural cover versus lawns). Mapped cores in the project area can be viewed via the Virginia Natural Heritage Data Explorer, available here: http://vanhde.org/content/map.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please re-submit project information and map for an update on this natural heritage information if the scope of the project changes and/or six months has passed before it is utilized.

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Ernie Aschenbach at 804-367-2733 or Ernie.Aschenbach@dgif.virginia.gov.

Should you have any questions or concerns, please contact me at 804-225-2429. Thank you for the opportunity to comment on this project.

Sincerely,

Tyler Meader

Tyler Meader
Natural Heritage Locality Liaison

-----Original Message-----
From: Warren, Arlene [mailto:arlene.warren@vdh.virginia.gov]
Sent: Friday, February 7, 2020 1:14 PM
To: Calder, Donald W Jr CIV USAF 733 MSG (USA) <donald.w.calder.civ@mail.mil>
Cc: rr Environmental Impact Review <eir@deq.virginia.gov>
Subject: [Non-DoD Source] Re: VA Dept Health Comments - JBLE-Eustis Shoreline Stabilization EA

All active links contained in this email were disabled. Please verify the identity of the sender, and confirm the authenticity of all links contained within the message prior to copying and pasting the address to a Web browser.

_____

Project Name: NEW SCOPING JBLE-Eustis Shoreline Stabilization

Project #: N/A

UPC #: N/A

Location: Cityof Newport News

VDH – Office of Drinking Water has reviewed the aboveproject. Below are our comments as they relate to proximity to publicdrinking water sources (groundwater wells, springs and surface waterintakes). Potential impacts on public water distribution systems orsanitary sewage collection systems must be verified by the local utility.

The following public groundwater wells are located within a1-mile radius of the project site:

PWS ID Number

City/County

System Name

Facility Name

3700500

NEWPORT NEWS

NEWPORT NEWS_ CITY OF

WELL 1B

3700500

NEWPORT NEWS

NEWPORT NEWS_ CITY OF

WELL 1A

The following surface water intakes are located within a 5-mile radius of the project site:

PWS ID Number

System Name

Facility Name

3700500

NEWPORT NEWS_ CITY OF

LEE HALL

3700500

NEWPORT NEWS_ CITY OF

SKIFFES CREEK

The project is not within the watershed of any publicsurface water intakes.

Best Management Practices should be employed, includingErosion & Sedimentation Controls and Spill Prevention Controls &Countermeasures on the project site.

Materials should be managed while on-site and during transportto prevent impacts to nearby surface water.

VirginiaDepartment of Health – Office of Drinking Water appreciates the opportunity toprovide comments. If you have any questions, please let me know.

Best Regards,

ArleneFields Warren

GISProgram Support Technician

Office ofDrinking Water

VirginiaDepartment of Health

109 GovernorStreet

Richmond, VA23219

(804)864-7781

On Wed, Feb 5, 2020 at 10:39 AM Fulcher, Valerie <valerie.fulcher@deq.virginia.gov < Caution-mailto:valerie.fulcher@deq.virginia.gov > > wrote:

Good morning—attached is a request for scoping comments on the following:

Shoreline Stabilization and Erosion Protection at the Joint BaseLangley-Eustis-Eustis (JBLE-Eustis) Training Area 1 (TA1) in Newport News, VA

If you choose to make comments, pleasesend them directly to the project sponsor (Donald.w.calder.civ@mail.mil < Caution-mailto:Donald.w.calder.civ@mail.mil >) and copy the DEQ Office of Environmental Impact Review: eir@deq.virginia.gov < Caution-mailto:eir@deq.virginia.gov > . We will coordinate a reviewwhen the environmental document is completed.

DEQ-OEIR's scoping response is alsoattached.

If you have any questions regardingthis request, please email our office at eir@deq.virginia.gov < Caution-mailto:eir@deq.virginia.gov > .

Valerie

--

Valerie A. Fulcher, CAP, OM, Environmental Program Specialist

Department of Environmental Quality

Environmental Enhancement - Office of Environmental Impact Review

1111 East Main Street

Richmond, VA 23219

804/698-4330 < tel:(804)%20698-4330 >

804/698-4319 < tel:(804)%20698-4319 > (Fax)

email: Valerie.Fulcher@deq.virginia.gov < Caution-mailto:Valerie.Fulcher@deq.virginia.gov >

Caution-https://urldefense.proofpoint.com/v2/url?u=http-3A__www.deq.virginia.gov_Programs_EnvironmentalImpactReview.aspx&d=DwIGaQ&c=TQzoP61-bYDBLzNd0XmHrw&r=qxG5SlwFg2JYYEHIUeHshw9ZM5yxQkqTBWqqSVJ8OmM&m=8Oh8BMz2gLx7Xht0YIzuo6Sc7DwL_6CjBn-TjIeBSbE&s=-vO8G-9NdzeaMiNuT6-3VkzUBYo9WSGlPMeHL_z9jas&e= < Caution-https://urldefense.proofpoint.com/v2/url?u=http-3A__www.deq.virginia.gov_Programs_EnvironmentalImpactReview.aspx&d=DwIGaQ&c=TQzoP61-bYDBLzNd0XmHrw&r=qxG5SlwFg2JYYEHIUeHshw9ZM5yxQkqTBWqqSVJ8OmM&m=8Oh8BMz2gLx7Xht0YIzuo6Sc7DwL_6CjBn-TjIeBSbE&s=-vO8G-9NdzeaMiNuT6-3VkzUBYo9WSGlPMeHL_z9jas&e= >

For program updates and public notices please subscribe to Constant Contact: Caution-https://urldefense.proofpoint.com/v2/url?u=https-3A__lp.constantcontact.com_su_MVcCump_EIR&d=DwIGaQ&c=TQzoP61-bYDBLzNd0XmHrw&r=qxG5SlwFg2JYYEHIUeHshw9ZM5yxQkqTBWqqSVJ8OmM&m=8Oh8BMz2gLx7Xht0YIzuo6Sc7DwL_6CjBn-TjIeBSbE&s=5KtEd4dU9EH6UvUFbIOR3UMZj_C9rcyaWSCK8RkAUYg&e= < Caution-https://urldefense.proofpoint.com/v2/url?u=https-3A__lp.constantcontact.com_su_MVcCump_EIR&d=DwIGaQ&c=TQzoP61-bYDBLzNd0XmHrw&r=qxG5SlwFg2JYYEHIUeHshw9ZM5yxQkqTBWqqSVJ8OmM&m=8Oh8BMz2gLx7Xht0YIzuo6Sc7DwL_6CjBn-TjIeBSbE&s=5KtEd4dU9EH6UvUFbIOR3UMZj_C9rcyaWSCK8RkAUYg&e= >

CLASSIFICATION: UNCLASSIFIED

COMMONWEALTH of VIRGINIA
Marine Resources Commission
380 Fenwick Road
Bldg 96
Fort Monroe, VA 23651-1064

Matthew J. Strickler
Secretary of Natural Resources

Steven G. Bowman
Commissioner

February 13, 2020

Environmental Element (733 CED/CEIE)
Attn: Donald W. Calder, Jr.
1407 Washington Blvd
Fort Eustis, VA 23604

Re: Comment Request
Air Force Joint Base Joint Base Langley-Eustis-Eustis,
Training Area 1

Dear Mr. Calder:

This will respond to the request for comments regarding the Air Force Joint Base Langley-Eustis-Eustis Training Area 1 Project, prepared by the United States Air Force. Specifically, the Air Force has proposed to stabilize the shoreline in Training Area 1 in Newport News, Virginia. We reviewed the provided project documents. A wetlands permit from the Newport News Wetlands Board will be required for any fill in tidal wetlands. A submerged bottom land permit will be required from the Marine Resources Commission (VMRC) if structures are placed channelward of mean low water. Per Section 104.1 of Title 28.2 of the Code of Virginia, living shorelines are the preferred alternative for stabilizing shorelines in the Commonwealth.

Please be advised that the VMRC pursuant to Chapter 12, 13, & 14 of Title 28.2 of the Code of Virginia administers permits required for submerged lands, tidal wetlands, and beaches and dunes. Any jurisdictional impacts will be reviewed by the VMRC during the Joint Permit Application process.

If you have any questions please contact me at (757) 247-2254 or by email at allison.lay@mrc.virginia.gov. Thank you for the opportunity to comment.

Sincerely,

Allison Lay

Allison Lay
Environmental Engineer, Habitat Management

AEL/keb
HM

TA 1 Native Tribes Contact Log									
	Catawba	Chickahominy	Chickahominy Eastern Division	Delaware Nation	Delaware Tribe	Nansemond Indian Nation	Rappahanock	Pamunkey	Upper Mattaponi
Ist Letter	Nov-16			Nov-16	Nov-16			Nov-16	
2nd letter	Mar-17			Mar-17	Mar-17			Mar-17	
3rd letter	Aug-18			Aug-18	Aug-18			Aug-18	
Site visit at G2G meeting		Aug-19	Aug-19			Aug-19		Aug-19	
4th letter/email with report	Feb-20	Feb-20	Feb-20	Feb-20	Feb-20	Feb-20	Feb-20	Feb-20	Feb-20
email		Aug-20	Aug-20			Aug-20	Aug-20		Aug-20
phone call		3-Sep-20	3-Sep-20			9/4/2020 No voice mail set up	4-Sep-20		

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733D MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA 23604

NOV 0 7 2016

Civil Engineering Division

Mr. Marc Holma
Review and Compliance
Virginia Department of Historic Resources
2801 Kensington Avenue
Richmond, Virginia 23221

Dear Mr. Holma,

The Air Force plans to stabilize the shoreline of Training Area (TA) 1 on the Fort Eustis portion of Joint Base Langley Eustis. We are at the beginning of the planning process for this action and are working to develop an environmental assessment of the action in order to comply with the National Environmental Policy Act. Depending on how the shoreline in TA1 is stabilized there is a potential to effect Archaeological Site 44NN0024. Site 44NN0024 is primarily a prehistoric base camp and long-term occupation site with components dating to the Early, Middle, and Late Woodland periods as well as a minor nineteenth-century historic component (enclosure). The site was determined eligible for the National Register of Historic Places in April of 2016.

We would like to keep you informed on this project as we move through its development and take any input you may have on this project into account as the project is developed. At this time we cannot make a determination of effect for this undertaking. We have also contacted the Pamunkey Indian Tribe, The Catawba Nation, the Delaware Tribe and the Delaware Nation regarding this matter.

If you would like additional information regarding this action please contact Dr. Christopher L. McDaid at (757) 878-7365 or email christopher.l.mcdaid.civ@mail.mil.

Sincerely,

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division

Enclosure

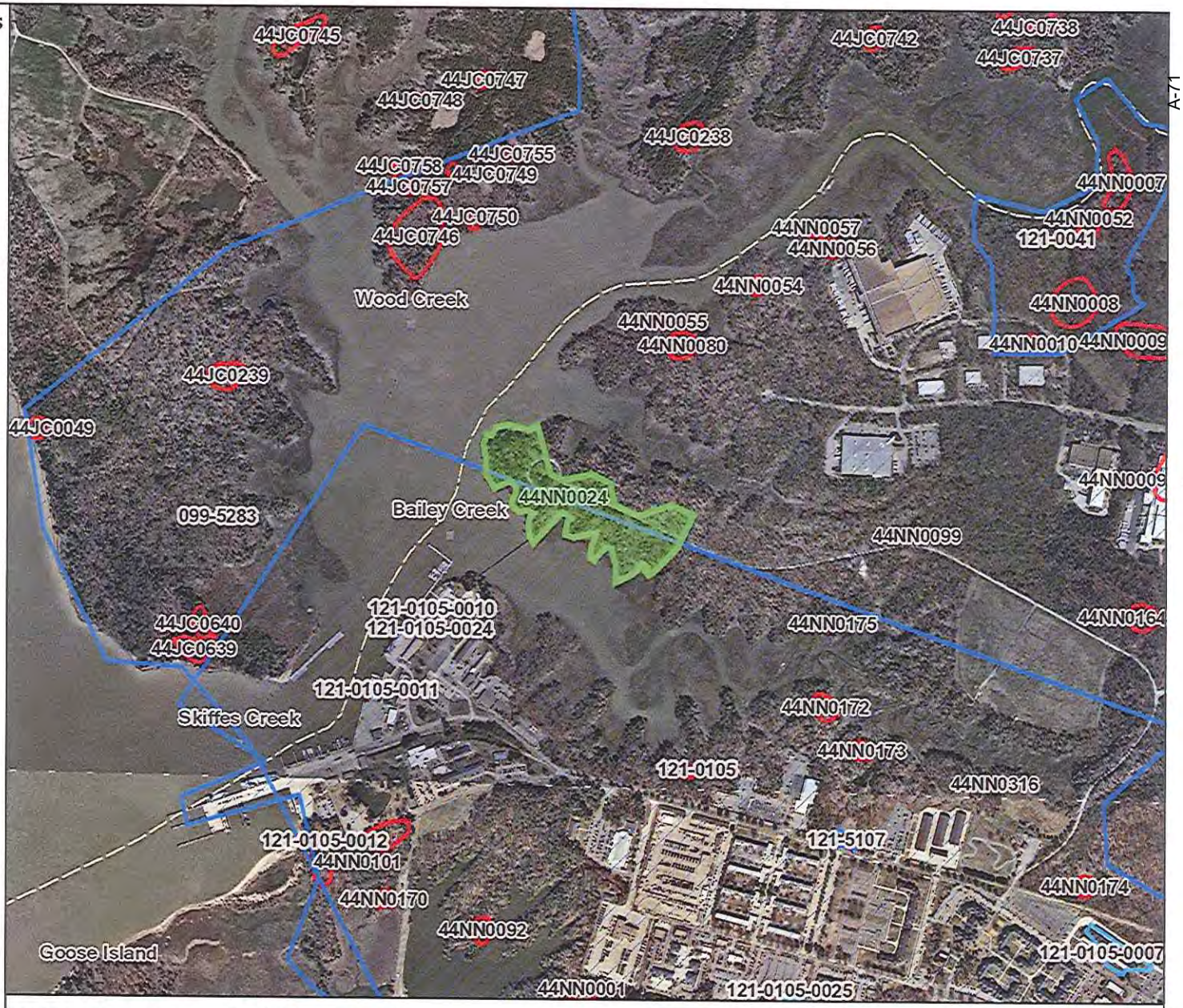
Virginia Dept. of Historic Resources

V-CRIS

Virginia Cultural Resource Information System

Legend

- Architecture Resources
- Architecture Labels
- Individual Historic District Properties
- Archaeological Resources
- Archaeology Labels
- USGS GIS Place names
- County Boundaries



N

Feet

0 500 1000 1500 2000

1:18,056 / 1"=1,505 Feet

Title: Archaeological Resources

Date: 10/28/2016

DISCLAIMER:Records of the Virginia Department of Historic Resources (DHR) have been gathered over many years from a variety of sources and the representation depicted is a cumulative view of field observations over time and may not reflect current ground conditions.The map is for general information purposes and is not intended for engineering, legal or other site-specific uses. Map may contain errors and is provided "as-is". More information is available in the DHR Archives located at DHR's Richmond office.

Notice if AE sites:Locations of archaeological sites may be sensitive the National Historic Preservation Act (NHPA), and the Archaeological Resources Protection Act (ARPA) and Code of Virginia §2.2-3705.7 (10). Release of precise locations may threaten archaeological sites and historic resources.

Snapshot

Date Generated: October 28, 2016

Site Name:	No Data
Site Classification:	Terrestrial, open air
Year(s):	No Data
Site Type(s):	Camp, base, Other, Shell midden
Other DHR ID:	No Data
Temporary Designation:	No Data

Site Evaluation Status

Not Evaluated

Locational Information

USGS Quad:	YORKTOWN
County/Independent City:	Newport News (Ind. City)
Physiographic Province:	Coastal Plain
Elevation:	20
Aspect:	Flat
Drainage:	James
Slope:	0 - 2
Acreage:	18.980
Landform:	Other, Terrace, Marine
Ownership Status:	Federal Govt
Government Entity Name:	U.S. Department of the Army

Site Components

Component 1

Category:	Domestic
Site Type:	Camp, base
Cultural Affiliation:	Native American
DHR Time Period:	Early Woodland, Late Woodland, Middle Woodland
Start Year:	No Data
End Year:	No Data
Comments:	long-term occupation site

Component 2

Category:	Indeterminate
Site Type:	Other
Cultural Affiliation:	Indeterminate
DHR Time Period:	Antebellum Period, Civil War, Reconstruction and Growth
Start Year:	No Data
End Year:	No Data
Comments:	minor historic component of indeterminate function dating to the nineteenth century

Component 3

Category:	Domestic
Site Type:	Shell midden
Cultural Affiliation:	Native American
DHR Time Period:	Middle Woodland
Start Year:	No Data
End Year:	No Data
Comments:	August 1986

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

Bibliographic Information

Bibliography:

Talbott, A.R.
1957Camp Abraham Eustis, Virginia, Index to Property Maps. Original drawing in 1919 by J. B. Ferguson and Co. Reissued by Office of the Post Engineer, Fort Eustis, Virginia.

Informant Data:

No Data

CRM Events

Event Type: Survey:Phase II

Project Staff/Notes:

Project Manager: Eric Voigt

Principal Investigator: Andrew Wilkins

Field Directors: Andrew Wilkins, Tracey Jones

Project Review File Number: 2016-0338

Sponsoring Organization: No Data

Organization/Company: The Louis Berger Group

Investigator: Tracey Jones

Survey Date: 11/4/2014

Survey Description:

Archaeological evaluation of four sites (44NN0024, 44NN0127, 44NN0213, and 44NN0214) located on the Fort Eustis military base.

Subsurface testing included shovel testing on grid alignments excavated at all sites, with 30-meter interval with 15-meter close interval tests at 44NN0024 and a 10-meter interval at Site 44NN0127, 44NN0213, and 44NN0214. 1x1-meter test units were hand-excavated at three of the four sites, but not at 44NN0214, as the close interval shovel testing indicated that that site had been destroyed. A total of 355 shovel tests, 20 1x1-meter test units, and two 50x50-centimeter test units were excavated at the site.

158 shovel tests and 12 test units were excavated at Site 44NN0024, with an additional 81 placements not excavated due to modern disturbance, slope, or water. Prehistoric and limited historic artifacts were recovered from 25 shovel tests and the test units, and two subsurface cultural features (prehistoric shell middens/pits) were identified, in addition to the presence of a surface scatter of shell within the core of the site.

54 shovel tests, four test units, and 2 50x50-centimeter test unit quads were excavated at Site 44NN0127. Two shovel test locations were not excavated due to a delineated wetland. Prehistoric and historic artifacts were recovered from six shovel tests, and all of the test units, and one subsurface feature (historic brick pier) was identified at the site, in addition to an associated adjacent surface brick rubble pile.

92 shovel tests and four test units were excavated in or adjacent to Site 44NN0213. One shovel test location was not excavated due to a modern pushpile disturbance. Prehistoric and historic artifacts were recovered from ten shovel tests and all four test units at the site, and two subsurface features (cultural shell middens/pits, cultural affiliation not determined) were identified. In addition, seven surface features (six prick piers and one brick rubble pile) were identified at the site. These surface features formed the outline for a historic rectangular foundation labeled as Structure 1.

51 shovel tests were excavated at Site 44NN0214. No artifacts were recovered from the shovel tests, nor were any surface artifacts encountered, and so no test units were excavated at this site. The site is believed to be destroyed.

Current Land Use	Date of Use	Comments
Forest	8/6/2015 12:00:00 AM	Training Area for US Army military exercises

Threats to Resource: None Known

Site Conditions: Subsurface Integrity

Survey Strategies: Subsurface Testing

Specimens Collected: Yes

Specimens Observed, Not Collected: Yes

Artifacts Summary and Diagnostics:

Total Artifacts= 2423- 87 Prehistoric, historic=5, faunal= 2331
Faunal Specimens: 2331
Freshwater Snail= 1
Oyster= 2327
Unidentified Gastropod= 2
Unidentified Shell= 1

Historic Artifacts:
Brick= 4
Machine Cut Nail=1

Lithics: (n=68), quartzite, quartz, minor amount of chert, milky quartz, granite
Biface, General= 1- not diagnostic
Biface Reduction Flake= 16
Core, General= 1
Cracked Rock= 1
Debitage, General= 7
Decortication Flake= 6
Early Reduction Flake= 2
Early Stage Biface= 1- not diagnostic
FCR= 20
Flake Fragment= 3

Groundstone Debitage= 1
Hematite= 1
Middle-stage Biface= 2
Shatter= 6

Prehistoric Ceramics (n=19) (Cordmarked= 7; Indeterminate=12) ;
Indeterminate Exterior Decoration=10
Interior: Plain/ Burnished=4, Plain/Smoothed= 5, or Indeterminate=10) Tempers: grit=5, shell=4, quartz=1, or multiple=4; indeterminate=5
Specific Ware Types could not be determined
Body Sherd= 16
Neck Sherd= 2
Rimsherd= 1

Stratum A: 41 artifacts (47 percent)
Stratum B: 31 artifacts (36 percent)
Feature Stratum A: 13 prehistoric artifacts (15 percent)
Feature Stratum B: 2 artifacts (2 percent)

Summary of Specimens Observed, Not Collected:

Oyster- sampled; remainder weighed and discarded in the field

Test Unit 4: 3.2 kilograms (7.1 pounds) discarded
Test Unit 10: 0.8 kilograms (1.8 pounds) discarded
Feature 1: 23.8 kilograms (52.5 pounds) discarded
Feature 2: 1.4 kilograms (3.1 pounds) discarded

Current Curation Repository:	Louis Berger
Permanent Curation Repository:	Fort Lee Curation Facility (Army)
Field Notes:	Yes
Field Notes Repository:	Fort Lee Curation Facitlity (Army)
Photographic Media:	Digital
Survey Reports:	Yes

Survey Report Information:

National Register Evaluation of Archaeological Sites 44NN0024, 44NN0127, 44NN0213, and 44NN0214, Joint Base Langley-Eustis, City of Newport News, Virginia. Andrew Wilkins, Tracey Jones< Eric Barr, Eric Voight. 2015

Survey Report Repository:	VDHR
DHR Library Reference Number:	NN-130
Significance Statement:	Though the archaeological assemblage is relatively small, the presence of intact subsurface cultural features and feature clusters associated with temporally diagnostic artifacts indicates that Site 44NN0024 has the potential to yield information that would further understanding of Woodland-period occupation sites in the coastal plain of Virginia. Though only shell middens were encountered during the archaeological evaluations, the intact nature of these deposits in relatively shallow stratigraphy suggests that other subsurface cultural features related to long-term occupation sites, such as postholes, pits, or hearths, may also be present. Research themes pertinent to sites with intact Woodland period components include the settlement patterns of indigenous groups prior to the contact period, subsistence practices, diet, and the spatial organization of Woodland occupation sites. As Site 44NN0024 has the potential to yield information important to subsistence practices, settlement patterns, and domestic activities at Woodland-period long-term occupation sites, Louis Berger recommends the site as eligible for inclusion in the National Register under Criterion D. Louis Berger further concludes that the minor historic component present at the site does not contribute to the eligibility of the site. Louis Berger further recommends that the original site boundaries be revised to exclude locations devoid of cultural materials or features. Louis Berger does not recommend the site as eligible for the National Register under Criterion A or Criterion B, as the site is not associated with events important to the broad pattern of local, state, or national history, or with individuals of local, state, or national significance. Criterion C was applied and found to be not applicable to the site.
Surveyor's Eligibility Recommendations:	Recommended Eligible
Surveyor's NR Criteria Recommendations, :	D
Surveyor's NR Criteria Considerations:	No Data

Event Type: NRHP Nomination

DHR ID:	44NN0024
Staff Name:	VDHR-James Christian Hill
Event Date:	7/27/1993
Staff Comment	No Data

Event Type: Survey:Phase I/Reconnaissance

Project Staff/Notes:

No Data

Project Review File Number: No Data

Sponsoring Organization: No Data

Organization/Company: Unknown (DSS)

Investigator: MAI

Survey Date: 8/1/1986

Survey Description:

Site was initially identified through surface collection and shovel testing.
The presence of exposed and intact shell midden deposits suggest this site to be entirely undisturbed except for the recent road grading and troop training activities. Systematic shovel testing and test excavation revealed in situ subsurface features and additional subsurface shell deposits. Additional occupational loci of various temporal periods were identified. Site is presently unused, though increased levels of troop training activities are anticipated. Site is undisturbed and apparently never cultivated.

Current Land Use	Date of Use	Comments
Other	*No Data*	military facility

Threats to Resource: No Data

Site Conditions: Site Condition Unknown

Survey Strategies: Subsurface Testing

Specimens Collected: Yes

Specimens Observed, Not Collected: Yes

Artifacts Summary and Diagnostics:

quartzite cobble, FCR, quartzite core, chipping debris (quartz, quartzite, rhyolite), decortication flakes (qquartz and quartzite), processual flakes (quartzite, quartz, chert, rhyolite), quartzite preform, quartzite bifacial blades, quartzite projectile point fragments, quartzite contracting stem projectile point fragment, quartzite triangular concave base projectile point, coarse sand tempered pottery (plain, net impressed), sand tempered pottery, shell tempered pottery (net impressed and cord marked), Townsend Ware, English kaolin pipestem (5/64"), 18th century window glass, phial glass

Summary of Specimens Observed, Not Collected:

No Data

Current Curation Repository: U.S. Army Transportation Museum, Va

Permanent Curation Repository: No Data

Field Notes: Yes

Field Notes Repository: MAI

Photographic Media: No Data

Survey Reports: No Data

Survey Report Information:

An Archaeological Overview and Management Plan of Fort Eustis and Fort Story, Cities of Newport News and Virginia Beach, Virginia by Antony F. Opperman on file at VDHL [VDHR] in Richmond; Special Military Map, Camp Abraham Eustis, Virginia, Corps of Engineers, U.S. Army, 1918; An Archaelolgical Survey of Mulberry Island by Mary C. Beaudry, 1975; Archaeological Evaluations of Significance, 44NN24, 44NN102, 44NN120, 44NN164, 44NN165, Fort Eustis, Virginia, by Harding Polk II, Antony F. Opperman, Stephen J. Hinks on file at VDHL [VDHR] in Richmond

Survey Report Repository: No Data

DHR Library Reference Number: No Data

Significance Statement: No Data

Surveyor's Eligibility Recommendations: No Data

Surveyor's NR Criteria Recommendations, : No Data

Surveyor's NR Criteria Considerations: No Data

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

MAR 0 9 2017

Civil Engineering Division

Mr. Marc Holma
Review and Compliance
Virginia Department of Historic Resources
2801 Kensington Avenue
Richmond, Virginia 23221

Dear Mr. Holma,

The Air Force is planning a project in Training Area 1 on the Fort Eustis portion of Joint Base Langley-Eustis. In October, I wrote to you letting you know of this project and inviting you to consult on the issue, as we develop the project. We currently have three possible courses of action to control the erosion of the land in TA 1. All three of the courses of action will have a direct physical effect on Archaeological Site 44NN0024. Site 44NN0024 was determined to be eligible for the National Register of Historic Places in 2016.

Included with this letter is a document that outlines the courses of action and maps (enclosure 1) that illustrate the three options to be examined as we develop an Environmental Assessment of this project. At this time we are not able to make a determination of effect of this action on Site 44NN0024. Since we cannot determine what effect this undertaking will have on Site 44NN0024, we are proposing to develop a "Programmatic Agreement." The agreement will guide how we will address the possible effect to Site 44NN0024. A preliminary draft of the agreement is at enclosure 2.

Please review the enclosed documents. Dr. Christopher L. McDaid will be in contact with you to further discuss the consultation process and provide additional information as it becomes available as we work through the process of developing this project.

If you have any questions regarding this undertaking please contact Dr. Christopher L. McDaid at (757) 878-7365 or email christopher.l.mcdaid.civ@mail.mil.

Sincerely,

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division

Enclosures

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

FEB 0 4 2020

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division
1407 Washington Blvd
Fort Eustis, VA 23604

Mr. Marc Holma
Review and Compliance
Virginia Department of Historic Resources
2801 Kensington Ave.
Richmond, VA 23221

Dear Mr. Holma,

The United States (US) Air Force is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with shoreline stabilization and erosion protection at the Joint Base Langley-Eustis - Eustis (JBLE-Eustis) Training Area 1 (TA1) in Newport News, Virginia (Proposed Action). TA1 is used by JBLE-Eustis for tactical bivouac, land navigation, military dog handling training, and small unit tactics. Recreational land uses, such as deer hunting and fishing, also occur in TA1.

The purpose of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land (and associated resources) at JBLE-Eustis TA1. The need for the Proposed Action is to protect available training land in order to maintain the quality of the training necessary to meet JBLE-Eustis mission and national defense requirements. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis. In addition to the loss of land and natural resources, erosion would continue to impact the adjacent archaeological site 44NN0024 that has been determined eligible for listing in the National Register of Historic Places (NRHP).

The EA will analyze the potential range of environmental impacts that would result from the Proposed Action. The US Air Force is considering four proposed alternatives (Alternatives A-C and the No Action Alternative) towards meeting the objectives and goals of the Proposed Action. A summary of the three action alternatives and corresponding site maps are provided in the corrective action plan at Attachment 1. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated.

As part of the data gathering for this EA additional archaeological fieldwork was conducted on Archaeological Site 44NN0024 (DHR# 2016-1148) to determine if the proposed shoreline stabilization would have an adverse effect on the site (see the Archaeological Investigations at Site 44NN0024 hard copy report and accompanying CD at Attachment 2). Site 44NN0024 was occupied during the Woodland period 1200 B.C. to A.D. 1600 and was determined eligible for the NRHP in 2016 under Criterion D. The purpose of the limited fieldwork was to assess the potential for the site to be adversely affected by the proposed project to stabilize the shoreline in TA 1.

The recently concluded fieldwork on Site 44NN0024 has allowed the Air Force to determine the execution of any of the proposed alternatives will have no adverse effect on the qualities of Site 44NN0024 that make it eligible for the NRHP. The site was determined eligible for the NRHP due to its potential to provide information about the past. The proposed stabilization actions all are on the edge of the site and will not damage the portions of the site that make it eligible for the NRHP. The Air Force has determined that selecting and executing any of the three identified alternatives will result in no adverse effect to Site 44NN0024. However, if the additional environmental analysis undertaken during the development of the EA indicates that our determination was erroneous we will contact your office to continue consultation on the matter

We request that you review this determination and forward your comments within 30 days. If you do not comment within 30 days, we will assume you agree with the Air Force's determination of no adverse effect to historic properties and will proceed without taking further steps in the Section 106 process. However, if the additional environmental analysis undertaken during the development of the EA indicates that our determination was erroneous we will contact your office to continue consultation on the matter.

The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, et seq.), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989). As part of this EA, we request your assistance in identifying any potential areas of environmental impact to be assessed in this analysis.

If you have any specific items of interest about this proposal, please contact Dr. Christopher L. McDaid at (757) 878-7365 or email christopher.l.mcdaid.civ@mail.mil or Ms. Tracey Sugg, Civil Engineer Division, Environmental Element (CED-CEIE), 1407 Washington Blvd, Fort Eustis, VA 23604, by email to tracey.l.sugg.civ@mail.mil, or by phone at (757)878-7315 within 30 days of receipt of this letter.

Sincerely,

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division

2 Attachments:
1. Corrective Action Plan
2. Archaeological Investigation Report

The VDHR concurs with the Air Force's determination of no adverse effect to historic properties

Project FE2018.013 Supplemental Fieldwork TA 1

_____

Signature/Date

Training Area 1 Shoreline Erosion Corrective Action Plan

For

THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY EUSTIS, FORT EUSTIS, VIRGINIA

Contract No. W91278-12-D-0028
Task Order No. 0007

Prepared By
Angler Environmental
3751 Westerre Parkway, Suite A
Richmond, Virginia 23233

August 2015

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EXECUTIVE SUMMARY

This Corrective Action Plan (CAP) was developed to provide an analysis, conceptual design options for consideration, and recommended project budget estimates to incorporate into future scope of work proposals. This design options were developed in order to address ongoing shoreline erosion and bluff failure located along the terminus of Training Area 1 (TA1) at Fort Eustis, Virginia. Training Area 1 is located at the western terminus of an east to west trending peninsula at the confluence of Skiffes Creek and Bailey Creek. This peninsula was identified by the Environmental Element (EE) of the 733D Mission Support Group, Civil Engineering Division, of Joint Base Langley Eustis as an important resource for military training, recreational use, and contains a documented archaeological resource.

In order to develop the conceptual plans and other components of the CAP, Angler conducted an initial site visit to assess and document current site conditions, completed a topographic survey along the shoreline, and researched available tide range data. Based on the data obtained from the site assessment, topographic survey, and available tide range data, three alternatives were developed that will address the ongoing erosion and provide long term stability of the shoreline along TA1. Angler developed an analysis of the regulatory requirements for each alternative and developed project cost estimates for final design; federal, state, and local permitting requirements; and construction (materials and labor) for planning and funding purposes.

I. BACKGROUND INFORMATION

A. Existing Site Conditions and Land Use

The area of concern is located at the western terminus of an east to west trending peninsula that extends into Skiffes Creek. The project area for this CAP includes approximately 1,800 linear feet (approx. 8 acres) of shoreline. Based on information provided by the ASA, Training Division, and the Range Control ITAM Program Manager, the usage of TA1 is primarily land navigation, tactical bivouac, small unit training and military dog handling training. In addition, recreational uses include deer hunting and fishing. Angler Environmental (Angler) conducted a site evaluation on October 28, 2014 to assess existing conditions. During the site assessment active erosion was observed along the entire shoreline within the project area. The loss of marsh grass, loss of marsh root structure, loss of sand substrate, and the inundation of marsh grass by upland erosion was observed. The long term shoreline erosion rate along Skiffes Creek have been estimated to be -0.6 ft./yr. based on the *Shoreline Evolution: City of Newport News, Virginia, James River and Hampton Roads Shoreline Data Report* published by the Virginia Institute of Marine Science (VIMS) in March 2010, however, localized erosion rates may be greater. The upland bluff is eroding in four (4) separate sections within the project area. This erosion can be observed by tree arching along the bluff rim, tree collapse along the shoreline and into the waterway, vertical or cantilevered bluff faces, exposed bluff faces exceeding 8 to 12 feet in height, and the loss of soil from within the bluff to Skiffes Creek. The bluff erosion appears to be attributed to tide and wave action along the toe-slope, the boat traffic that compounds the influence of the wave action, and the subsequent undermining of the tree root zone which is perpetuating the tree collapse and unstable bluff face. All of the land loss is collapsing onto the shoreline and is subsequently transported into Skiffes Creek delivering a substantial amount of sand and sediment offshore, below mean low water.

Average fetch estimates to the project area, as shown on the attached CAP, includes 0.29 mile to the north, 0.33 mile to the northwest, 0.35 mile to the southwest at the point of the peninsula, and 0.25 mile to the southwest within Bailey Creek near the existing pedestrian bridge. The greatest average fetch is 0.35 mile to the southwest at the point of the peninsula where the project area is experiencing the greatest erosion and is more exposed to the James River.

A documented archaeological site (DHR ID 44NN0024) is located within the TA1. The site is classified as a Native American (terrestrial, open air) site during the middle woodland time period. A Phase II Cultural Resources Survey was completed in late 2014/early 2015 to determine the boundaries and recommended eligibility status of the site. Based on the survey the limits were redefined and are shown on the attached CAP. At the time of developing this CAP, the Virginia Department of Historic Resources (DHR) review of the Phase II survey was not complete. As such, the limits of archaeological site 44NN0024 as shown on the attached CAP, have not been approved and may change based on DHR's review.

B. Topographic Survey

A topographic survey was completed on February 18, 2015, within the project area in order to develop the various design concepts. The survey did not include a boundary survey or verification of property lines and/or easements. The contours (2 ft.) based on the topographic survey are shown on the attached CAP. Since this was completed for a concept level plan, neither a tidal survey nor topographic survey within Skiffes Creek were

completed. As such, prior to completing final design plans it is recommended that a tidal survey be completed as well as additional topographic survey as needed based on the preferred design option. The cost estimates for the final design options provided in Section IV include estimates for completion of a tidal survey and any additional topographic survey that may be needed.

C. Tide Range Research

Tide data used for the development of the CAP was obtained from the Fort Eustis (Marad), James River station (ID #8638017). The mean tide range based on 2015 predictions was approximately 2.24 ft. As discussed above, a tidal survey should be completed prior to final design and cost estimates for completion of a tidal survey are included as part of the design cost estimates provided in Section IV.

II. CONCEPTUAL DESIGN OPTIONS

A. Option A: Marsh and Vegetation Management

The concept design utilizes a non-structural approach to protecting the existing and proposed planted marshes. By enhancing, planting & protecting existing marshes the natural erosion protection benefits of these systems is being protected. This method is only suitable in areas with elevations higher than mean-tide level (MTL), with minimal wave action and boat wake, and with adjacent vegetation management and bank grading and restoration.

This method utilizes a fiber log located at MTL, either placed to protect an existing marsh or placed such that a new or enhanced planted marsh can be installed landward of the fiber log. Proposed planted marshes should be graded at a slope between 8:1 and 10:1. If this is not the natural slope clean coarse grained sand fill can be brought in behind the log to achieve the desired slope. The existing offshore area surrounding Training Area 1 (TA1) falls naturally within this slope range making it a good candidate for this approach. There are pockets along the TA1 peninsula where there is healthy marsh growth that can be blended in to the planted marsh areas providing natural erosion protection and enhancing and extending natural ecosystem. The planted marsh behind the fiber log should be planted with two types of vegetation. From the back of the fiber log to the mean high water (MHW) line a low marsh will be planted with smooth cordgrass (*Spartina alterniflora*). Above MHW to approximately 3-4' above mean low water (MLW) a high marsh will be planted with saltmeadow cordgrass (*Spartina patens*) and saltgrass (*Distichlis spicata*). Behind the planted marsh a 4' wide tidal shrub zone will be planted to help stabilize the toe of the slope beyond, this area is planted with native tidal shrubs such as marsh elder (*Iva frutescens*) and groundsel tree (*Baccharis halimifolia*).

Beyond the planted marsh, bank grading will be utilized to repair the high unstable banks to prevent future erosion of those banks from inundating the new and enhanced planted marshes. In this concept the bank grading slope is noted as 2:1, this is steeper than the typical recommended range, however it minimizes the amount of earthwork necessary. In order to protect the steeper slope from erosion, erosion control matting (ECM) is recommended to help stabilize these slopes, while suitable native vegetation is becoming established, which will provide permanent bank stabilization.

Due to the minimal nature of this design, emphasis is placed on developing a vegetation management program. With proper vegetation management natural systems can be enhanced and can provide natural erosion protection. Vegetation management would include selective tree pruning and clearing, the removal of debris from the shoreline (especially after storm events), supplemental native upland plantings to stabilize adjacent banks and regular inspections and maintenance as necessary.

B. Option B: Living Shoreline

The concept design option employs Living Shoreline design methodologies to create a structural solution that maintains the natural functionality and connectivity of the delicate ecosystem that exists along tidal shores. This design methodology is suitable for areas exposed to longer fetches, greater tidal ranges, more boat wake, adjacent to bank grading, plenty of sunlight and has a shallow hard sand bottom extending offshore.

In this concept design a low profile stone structure, called a sill, is used to contain sand fill which is placed to support a new planted marsh. The sill placement is site-specific and is

dependent on the adjacent bank height, bank grade, water depth, tide ranges and bottom type near the shoreline. In the concept design option recommended for TA1 the sill is placed seaward from the existing shoreline in an attempt to balance the cut/fill required as part of the bank grading behind it. However, by pushing the sill seaward, and thus the planted marsh as well, a larger amount of sand fill will be required to achieve the desired slope range between 8:1 and 10:1 for the planted marsh. The sills are typically located at an elevation near mean low water (MLW) with the height of the sill between 0-1' above mean high water (MHW) in low energy settings (average fetch less than 0.5 miles) to allow for regular wave overtopping. Since the total sill length is greater than 100 ft., tidal gaps should be strategically placed to allow for flushing of the tidal marsh behind the sill, as well as providing connectivity between ecosystems.

The planted marsh behind the sill will be planted with two types of vegetation. From the back of the sill to the MHW line a low marsh will be planted with smooth cordgrass (*Spartina alterniflora*); above MHW to approximately 3-4' above MLW a high marsh will be planted with saltmeadow cordgrass (*Spartina patens*) and saltgrass (*Distichlis spicata*). Due to the sensitivity of this design it is important to allow the sand fill to sit for 1-2 weeks before planting. This allows for settlement, the verification of actual tide levels within the planting area and appropriate adjustments to the slope or height of the marsh area as necessary prior to planting.

Behind the planted marsh a 4' wide tidal shrub zone will be planted to help stabilize the toe of the slope beyond. This area is planted with native tidal shrubs such as marsh elder (*Iva frutescens*) and groundsel tree (*Baccharis halimifolia*). At the areas where there is extensive existing wetland vegetation, and no proposed work, the planted marsh will be blended with the existing vegetation to create a connected ecosystem.

Beyond the planted marsh, bank grading will be utilized to properly connect the marsh with the upland area. Bank grading is recommended in areas with active erosion at the top and bottom of the bank, areas with high unstable banks, undercutting or falling trees, and where sunlight will reach the graded slopes. Target slopes range between 6:1 and 3:1 and are chosen based on natural shore topography, adjacent land uses and design combinations with other shore protection methods. For the bank grading in design Option B the recommended slope is 4:1. This is a stable slope that would allow for good vegetation cover and that would not be impacted negatively by higher than normal wave action.

For the long term success of the project and for the protection of areas not within the bank grading and replanting areas a vegetation management program should be utilized to protect and enhance the natural erosion protection provided by vegetation. Vegetation management would include selective tree pruning and clearing, the removal of debris from the shoreline (especially after storm events), and supplemental native upland plantings to stabilize adjacent banks. The components and benefits of a vegetation management program are discussed further under TA1 design Option A.

C. Option C: Concrete Bulkhead

This concept design option uses a precast concrete wall, called a bulk head, to stabilize sections of eroded shoreline, specifically in bluff areas with toe erosion and high unstable banks. The precast concrete wall is placed into an excavated trench and backfill is placed on top of a rear anchor to hold the wall in place. Bulkheads are appropriate in areas where the channel is used frequently for navigation and where a more environmentally

preferred design option will impair the use of the channel for navigation. At the location of eroded shoreline adjacent to the pedestrian bridge a stone sill and planted marsh, (reference design Option B), are being recommended in order to protect the foundation of the existing pedestrian bridge without requiring modifications to the bridge.

Beyond the bulk head, bank grading will be utilized to tie the adjacent grade into the wall. Target slopes for bank grading typically range between 6:1 and 3:1 and are chosen based on natural shore topography, adjacent land uses and design combinations with other shoreline protection methods. With the use of a bulk head a steeper slope, 3:1, can be used since the upland area will not be exposed to regular wave action.

For the long term success of the project and for the protection of areas not protected by the bulk head, or within the bank grading and replanting areas a vegetation management program should be utilized to protect and enhance the natural erosion protection provided by vegetation. Vegetation management would include selective tree pruning and clearing, the removal of debris from the shoreline (especially after storm events), and supplemental native upland plantings to stabilize adjacent banks. The components and benefits of a vegetation management program are discussed further under TA1 design Option A.

D. Construction Considerations

These design options range from Option A requiring the least amount of heavy construction, to Option C requiring the most amount. Depending on the design, construction equipment will have to access the bank and in some cases the shoreline in order to execute the design. The existing access road to TA1 will provide construction access to the peninsula, however, additional temporary access roads will need to be cleared to allow for equipment access to the areas of bank grading and shoreline. Depending on the cut/fill balance of the chosen design temporary soil stockpile area(s) may be required depending on the sequence of construction. In addition, to house the equipment overnight and when not in use, a temporary material & equipment storage area will be needed. The material and equipment storage area should be located in an upland area and if possible utilize existing cleared areas to minimize additional land clearing and disturbance. Once the bank grading is completed, and the marsh, shrub zones and bank areas planted (as appropriate) additional precautions will need to be taken to protect the graded areas from erosion and the planted vegetation from waterfowl while the vegetation becomes established.

III. REGULATORY ANALYSIS

The following sections describe the regulatory requirements and applicable permits that may be required from local, state, and federal agencies based on the conceptual design options. It should be noted these are requirements that are anticipated to complete the project at the time this CAP was developed. In addition to the following, it is anticipated that due to the nature and location of the project an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) of 1969 will be required.

A. Tidal Wetlands/Waters

Impacts and encroachments (both temporary and permanent) to tidal wetlands and waters are anticipated based on the conceptual design options included in the CAP. As such, authorizations from local, state, and federal agencies including the Local Wetlands Board (LWB) and/or Virginia Marine Resource Commission (VMRC) pursuant to the Virginia Tidal Wetlands Act and the U.S. Army Corps of Engineers (Corps) pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. A Tidewater Joint Permit Application (JPA) will need to be submitted to the VMRC for coordination with the LWB and Corps. Based on the conceptual design options, it is anticipated the project may qualify for authorization under the Corps Regional Permit 19 (13-RP-19). The State Water Control Board has issued unconditional 401 Water Quality Certification for the 13-RP-19. As such, the activities that qualify for this RP also meet the requirements of the Virginia Department of Environmental Quality (DEQ) Virginia Water Protection Permit (VWP) Regulation and no additional authorization from DEQ would be required as long as the project meets the terms and conditions of 13-RP-19. In lieu of the 13-RP-19, it is our understanding the Corps has recently authorized shoreline stabilization projects under Nationwide Permit 13 (Bank Stabilization). Therefore, the regulatory strategy for this project will require further analysis and coordination depending on the chosen option presented in the CAP.

Since the project will likely require federal and state authorizations for impacts and encroachments to tidal wetlands and waters, coordination with other supporting agencies will be required to determine potential adverse effects to Cultural Resources under Section 106 of the National Historic Preservation Act (NHPA) and to threatened and/or endangered species under Section 7 of the Federal Species Act (ESA). As previously discussed, an archaeological site (DHR ID 44NN0024) is located within the TA1 project area. A Phase II survey was completed in early 2015 to define the limits of the site and determined the eligibility status. At this time DHR is in the process of reviewing the Phase II survey. Therefore, the limits of the site may change and it is uncertain, at this time, if the site will be determined eligible or potentially eligible for listing on the National Register of Historic Places (NRHP). Depending on the final limits and status of the site, additional surveys may be required. Angler completed a preliminary review of threatened and endangered species information through available resources including the U.S. Fish and Wildlife Service's (USFWS) Information, Planning, and Conservation System (IPaC), Virginia Department of Game and Inland Fisheries' (VDGIF) Fish and Wildlife Information System (VaFWIS), and the Department of Conservation and Recreation's (DCR) Virginia Natural Heritage Data Explorer (NHDE). Due to its recent listing the Northern Long-eared bat (*Myotis septentrionalis*) was included on the USFWS IPaC report. As such, further coordination with USFWS will likely be required in accordance with the recently implemented 4(d) rule for the Northern Long-eared Bat. At this time the USFWS is recommending a time of year restriction (April 15th to September 15th) for projects involving land clearing activities and require a federal authorization. However, since the 4(d) Rule

was recently implemented requirements and/or recommendations from the USFWS may vary depending on the project scope and location. Furthermore, the Atlantic sturgeon (*Acipenser oxyrinchus*, state and federal endangered) was included on the VDGIF VaFWIS and DCR's NHDE reports. Since the project will occur along Skiffes Creek, a tributary to the James River, coordination with the National Oceanic and Atmospheric Administration (NOAA) Fisheries may be required.

B. Resource Protection Area

A 100-foot Resource Protection Area (RPA) is located along Skiffes Creek and/or the tidal and non-tidal wetlands connected and contiguous to Skiffes Creek. A detailed assessment to determine the RPA limits within the project area has not been completed. Therefore, the RPA limits shown on the CAP are preliminary and based on general site evaluation and mapping. The conceptual design option included in the CAP include a combination of clearing, grading, and structural fill. Although the Chesapeake Bay Preservation Act (CBPA) is administered at the local level and may not apply on federal lands, additional review and coordination may be needed for proposed work within the RPA.

C. 100-Year Floodplain

The limits of the Federal Emergency Management Agency (FEMA) 100-year floodplain are shown on the attached CAP. Since the conceptual design options include fill and grading within the limits of the 100-year floodplain, a floodplain study/analysis will likely be required to determine potential changes to the 100-year floodplain limits based on the final design. Coordination with FEMA and/or Local review will be required for proposed work within the limits of the 100-year floodplain and to determine the need for a Conditional Letter of Map Revision (CLOMR).

D. Construction General Permit

Since the conceptual design options will require land disturbing activities, a Virginia Pollutant Discharge Elimination System (VPDES) Construction General Permit (CGP) and Stormwater Pollution Prevention Plan (SWPPP) may be required and will also depend on the acreage of land disturbance in the final design. The CGP permit fees vary depending on the acreage of land disturbance.

IV. COST ESTIMATES

The cost estimates presented below are based on the conceptual design options included in the CAP. The estimates includes and EA in accordance with NEPA requirements, final design including, local, state, and federal permitting, tidal survey, additional topographic survey that may be needed to complete the design, additional surveys and/or evaluations regarding cultural resources, and surveys and agency coordination related to threatened and endangered species. Construction estimates include site mobilization as well as material and labor for each conceptual design option. The cost estimates include development of a Vegetation Management Program and the anticipated maintenance associated with this type of program for each option. The cost estimates for the Vegetation Management Program vary between options and is based on the type of shoreline stabilization practice proposed and planting.

Ft. Eustis Training Area 1 Shoreline Erosion Corrective Action Plan Cost Estimates

Option A: Coir Logs

Item	Estimated Quantity Unit	Unit Price	Total Price
Environmental Assessment			$100,000.00
Cultural Resources Evaluation/Survey			$100,000.00
Threatened/Endangered Species Surveys/Coord.			$8,000.00
Floodplain Study/FEMA Coordination			$75,000.00
Final Design, Survey, Permitting			$19,500.00
Mobilization/Management	1.00 LS	$19,070.00	$19,070.00
Erosion and Sediment Control	1.00 LS	$21,897.00	$21,897.00
Clearing and Grubbing	0.20 Ac.	$24,579.00	$4,915.80
Earthwork Grading	1,200.00 CY	$52.00	$62,400.00
20" Coir Log Installation	875.00 LF	$31.00	$27,125.00
Marsh Planting (1.5' O.C.)	4,930.00 Each	$3.00	$14,790.00
Tidal Shrub Planting (1.5' O.C.)	2,345.00 Each	$14.00	$32,830.00
Stabilization	4,840.00 SF	$2.00	$9,680.00
Vegetative Management Program	5 Years	$14,000.00	$70,000.00
		Total Price for Option A:	**$565,207.80**

Option B: Stone Sill

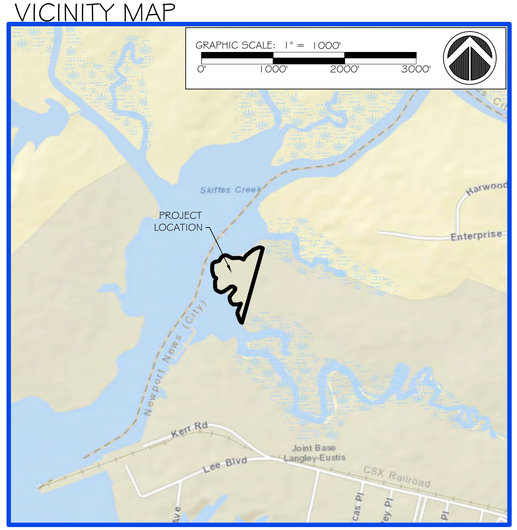
Item	Estimated Quantity Unit	Unit Price	Total Price
Environmental Assessment			$100,000.00
Cultural Resources Evaluation/Survey			$100,000.00
Threatened/Endangered Species Surveys/Coord.			$8,000.00
Floodplain Study/FEMA Coordination			$75,000.00
Final Design, Survey, Permitting			$65,000.00
Mobilization/Management	1.00 LS	$40,663.00	$40,663.00
Erosion and Sediment Control	1.00 LS	$22,535.00	$22,535.00
Clearing and Grubbing	1.00 Acre	$11,376.00	$11,376.00
Earthwork Grading	2,556.00 CY	$21.00	$53,676.00
Stone Sill	1,150.00 LF	$222.00	$255,300.00
Sand Fill	1,150.00 LF	$154.00	$177,100.00
Marsh Planting (1.5' O.C.)	12,975.00 Each	$3.00	$38,925.00
Tidal Shrub Planting (1.5' O.C.)	3,244.00 Each	$15.00	$48,660.00
Native Upland Seeding	3,227.00 SY	$1.00	$3,227.00
Vegetative Management Program	5 Years	$17,000.00	$85,000.00
		Total Price for Option B:	**$1,084,462.00**

Option C: Concrete Bulkhead

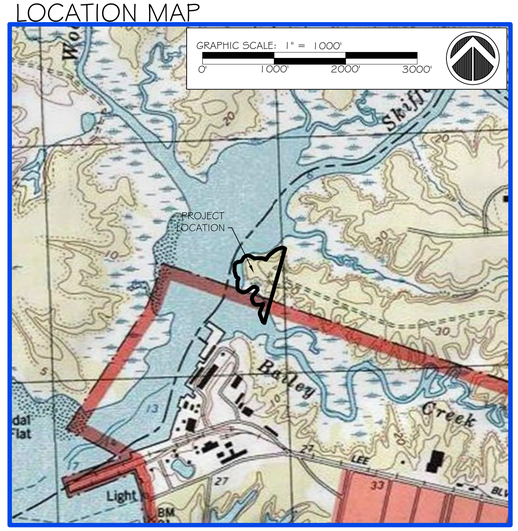
Item	Estimated Quantity Unit	Unit Price	Total Price
Environmental Assessment			$100,000.00
Cultural Resources Evaluation/Survey			$100,000.00
Threatened/Endangered Species Surveys/Coord.			$8,000.00
Floodplain Study/FEMA Coordination			$75,000.00
Final Design, Survey, Permitting			$35,000.00
Mobilization/Management	1.00 LS	$21,619.00	$21,619.00
Erosion and Sediment Control	1.00 LS	$22,535.00	$22,535.00
Clearing and Grubbing	1.00 Acre	$11,376.00	$11,376.00
Earthwork Grading	1,019.00 CY	$21.00	$21,399.00
Stone Sill	200.00 LF	$218.00	$43,600.00
Sand Fill	200.00 LF	$154.00	$30,800.00
Concrete Bulkhead	500.00 LF	$348.00	$174,000.00
Marsh Planting (1.5' O.C.)	2,256.00 Each	$3.00	$6,768.00
Tidal Shrub Planting (1.5' O.C.)	510.00 Each	$15.00	$7,650.00
Native Upland Seeding	1,854.00 SY	$1.00	$1,854.00
Vegetative Management Program	5 Years	$9,000.00	$45,000.00
		Total Price for Option C:	**$704,601.00**

FT. EUSTIS TRAINING AREA (TA) 1 SHORELINE EROSION CORRECTIVE ACTION PLAN
FORT EUSTIS, VIRGINIA

VICINITY MAP



LOCATION MAP



LATITUDE: N 37° 10' 28.9"
LONGITUDE: W 76° 36' 3.3"

OWNER/APPLICANT:
THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS
1407 WASHINGTON BLVD
FORT EUSTIS, VIRGINIA 23604
CONTACT: TIMOTHY CHRISTENSEN
PHONE: 757-878-4231

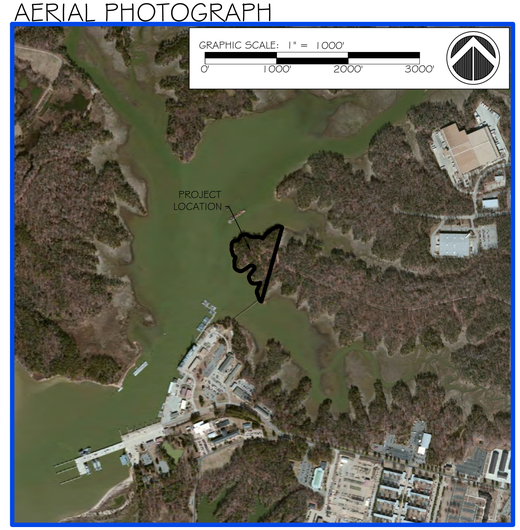
CLIENT:
DIAL CORDY & ASSOCIATES
490 OSCEOLA AVENUE
JACKSONVILLE BEACH, FL 32250

PROPERTY INFO:
LAT: 37° 10' 28.9", LONG: -76° 36' 3.3"
STUDY AREA: 8.30 AC

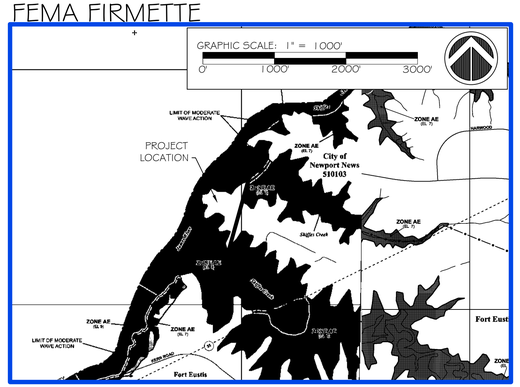
SHEET INDEX:

1 - COVERSHEET
2 - EXISTING CONDITIONS
3 - OPTION A
4 - OPTION B
5 - OPTION C

AERIAL PHOTOGRAPH



FEMA FIRMETTE



REFERENCE FEMA MAP: 5101030036D & 5101030037D

FT. EUSTIS TA 1 SHORELINE EROSION CORRECTIVE ACTION PLAN

REVISIONS:	
REVISIONS:	
REVISIONS:	
PROJECT MANAGER: RA	JOB NUMBER: 4857
DESIGNED: BW	DESIGN FILE: CONCEPTUAL CAP
DRAWN: BW	DATE: 6/26/2015

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P: 410.590.4170 | F: 410.590.4172

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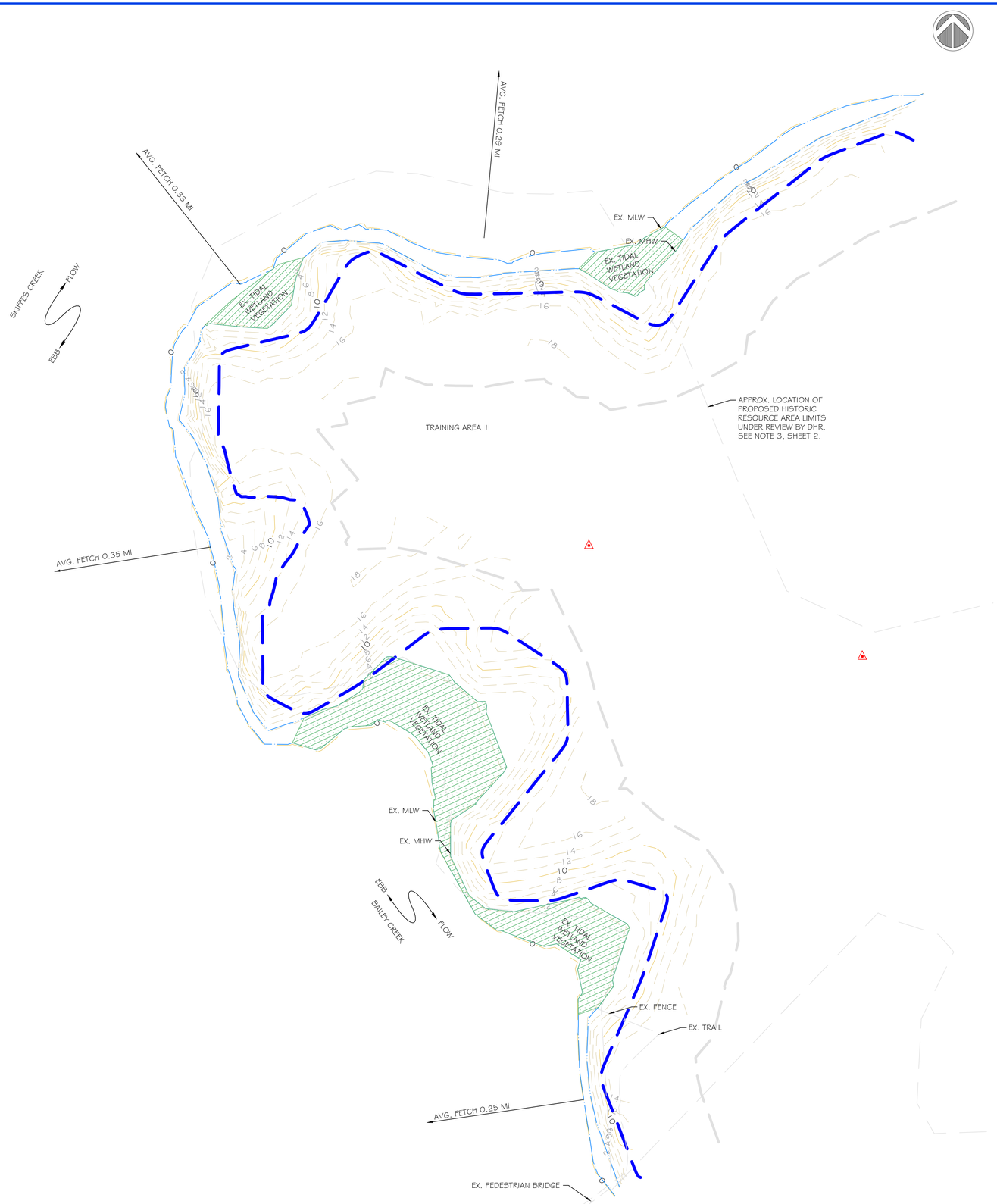

LEGEND

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. APPROX. MEAN HIGH WATER (MHW)
- EX. APPROX. MEAN LOW WATER (MLW)
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT

SURVEY NOTES:
1. THIS TOPOGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF TERRY L. HICKMAN, LAND SURVEYOR, FROM AN ACTUAL GROUND SURVEY MADE UNDER HIS SUPERVISION; THE ORIGINAL DATA WAS OBTAINED ON 2/18/15 (COMPLETED); AND THAT THIS INCLUDING METADATA MEETS MINIMUM ACCURACY STANDARDS UNLESS OTHERWISE NOTED.

2. PROPERTY LINES: THIS MAP DOES NOT REPRESENT A CURRENT LAND BOUNDARY SURVEY. THE MAP WAS COMPILED WITHOUT THE BENEFIT OF A TITLE REPORT. IT DOES NOT SHOW PROPERTY LINES OR ANY OTHER EVIDENCE OF OWNERSHIP. THIS MAP DOES NOT CREATE NEW OR REVISE ANY EXISTING PARCELS.

3. EASEMENTS: THE PARCELS MAY BE SUBJECT TO UNMAPPED EASEMENTS AND/OR RESTRICTIONS OF RECORD AND/OR THE UNMAPPED, UNWRITTEN RIGHTS.

4. THE CONTOUR INTERVAL IS 2FT.

5. MAPPING SYSTEM: VIRGINIA COORDINATE SYSTEM OF 1983. VIRGINIA SOUTH ZONE, NAD-83, US. FT.

6. THIS SPECIAL PURPOSE SURVEY DOES NOT INCLUDE ALL CHARACTERISTICS OF A COMPLETE TOPOGRAPHIC SURVEY.

NOTES:
1. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.

2. EX. TIDAL WETLAND VEGETATION LIMITS ARE APPROXIMATE AND ARE BASED UPON VISUAL SITE INSPECTION AND NOT A WATERS OF THE US DELINEATION.

3. THE PROPOSED HISTORIC RESOURCE AREA LIMITS FOR SITE 44NN0024 ARE BASED UPON UPDATED FIELD WORK AND ARE STILL TO BE APPROVED AND ACCEPTED BY THE DEPARTMENT OF HISTORIC RESOURCES (DHR.)

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PROJECT: FT. EUSTIS TA1 SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

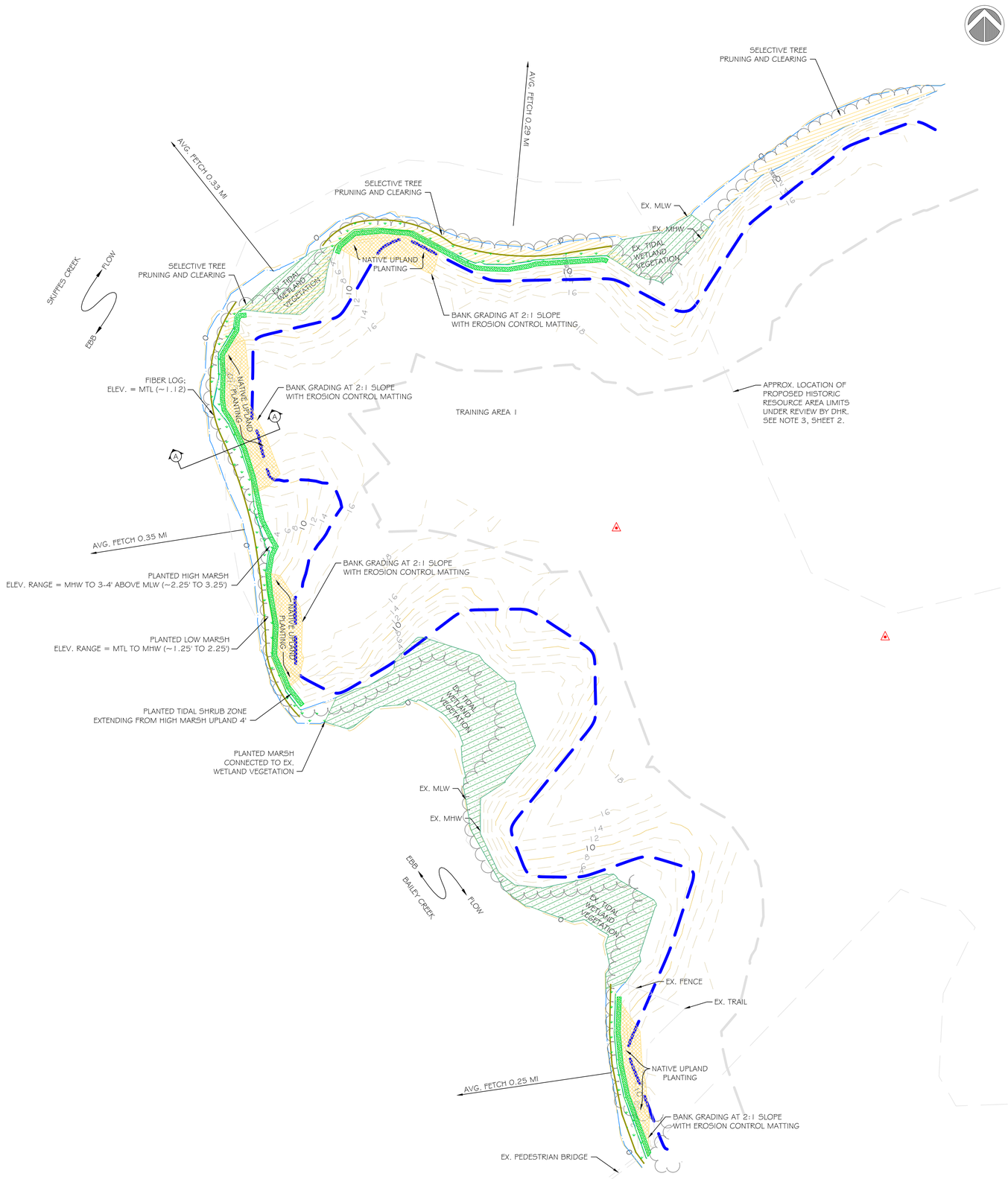
EXISTING CONDITIONS

FORT EUSTIS, VIRGINIA

REVISIONS:
X

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	2 OF 5

A-94



NARRATIVE

DESIGN METHODOLOGY:
THIS DESIGN OPTION UTILIZES A NON-STRUCTURAL APPROACH TO PROTECT EXISTING AND PLANTED MARSHES. THIS METHOD IS SUITABLE FOR AREAS HIGHER THAN MID-TIDE LEVEL (MTL), WITH MINIMAL WAVE AND BOAT WAKE, AND WITH ADJACENT TREE REMOVAL AND GRADED BANKS UNDER LANDSCAPE RESTORATION.

THE FIBER LOG IS LOCATED NEAR MTL WITH A PLANTED MARSH OR EXISTING MARSH IN THE AREA BEHIND THE LOG RUNNING TO ABOVE MID HIGH WATER (MHW). IF SAND FILL IS REQUIRED BEHIND THE FIBER LOG IT SHOULD BE GRADED AT AN 8:1-10:1 SLOPE, HOWEVER, AT THIS SITE MOST OF THE EXISTING BANK IS WITHIN THAT RANGE AND HAS MINIMAL MARSH COVERAGE THAT CAN BE SUPPLEMENTED WITH PLANTING. THE PLANTED MARSH BEHIND THE FIBER LOG WILL BE PLANTED WITH TWO TYPES OF VEGETATION. FROM THE BACK OF THE FIBER LOG TO THE MEAN HIGH WATER (MHW) LINE A LOW MARSH WILL BE PLANTED WITH SPARTINA ALTERNIFLORA (SMOOTH CORDGRASS) & DISTICHLIS SPICATA (SALTGRASS). ABOVE MHW TO APPROXIMATELY 3-4' ABOVE MEAN LOW WATER (MLW) A HIGH MARSH WILL BE PLANTED WITH SPARTINA PATENS (SALTMEADOW CORDGRASS) & DISTICHLIS SPICATA (SALTGRASS). BEHIND THE PLANTED MARSH A 4' WIDE TIDAL SHRUB ZONE WILL BE PLANTED TO HELP STABILIZE THE TOE OF THE SLOPE BEYOND, THIS AREA IS PLANTED WITH NATIVE TIDAL SHRUBS SUCH AS IVA FRUTESCENS (MARSH ELDER) & BACCHARIS HALIMIFOLIA (GROUNDSEL TREE).

BEYOND THE PLANTED MARSH BANK GRADING WILL BE UTILIZED TO REPAIR THE HIGH UNSTABLE BANKS TO PREVENT FUTURE EROSION OF THOSE BANKS FROM IMPACTING THE PLANTED MARSHES. IN THIS CONCEPT THE GRADING SLOPE IS NOTED AS 2:1 WHICH IS STEEPER THAN THE TYPICAL RECOMMENDED RANGE. IN ORDER TO PROTECT THE STEEPER SLOPE FROM EROSION, EROSION CONTROL MATTING (ECM) IS BEING RECOMMENDED TO HELP STABILIZE THESE SLOPES, WHILE SUITABLE NATIVE VEGETATION IS BECOMING ESTABLISHED, WHICH WILL PROVIDE PERMANENT BANK STABILIZATION.

DUE TO THE MINIMAL NATURE OF THIS DESIGN, EMPHASIS IS PLACED ON VEGETATION MANAGEMENT. WITH PROPER VEGETATION MANAGEMENT NATURAL SYSTEMS CAN BE ENHANCED AND CAN PROVIDE NATURAL EROSION PROTECTION. VEGETATION MANAGEMENT WOULD INCLUDE SELECTIVE TREE PRUNING AND CLEARING, THE REMOVAL OF DEBRIS FROM THE SHORELINE (ESPECIALLY AFTER STORM EVENTS), AND SUPPLEMENTAL NATIVE UPLAND PLANTINGS TO STABILIZE ADJACENT BANKS.

CONSTRUCTION CONSIDERATIONS:

- CONSTRUCTION ACCESS MUST BE AVAILABLE TO THE BANK IN AREAS WHERE BANK GRADING IS REQUIRED. THE EXISTING ACCESS ROAD TO THE PENINSULA CAN BE UTILIZED IN CONJUNCTION WITH TEMPORARY ACCESS ROADS TO PROVIDE ACCESS FOR CONSTRUCTION EQUIPMENT TO THE BANK.
- TEMPORARY MATERIAL AND EQUIPMENT STORAGE AREAS SHOULD BE LOCATED IN THE UPLAND AREA. IF POSSIBLE, THE EXISTING STORAGE AREA OFF OF THE ACCESS ROAD WOULD BE UTILIZED FOR CONSTRUCTION TO MINIMIZE ADDITIONAL LAND DISTURBANCE AND CLEARING.
- TEMPORARY STOCKPILE AREAS MAY BE NECESSARY.
- PROPER PRECAUTIONS WILL NEED TO BE TAKEN TO ENSURE THAT THE PLANTED VEGETATION IS PROTECTED FROM WATERFOWL.

PERMITTING CONSIDERATIONS:
IN ACCORDANCE WITH THE CHESAPEAKE BAY PRESERVATION ACT A WATER QUALITY IMPACT ASSESSMENT AND ASSOCIATED REVEGETATION PLAN MAY BE REQUIRED DUE TO THE AMOUNT OF CLEARING PERFORMED AS PART OF THE BANK GRADING.

DEPENDING ON THE AMOUNT OF UPLAND DISTURBED A LAND DISTURBANCE PERMIT WILL BE REQUIRED.

IN ORDER TO PERFORM WORK IN AREAS WITH JURISDICTIONAL WATER AND WETLAND, DUNE AND BEACH RESOURCES, A JOINT PERMIT APPLICATION WILL BE REQUIRED. THIS WILL COVER THE NECESSARY PERMITTING WITH THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE), VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VA DEQ) AND THE VIRGINIA MARINE RESOURCES COMMISSION (VMRC).

LEGEND

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- EX. MINOR CONTOUR
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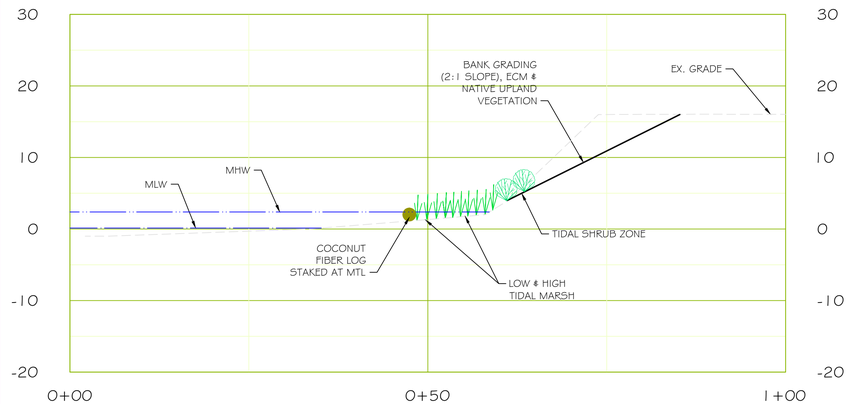
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT
- APPROXIMATE LOCATION OF TREELINE
- PROPOSED GRADE
- FIBER LOG
- SELECTIVE TREE PRUNING & CLEARING
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE
- PROPOSED BANK GRADING & EROSION CONTROL MATTING (ECM)

NOTES:
1. EXISTING TOPOGRAPHY BASED ON AN ACTUAL GROUND SURVEY PERFORMED BY TERRY HICKMAN, LS, ON 2-18-15. SEE SHEET 2 FOR ADDITIONAL NOTES.

2. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.



GRAPHIC SCALE: 1" = 10'
0 10' 20' 30'

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PROJECT: FT. EUSTIS TA1 SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

OPTION A

FORT EUSTIS, VIRGINIA

REVISIONS:
X

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	3 OF 5

A-95

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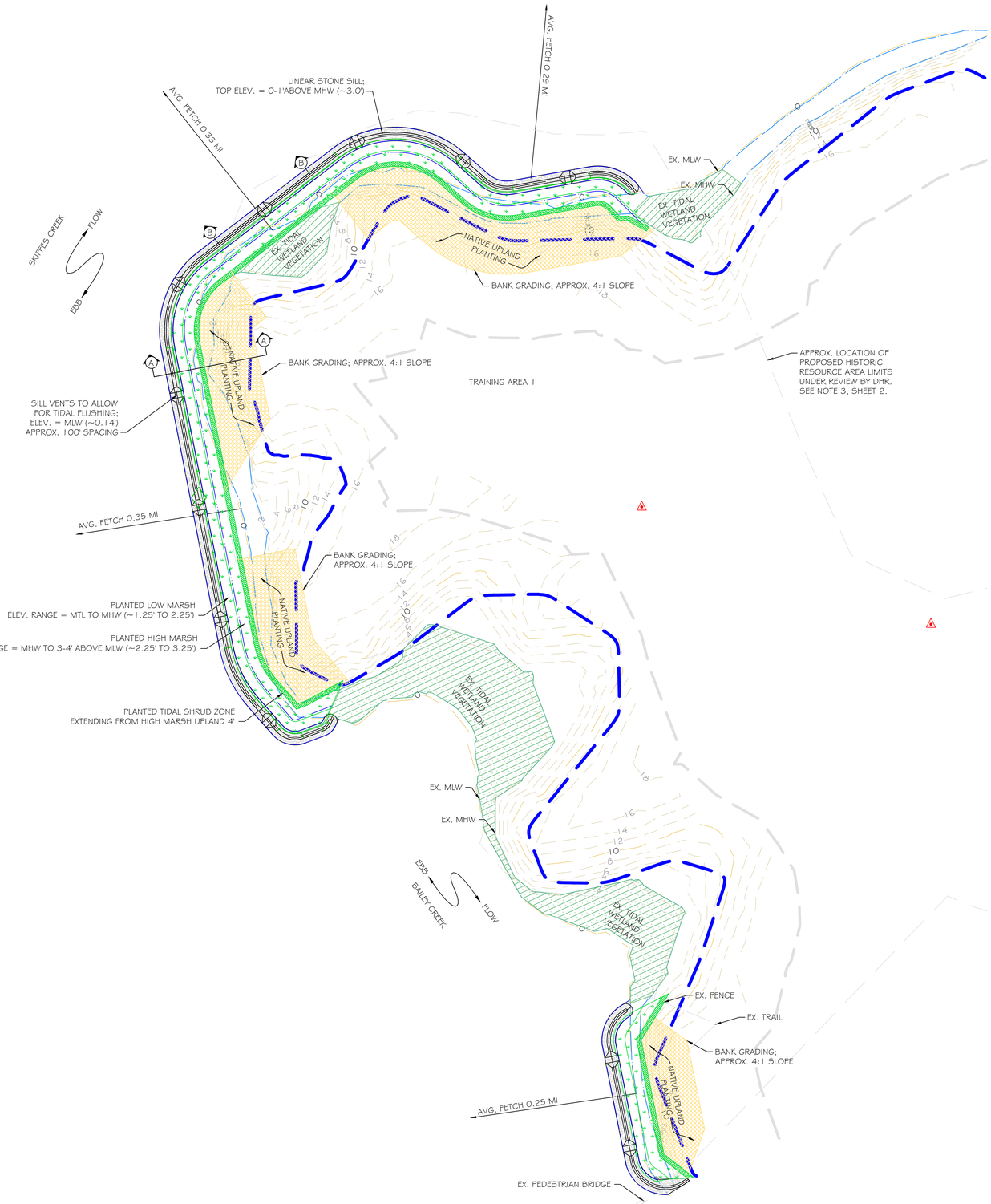


NARRATIVE

DESIGN METHODOLOGY:
THIS DESIGN OPTION UTILIZES A LOW PROFILE STONE STRUCTURE, CALLED A SILL, TO CONTAIN SAND FILL IN ORDER TO CREATE A NEW PLANTED MARSH. THE SILL PLACEMENT IS SITE-SPECIFIC AND IS DEPENDENT ON THE BANK HEIGHT, BANK GRADE, WATER DEPTH, TIDE RANGES AND BOTTOM TYPE NEAR THE SHORELINE. THIS METHOD IS SUITABLE FOR AREAS WHERE THERE IS ADJACENT BANK GRADING, PLENTY OF SUNLIGHT AND SHALLOW HARD SAND BOTTOMS EXTENDING OFF SHORE.

THE SILL IS LOCATED NEAR MEAN LOW WATER (MLW) WITH A SAND FILL GRADED BEHIND THE SILL RUNNING TO THE BANK AT AN AVERAGE 8:1 OR 10:1 SLOPE. THE HEIGHT OF THE SILL SHOULD BE BETWEEN 0-1' ABOVE MEAN HIGH WATER (MHW) IN LOW ENERGY SETTINGS (AVERAGE FETCH LESS THAN 0.5 MILES) TO ALLOW FOR REGULAR WAVE OVERTOPPING. SINCE THE TOTAL SILL LENGTH IS GREATER THAN 100 FT, TIDAL GAPS SHOULD BE STRATEGICALLY PLACED TO ALLOW FOR FLUSHING OF THE TIDAL MARSH BEHIND THE SILL, AS WELL AS PROVIDING CONNECTIVITY BETWEEN ECOSYSTEMS.

THE PLANTED MARSH BEHIND THE SILL WILL BE PLANTED WITH TWO TYPES OF VEGETATION. FROM THE BACK OF THE SILL TO THE MHW LINE A LOW MARSH WILL BE PLANTED WITH SPARTINA ALTERNIFLORA (SMOOTH CORDGRASS). ABOVE MHW TO APPROXIMATELY 3-4' ABOVE MLW A HIGH MARSH WILL BE PLANTED WITH SPARTINA PATENS (SALTMEADOW CORDGRASS) & DISTICHLIS SPICATA (SALTGRASS). BEHIND THE PLANTED MARSH A 4' WIDE TIDAL SHRUB ZONE WILL BE PLANTED TO HELP STABILIZE THE TOE OF THE SLOPE BEYOND, THIS AREA IS PLANTED WITH NATIVE TIDAL SHRUBS SUCH AS IVA FRUTESCENS (MARSH ELDER) & BACCHARIS HALIMIFOLIA (GROUNDSEL TREE).

BEYOND THE PLANTED MARSH BANK GRADING WILL BE UTILIZED TO PROPERLY CONNECT THE MARSH WITH THE UPLAND AREA. BANK GRADING IS RECOMMENDED IN AREAS WITH ACTIVE EROSION AT THE TOP AND BOTTOM OF THE BANK, AREAS WITH HIGH UNSTABLE BANKS, UNDERCUTTING OR FALLING TREES, AND WHERE SUNLIGHT WILL REACH THE GRADED SLOPES. TARGET SLOPES RANGE BETWEEN 6:1 AND 3:1 AND ARE CHOSEN BASED ON NATURAL SHORE TOPOGRAPHY, ADJACENT LAND USES AND DESIGN COMBINATIONS WITH OTHER SHORE PROTECTION METHODS. ONCE THE BANK GRADING IS COMPLETED TEMPORARY EROSION CONTROL METHODS ARE USED TO STABILIZE THE SOIL UNTIL SUITABLE NATIVE VEGETATION IS ESTABLISHED.

FOR THE LONG TERM SUCCESS OF THE PROJECT AND FOR THE PROTECTION OF AREAS NOT WITHIN THE BANK GRADING & REPLANTING AREAS A VEGETATION MANAGEMENT PROGRAM SHOULD BE UTILIZED TO PROTECT & ENHANCE THE NATURAL EROSION PROTECTION PROVIDED BY VEGETATION. VEGETATION MANAGEMENT WOULD INCLUDE SELECTIVE TREE PRUNING AND CLEARING, THE REMOVAL OF DEBRIS FROM THE SHORELINE (ESPECIALLY AFTER STORM EVENTS), AND SUPPLEMENTAL NATIVE UPLAND PLANTINGS TO STABILIZE ADJACENT BANKS.

CONSTRUCTION CONSIDERATIONS:

- CONSTRUCTION ACCESS MUST BE AVAILABLE TO THE BANK AND SHORELINE. THE EXISTING ACCESS ROAD TO THE PENINSULA CAN BE UTILIZED IN CONJUNCTION WITH TEMPORARY ACCESS ROADS TO PROVIDE ACCESS FOR CONSTRUCTION EQUIPMENT TO THE BANK AND SHORE.
- TEMPORARY MATERIAL AND EQUIPMENT STORAGE AREAS SHOULD BE LOCATED IN THE UPLAND AREA. IF POSSIBLE, THE EXISTING STORAGE AREA OFF OF THE ACCESS ROAD WOULD BE UTILIZED FOR CONSTRUCTION TO MINIMIZE ADDITIONAL LAND DISTURBANCE AND CLEARING.
- IF THE EXISTING SOIL TYPE IS SUITABLE CUT AND FILL QUANTITIES SHOULD BE BALANCED IN THE UPLAND AREAS TO MINIMIZE THE COST OF MATERIAL AND TRUCKING. TEMPORARY STOCKPILE AREAS MAY BE NECESSARY.
- TO BUILD THE TIDAL MARSH CLEAN COARSE-GRAINED SAND FILL WILL NEED TO BE BROUGHT IN. ONCE THE SAND FILL IS PLACED IT SHOULD BE ALLOWED TO SIT FOR AT LEAST 1-2 WEEKS TO ALLOW FOR SETTLEMENT, VERIFY ACTUAL TIDE LEVELS WITHIN THE PLANTING AREA, AND ADJUST SLOPE OR HEIGHT IF NECESSARY BEFORE PLANTING.
- PROPER PRECAUTIONS WILL NEED TO BE TAKEN TO ENSURE THAT THE PLANTED VEGETATION IS PROTECTED FROM WATERFOWL.

PERMITTING CONSIDERATIONS:
IN ACCORDANCE WITH THE CHESAPEAKE BAY PRESERVATION ACT A WATER QUALITY IMPACT ASSESSMENT AND ASSOCIATED REVEGETATION PLAN MAY BE REQUIRED DUE TO THE AMOUNT OF CLEARING PERFORMED AS PART OF THE BANK GRADING.

DEPENDING ON THE AMOUNT OF UPLAND DISTURBED MOST LIKELY A LAND DISTURBANCE PERMIT WILL BE REQUIRED.

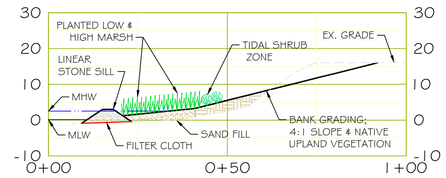
IN ORDER TO PERFORM WORK IN AREAS WITH JURISDICTIONAL WATER AND WETLAND, DUNE AND BEACH RESOURCES A JOINT PERMIT APPLICATION WILL BE REQUIRED. THIS WILL COVER THE NECESSARY PERMITTING WITH THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE), VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VA DEQ) AND THE VIRGINIA MARINE RESOURCES COMMISSION (VMRC).

LEGEND

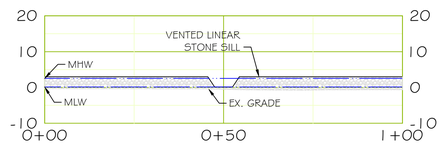
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. APPROX. MEAN HIGH WATER (MHW)
- EX. APPROX. MEAN LOW WATER (MLW)
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT
- PROPOSED MEAN HIGH WATER (MHW)
- PROPOSED MEAN LOW WATER (MLW)
- PROPOSED GRADE
- PROPOSED ROCK SILL
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE
- PROPOSED BANK GRADING
- COMPACTED SOIL FILL
- CLEAN COARSE-GRAINED SAND FILL

NOTES:
1. EXISTING TOPOGRAPHY BASED ON AN ACTUAL GROUND SURVEY PERFORMED BY TERRY HICKMAN, LS. ON 2-18-15. SEE SHEET 2 FOR ADDITIONAL NOTES.

2. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.

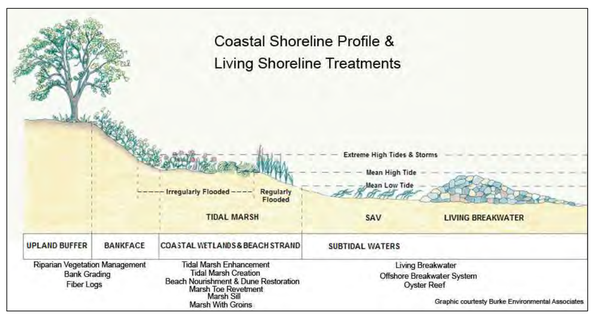


A-A TYPICAL BANK SECTION



B-B TYPICAL SILL SECTION

GRAPHIC SCALE: 1" = 20'
0' 20' 30' 40'



LIVING SHORELINE SCHEMATIC

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PROJECT: FT. EUSTIS TA1 SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

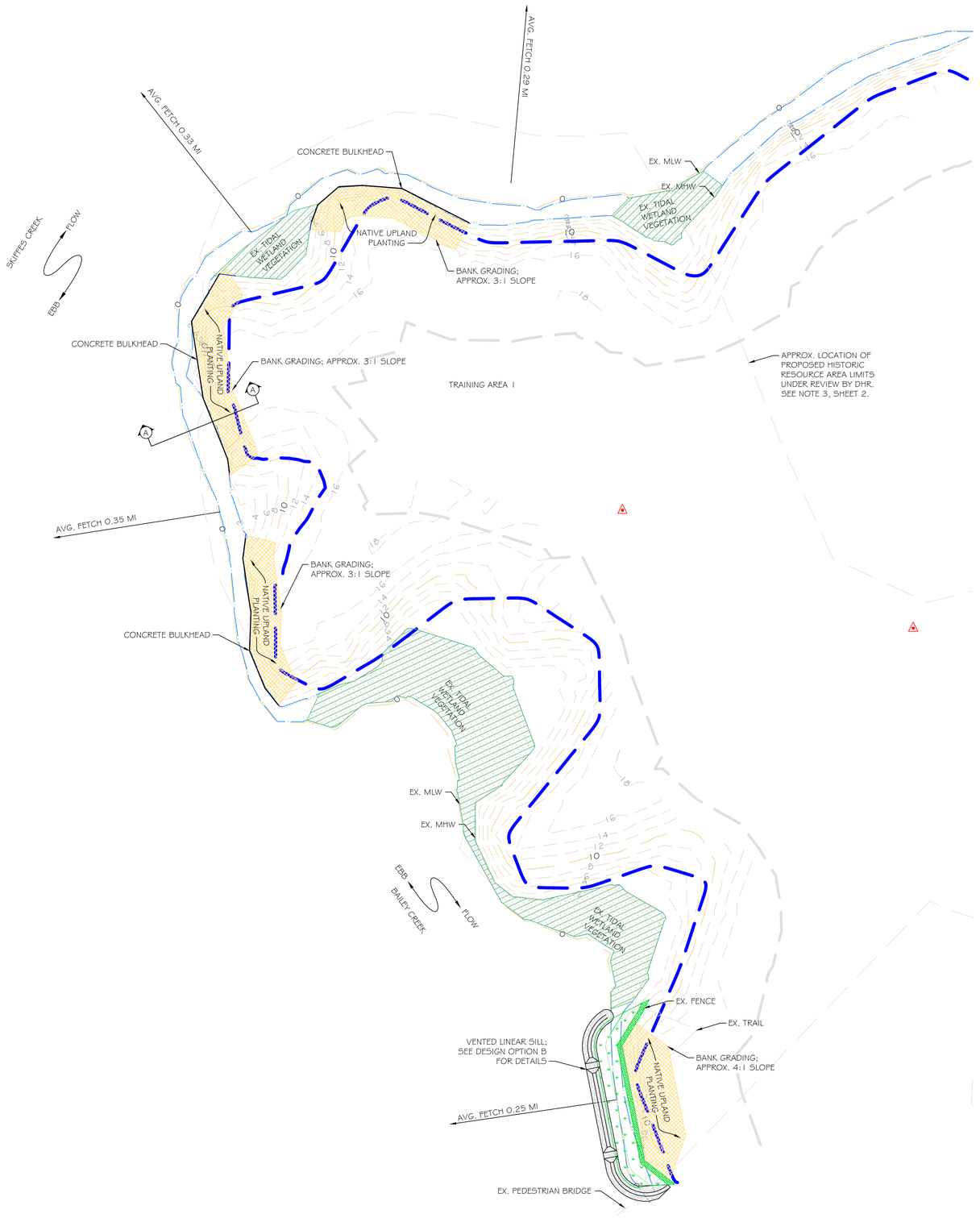
OPTION B

FORT EUSTIS, VIRGINIA

REVISIONS:
X

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	4 OF 5

A-96



NARRATIVE

DESIGN METHODOLOGY:
THIS DESIGN OPTION UTILIZES A PRECAST CONCRETE WALL TO STABILIZE SECTIONS OF ERODED SHORELINE, SPECIFICALLY IN BLUFF AREAS WITH TOE EROSION. THE PRECAST CONCRETE WALL IS PLACED INTO AN EXCAVATED TRENCH AND BACKFILL IS PLACED ON TOP OF A REAR ANCHOR TO HOLD THE WALL IN PLACE. BULKHEADS ARE APPROPRIATE IN AREAS WHERE THE CHANNEL IS USED FREQUENTLY FOR NAVIGATION AND WHERE A MORE ENVIRONMENTALLY PREFERRED DESIGN OPTION WILL IMPAIR THE USE OF THE CHANNEL FOR NAVIGATION.

AT THE LOCATION OF ERODED SHORELINE ADJACENT TO THE PEDESTRIAN BRIDGE A STONE SILL AND PLANTED MARSH, REFERENCE DESIGN OPTION B, ARE STILL BEING RECOMMENDED IN ORDER TO PROTECT THE FOUNDATION OF THE EXISTING PEDESTRIAN BRIDGE WITHOUT REQUIRING MODIFICATIONS TO THE STRUCTURE.

BEYOND THE BULK HEAD BANK GRADING WILL BE UTILIZED TO PROPERLY TIE THE BULK HEAD IN TO THE ADJACENT GRADE. TARGET SLOPES RANGE BETWEEN 6:1 AND 3:1 AND ARE CHOSEN BASED ON NATURAL SHORE TOPOGRAPHY, ADJACENT LAND USES AND DESIGN COMBINATIONS WITH OTHER SHORE PROTECTION METHODS. WITH THE USE OF A BULK HEAD A STEEPER SLOPE, 3:1, CAN BE USED SINCE THE UPLAND AREA WILL NOT BE EXPOSED TO WAVE ACTION REGULARLY. ONCE THE BANK GRADING IS COMPLETED TEMPORARY EROSION CONTROL METHODS ARE USED TO STABILIZE THE SOIL UNTIL SUITABLE NATIVE VEGETATION IS ESTABLISHED.

FOR THE LONG TERM SUCCESS OF THE PROJECT AND FOR THE PROTECTION OF AREAS NOT PROTECTED BY THE BULK HEAD A VEGETATION MANAGEMENT PROGRAM SHOULD BE UTILIZED TO PROTECT & ENHANCE THE NATURAL EROSION PROTECTION PROVIDED BY NATIVE VEGETATION. VEGETATION MANAGEMENT WOULD INCLUDE SELECTIVE TREE PRUNING AND CLEARING, THE REMOVAL OF DEBRIS FROM THE SHORELINE (ESPECIALLY AFTER STORM EVENTS), AND SUPPLEMENTAL NATIVE UPLAND PLANTINGS TO STABILIZE ADJACENT BANKS.

CONSTRUCTION CONSIDERATIONS:

- CONSTRUCTION ACCESS MUST BE AVAILABLE TO THE BANK AND SHORELINE. THE EXISTING ACCESS ROAD TO THE PENINSULA CAN BE UTILIZED IN CONJUNCTION WITH TEMPORARY ACCESS ROADS TO PROVIDE ACCESS FOR CONSTRUCTION EQUIPMENT TO THE BANK AND SHORE.
- TEMPORARY MATERIAL AND EQUIPMENT STORAGE AREAS SHOULD BE LOCATED IN THE UPLAND AREA. IF POSSIBLE, THE EXISTING STORAGE AREA OFF OF THE ACCESS ROAD WOULD BE UTILIZED FOR CONSTRUCTION TO MINIMIZE ADDITIONAL LAND DISTURBANCE AND CLEARING.
- IF THE EXISTING SOIL TYPE IS SUITABLE CUT AND FILL QUANTITIES SHOULD BE BALANCED IN THE UPLAND AREAS TO MINIMIZE THE COST OF MATERIAL AND TRUCKING. TEMPORARY STOCKPILE AREAS MAY BE NECESSARY.

PERMITTING CONSIDERATIONS:
IN ACCORDANCE WITH THE CHESAPEAKE BAY PRESERVATION ACT A WATER QUALITY IMPACT ASSESSMENT AND ASSOCIATED REVEGETATION PLAN MAY BE REQUIRED DUE TO THE AMOUNT OF CLEARING PERFORMED AS PART OF THE BANK GRADING.

DEPENDING ON THE AMOUNT OF UPLAND DISTURBED A LAND DISTURBANCE PERMIT WILL LIKELY BE REQUIRED.

IN ORDER TO PERFORM WORK IN AREAS WITH JURISDICTIONAL WATER AND WETLAND, DUNE AND BEACH RESOURCES, A JOINT PERMIT APPLICATION WILL BE REQUIRED. THIS WILL COVER THE NECESSARY PERMITTING WITH THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE), VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VA DEQ) AND THE VIRGINIA MARINE RESOURCES COMMISSION (VMRC).

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- PROPOSED ROCK SILL
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE

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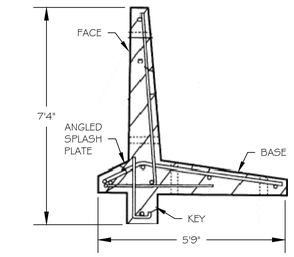
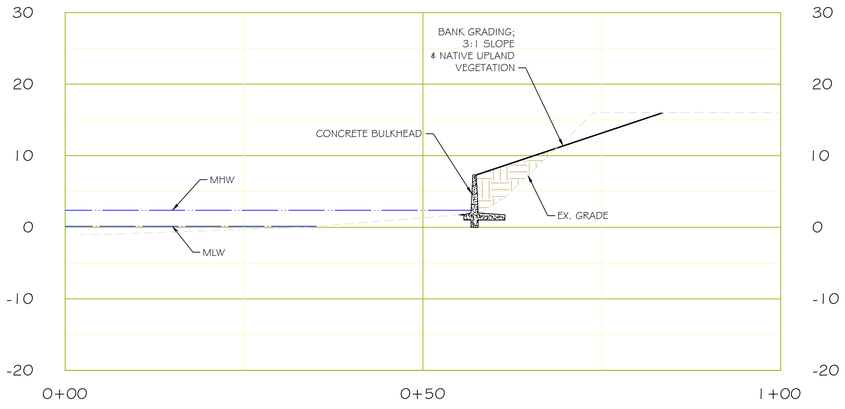
1. EXISTING TOPOGRAPHY BASED ON AN ACTUAL GROUND SURVEY PERFORMED BY TERRY HICKMAN, LS. ON 2-18-15. SEE SHEET 2 FOR ADDITIONAL NOTES.

2. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.



TYP. PRECAST CONCRETE BULKHEAD
(BASIS OF DESIGN SEAMENT SHORELINE SYSTEMS L-WALL)



A-A TYPICAL BULKHEAD / BANK SECTION

GRAPHIC SCALE: 1" = 10'
0' 10' 20' 30'

ANGLER ENVIRONMENTAL
CORPORATE | 5367 TELEPHONE ROAD, WARRENTON, VIRGINIA 20187
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P: 804.353.6017 | F: 804.353.6018
MARYLAND | 1434 ODENTON ROAD, ODENTON, MARYLAND 21113
P: 410.672.4326 F: 410.672.4328

PROJECT: FT. EUSTIS TAI SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

OPTION C

FORT EUSTIS, VIRGINIA

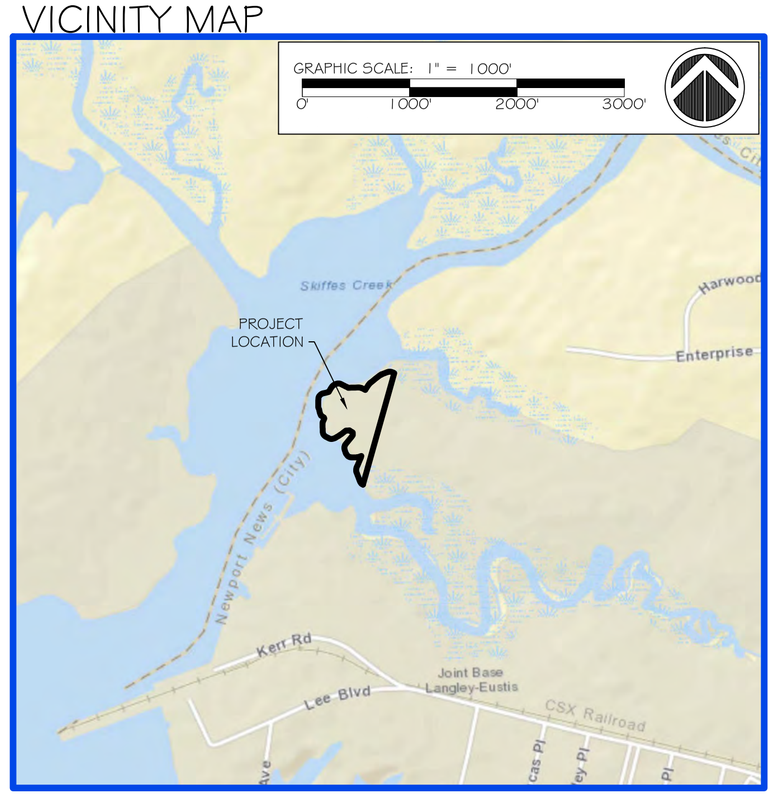
REVISIONS:
1 X

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	5 OF 5

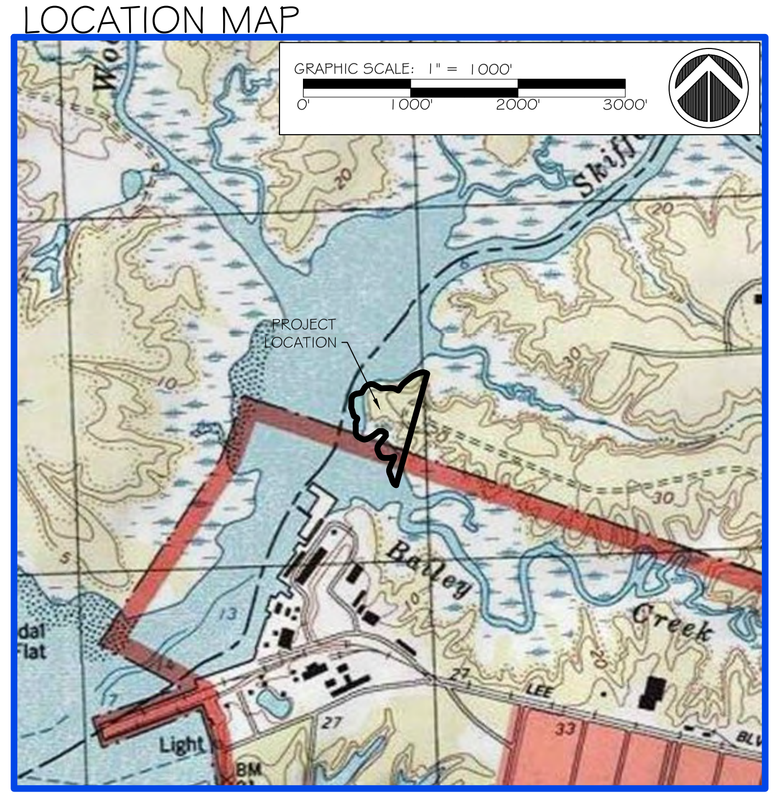
A-07

FT. EUSTIS TRAINING AREA (TA) 1 SHORELINE EROSION CORRECTIVE ACTION PLAN
FORT EUSTIS, VIRGINIA

VICINITY MAP



LOCATION MAP



LATITUDE: N 37° 10' 28.9"
LONGITUDE: W 76° 36' 3.3"

OWNER/APPLICANT:
THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS
1407 WASHINGTON BLVD
FORT EUSTIS, VIRGINIA 23604
CONTACT: TIMOTHY CHRISTENSEN
PHONE: 757-878-4231

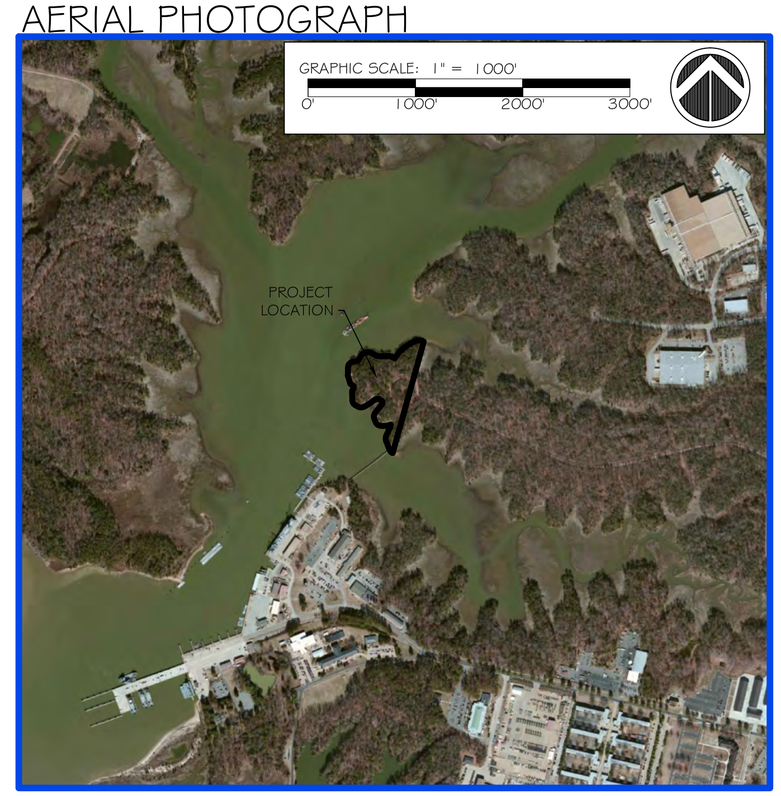
CLIENT:
DIAL CORDY & ASSOCIATES
490 OSCEOLA AVENUE
JACKSONVILLE BEACH, FL 32250

PROPERTY INFO:
LAT: 37° 10' 28.9", LONG: -76° 36' 3.3"
STUDY AREA: 8.30 AC

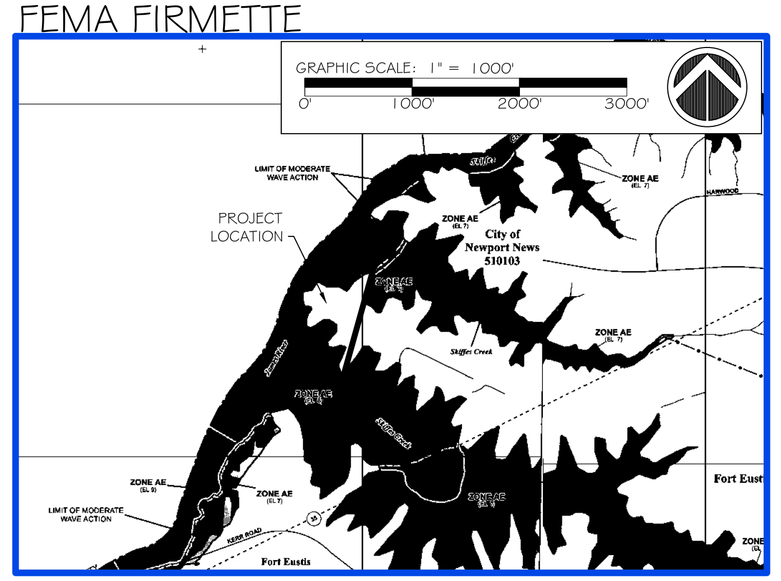
SHEET INDEX:

1 - COVERSHEET
2 - EXISTING CONDITIONS
3 - OPTION A
4 - OPTION B
5 - OPTION C

AERIAL PHOTOGRAPH



FEMA FIRMETTE



REFERENCE FEMA MAP: 5101030036D & 5101030037D

FT. EUSTIS TA 1 SHORELINE EROSION CORRECTIVE ACTION PLAN

REVISIONS:	
REVISIONS:	
REVISIONS:	
PROJECT MANAGER: RA	JOB NUMBER: 4857
DESIGNED: BW	DESIGN FILE: CONCEPTUAL CAP
DRAWN: BW	DATE: 6/26/2015

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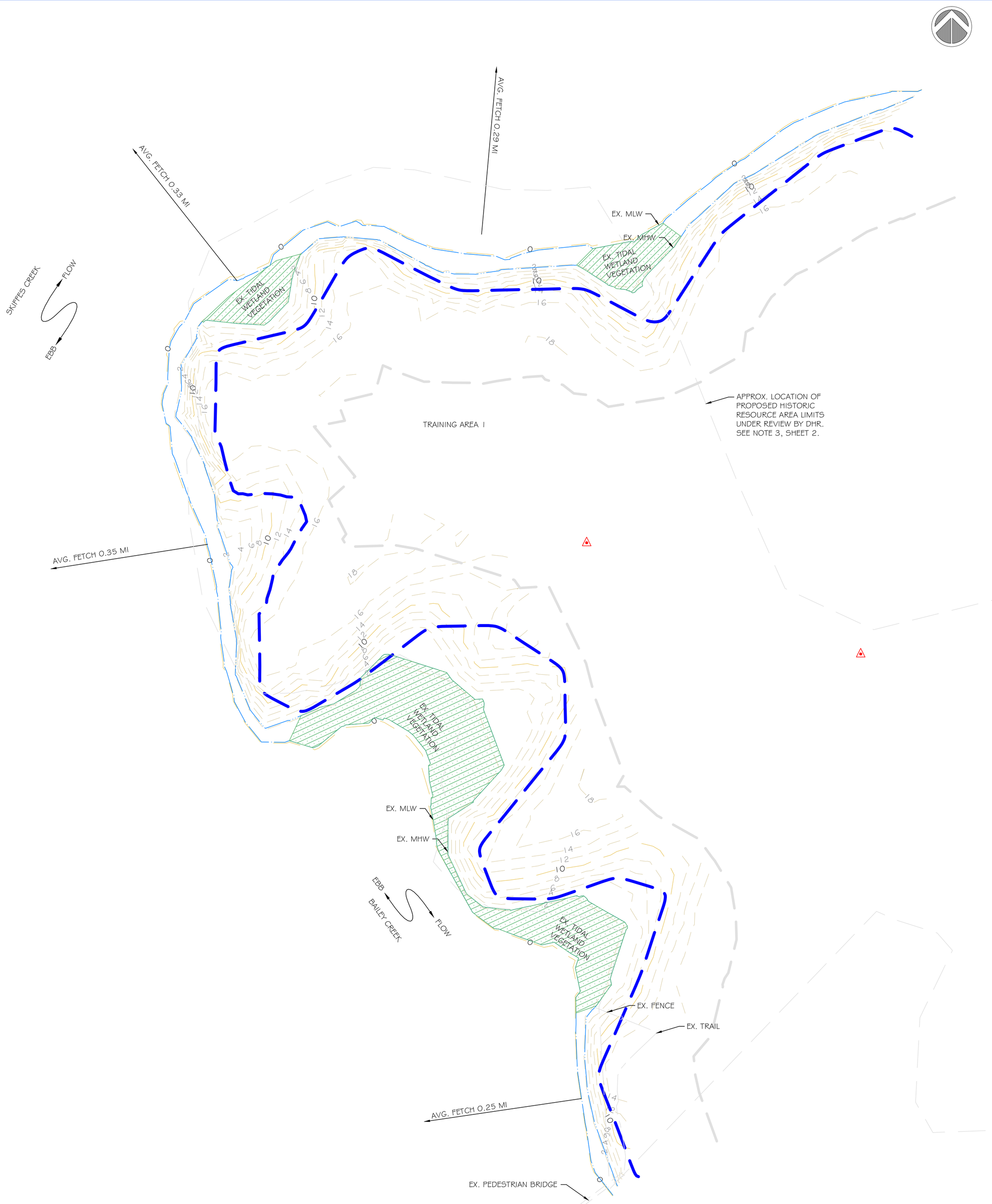
MARYLAND | 1434 ODENTON ROAD, ODENTON, MARYLAND 21113
P: 410.590.4170 | F: 410.590.4172



GRAPHIC SCALE: 1" = 50'

0 50' 100' 150'

LEGEND

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. APPROX. MEAN HIGH WATER (MHW)
- EX. APPROX. MEAN LOW WATER (MLW)
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT

SURVEY NOTES:

1. THIS TOPOGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF TERRY L. HICKMAN, LAND SURVEYOR, FROM AN ACTUAL GROUND SURVEY MADE UNDER HIS SUPERVISION; THE ORIGINAL DATA WAS OBTAINED ON 2/18/15 (COMPLETED); AND THAT THIS INCLUDING METADATA MEETS MINIMUM ACCURACY STANDARDS UNLESS OTHERWISE NOTED.

2. PROPERTY LINES: THIS MAP DOES NOT REPRESENT A CURRENT LAND BOUNDARY SURVEY. THE MAP WAS COMPILED WITHOUT THE BENEFIT OF A TITLE REPORT. IT DOES NOT SHOW PROPERTY LINES OR ANY OTHER EVIDENCE OF OWNERSHIP. THIS MAP DOES NOT CREATE NEW OR REVISE ANY EXISTING PARCELS.

3. EASEMENTS: THE PARCELS MAY BE SUBJECT TO UNMAPPED EASEMENTS AND/OR RESTRICTIONS OF RECORD AND/OR THE UNMAPPED, UNWRITTEN RIGHTS.

4. THE CONTOUR INTERVAL IS 2FT.

5. MAPPING SYSTEM: VIRGINIA COORDINATE SYSTEM OF 1983. VIRGINIA SOUTH ZONE, NAD-83, US. FT.

6. THIS SPECIAL PURPOSE SURVEY DOES NOT INCLUDE ALL CHARACTERISTICS OF A COMPLETE TOPOGRAPHIC SURVEY.

NOTES:

1. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.

2. EX. TIDAL WETLAND VEGETATION LIMITS ARE APPROXIMATE AND ARE BASED UPON VISUAL SITE INSPECTION AND NOT A WATERS OF THE US DELINEATION.

3. THE PROPOSED HISTORIC RESOURCE AREA LIMITS FOR SITE 44NN0024 ARE BASED UPON UPDATED FIELD WORK AND ARE STILL TO BE APPROVED AND ACCEPTED BY THE DEPARTMENT OF HISTORIC RESOURCES (DHR.)

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PROJECT: FT. EUSTIS TA1 SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

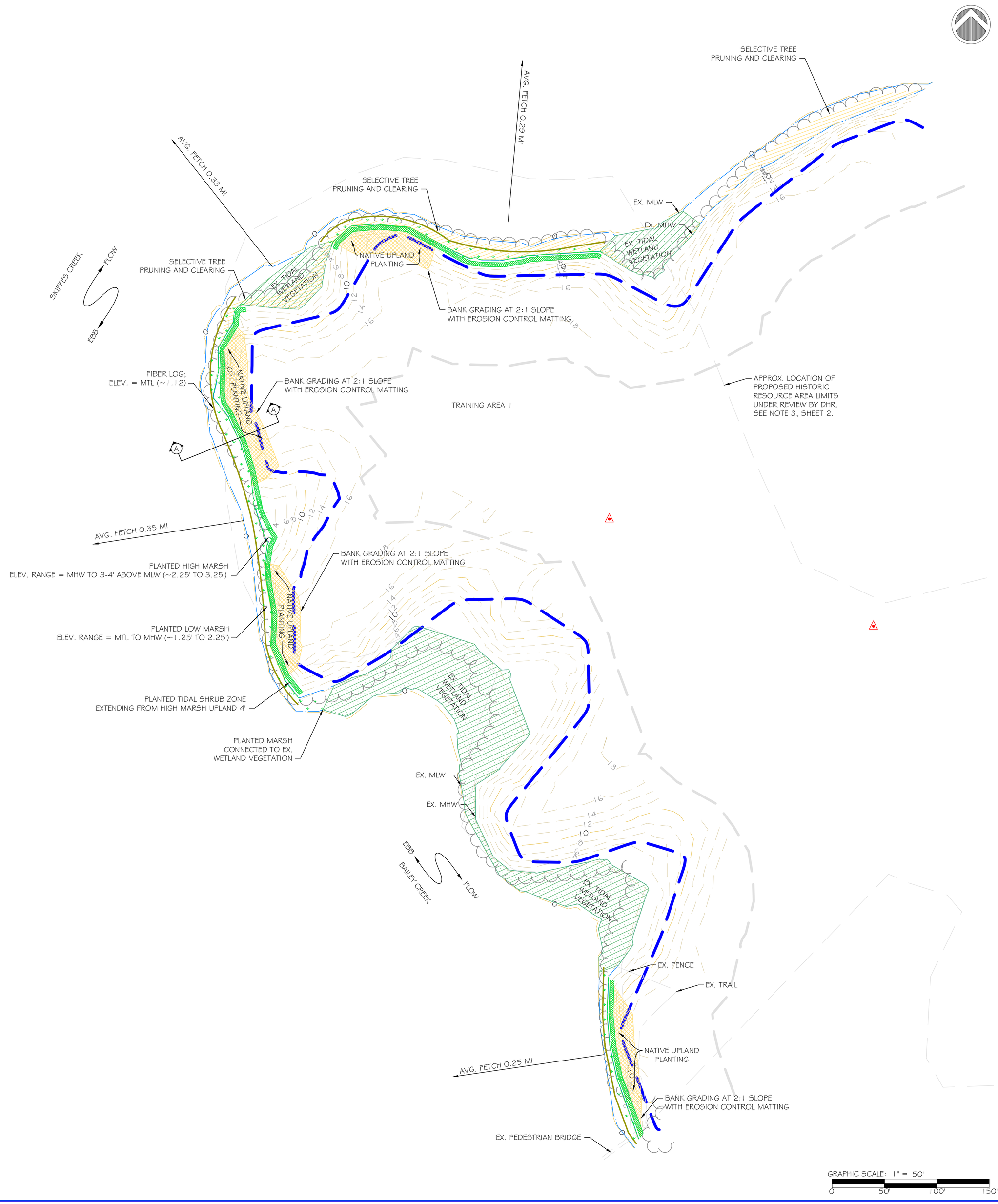
EXISTING CONDITIONS

FORT EUSTIS, VIRGINIA

REVISIONS:

1

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	2 OF 5



NARRATIVE

DESIGN METHODOLOGY:
THIS DESIGN OPTION UTILIZES A NON-STRUCTURAL APPROACH TO PROTECT EXISTING AND PLANTED MARSHES. THIS METHOD IS SUITABLE FOR AREAS HIGHER THAN MID-TIDE LEVEL (MTL), WITH MINIMAL WAVE AND BOAT WAKE, AND WITH ADJACENT TREE REMOVAL AND GRADED BANKS UNDER LANDSCAPE RESTORATION.

THE FIBER LOG IS LOCATED NEAR MTL WITH A PLANTED MARSH OR EXISTING MARSH IN THE AREA BEHIND THE LOG RUNNING TO ABOVE MID HIGH WATER (MHW). IF SAND FILL IS REQUIRED BEHIND THE FIBER LOG IT SHOULD BE GRADED AT AN 8:1-10:1 SLOPE, HOWEVER, AT THIS SITE MOST OF THE EXISTING BANK IS WITHIN THAT RANGE AND HAS MINIMAL MARSH COVERAGE THAT CAN BE SUPPLEMENTED WITH PLANTING. THE PLANTED MARSH BEHIND THE FIBER LOG WILL BE PLANTED WITH TWO TYPES OF VEGETATION. FROM THE BACK OF THE FIBER LOG TO THE MEAN HIGH WATER (MHW) LINE A LOW MARSH WILL BE PLANTED WITH SPARTINA ALTERNIFLORA (SMOOTH CORDGRASS) & DISTICHLIS SPICATA (SALTGRASS). ABOVE MHW TO APPROXIMATELY 3-4' ABOVE MEAN LOW WATER (MLW) A HIGH MARSH WILL BE PLANTED WITH SPARTINA PATENS (SALTMEADOW CORDGRASS) & DISTICHLIS SPICATA (SALTGRASS). BEHIND THE PLANTED MARSH A 4' WIDE TIDAL SHRUB ZONE WILL BE PLANTED TO HELP STABILIZE THE TOE OF THE SLOPE BEYOND, THIS AREA IS PLANTED WITH NATIVE TIDAL SHRUBS SUCH AS IVA FRUTESCENS (MARSH ELDER) & BACCHARIS HALIMIFOLIA (GROUNDSEL TREE).

BEYOND THE PLANTED MARSH BANK GRADING WILL BE UTILIZED TO REPAIR THE HIGH UNSTABLE BANKS TO PREVENT FUTURE EROSION OF THOSE BANKS FROM IMPACTING THE PLANTED MARSHES. IN THIS CONCEPT THE GRADING SLOPE IS NOTED AS 2:1 WHICH IS STEEPER THAN THE TYPICAL RECOMMENDED RANGE. IN ORDER TO PROTECT THE STEEPER SLOPE FROM EROSION, EROSION CONTROL MATTING (ECM) IS BEING RECOMMENDED TO HELP STABILIZE THESE SLOPES, WHILE SUITABLE NATIVE VEGETATION IS BECOMING ESTABLISHED, WHICH WILL PROVIDE PERMANENT BANK STABILIZATION.

DUE TO THE MINIMAL NATURE OF THIS DESIGN, EMPHASIS IS PLACED ON VEGETATION MANAGEMENT. WITH PROPER VEGETATION MANAGEMENT NATURAL SYSTEMS CAN BE ENHANCED AND CAN PROVIDE NATURAL EROSION PROTECTION. VEGETATION MANAGEMENT WOULD INCLUDE SELECTIVE TREE PRUNING AND CLEARING, THE REMOVAL OF DEBRIS FROM THE SHORELINE (ESPECIALLY AFTER STORM EVENTS), AND SUPPLEMENTAL NATIVE UPLAND PLANTINGS TO STABILIZE ADJACENT BANKS.

CONSTRUCTION CONSIDERATIONS:

- CONSTRUCTION ACCESS MUST BE AVAILABLE TO THE BANK IN AREAS WHERE BANK GRADING IS REQUIRED. THE EXISTING ACCESS ROAD TO THE PENINSULA CAN BE UTILIZED IN CONJUNCTION WITH TEMPORARY ACCESS ROADS TO PROVIDE ACCESS FOR CONSTRUCTION EQUIPMENT TO THE BANK.
- TEMPORARY MATERIAL AND EQUIPMENT STORAGE AREAS SHOULD BE LOCATED IN THE UPLAND AREA. IF POSSIBLE, THE EXISTING STORAGE AREA OFF OF THE ACCESS ROAD WOULD BE UTILIZED FOR CONSTRUCTION TO MINIMIZE ADDITIONAL LAND DISTURBANCE AND CLEARING.
- TEMPORARY STOCKPILE AREAS MAY BE NECESSARY.
- PROPER PRECAUTIONS WILL NEED TO BE TAKEN TO ENSURE THAT THE PLANTED VEGETATION IS PROTECTED FROM WATERFOWL.

PERMITTING CONSIDERATIONS:
IN ACCORDANCE WITH THE CHESAPEAKE BAY PRESERVATION ACT A WATER QUALITY IMPACT ASSESSMENT AND ASSOCIATED REVEGETATION PLAN MAY BE REQUIRED DUE TO THE AMOUNT OF CLEARING PERFORMED AS PART OF THE BANK GRADING.

DEPENDING ON THE AMOUNT OF UPLAND DISTURBED A LAND DISTURBANCE PERMIT WILL BE REQUIRED.

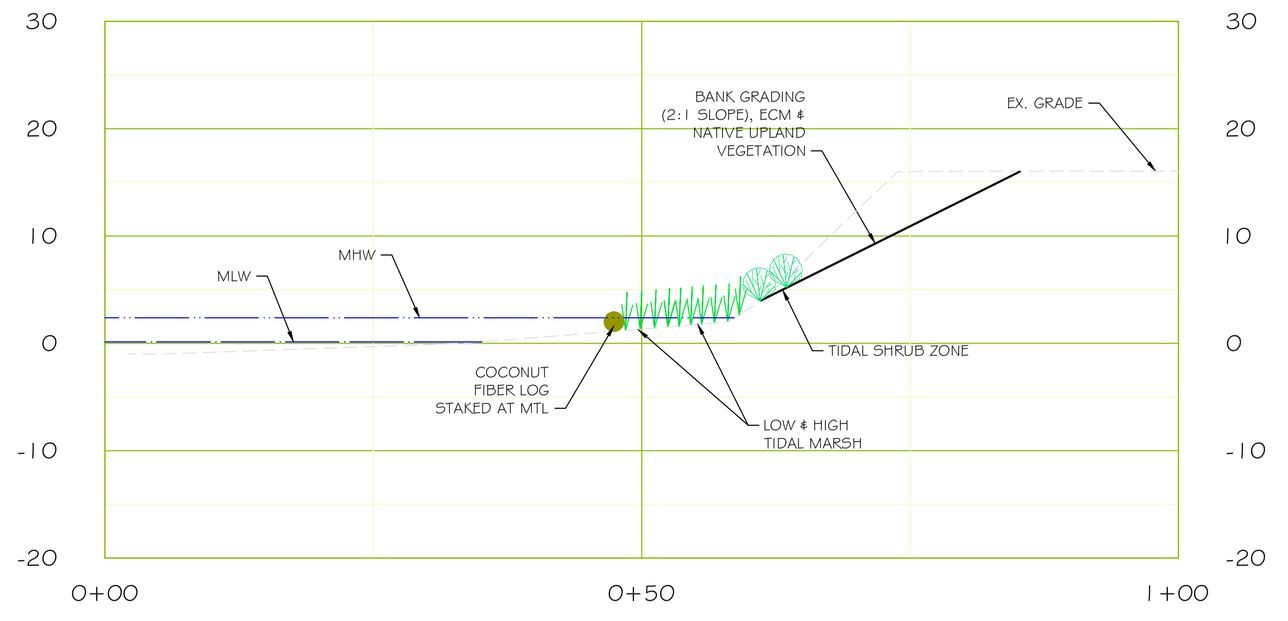
IN ORDER TO PERFORM WORK IN AREAS WITH JURISDICTIONAL WATER AND WETLAND, DUNE AND BEACH RESOURCES, A JOINT PERMIT APPLICATION WILL BE REQUIRED. THIS WILL COVER THE NECESSARY PERMITTING WITH THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE), VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VA DEQ) AND THE VIRGINIA MARINE RESOURCES COMMISSION (VMRC).

LEGEND

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. APPROX. MEAN HIGH WATER (MHW)
- EX. APPROX. MEAN LOW WATER (MLW)
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT
- APPROXIMATE LOCATION OF TREELINE
- PROPOSED GRADE
- FIBER LOG
- SELECTIVE TREE PRUNING & CLEARING
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE
- PROPOSED BANK GRADING & EROSION CONTROL MATTING (ECM)

NOTES:
1. EXISTING TOPOGRAPHY BASED ON AN ACTUAL GROUND SURVEY PERFORMED BY TERRY HICKMAN, LS, ON 2-18-15. SEE SHEET 2 FOR ADDITIONAL NOTES.

2. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.



GRAPHIC SCALE: 1" = 10'
0 10' 20' 30'

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CORPORATE | 5367 TELEPHONE ROAD, WARRENTON, VIRGINIA 20187
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MARYLAND | 1434 ODENTON ROAD, ODENTON, MARYLAND 21113
P: 410.672.4326 F: 410.672.4328

PROJECT: FT. EUSTIS TA1 SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

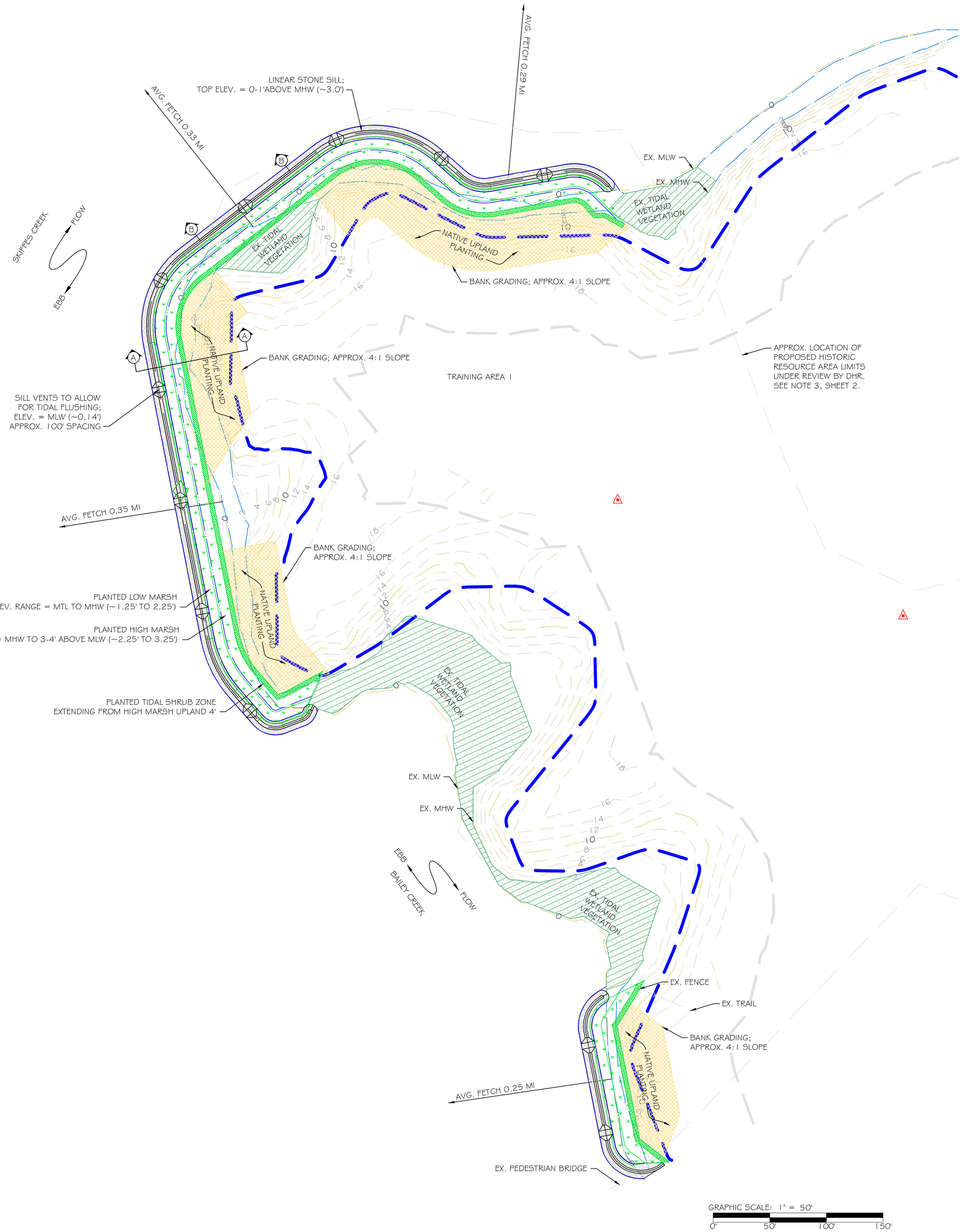
OPTION A

FORT EUSTIS, VIRGINIA

REVISIONS:
1

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	3 OF 5

A:\Active Jobfiles\4857 - Ft. Eustis Erosion CAP\CADD Files\Corrective Action Plan\Plan Sheets\3-MARSH-VEG MGMT.dwg, 6/30/2015 8:30:55 AM, bwilfong, 1:1



NARRATIVE

DESIGN METHODOLOGY:
THIS DESIGN OPTION UTILIZES A LOW PROFILE STONE STRUCTURE, CALLED A SILL, TO CONTAIN SAND FILL IN ORDER TO CREATE A NEW PLANTED MARSH. THE SILL PLACEMENT IS SITE-SPECIFIC AND IS DEPENDENT ON THE BANK HEIGHT, BANK GRADE, WATER DEPTH, TIDE RANGES AND BOTTOM TYPE NEAR THE SHORELINE. THIS METHOD IS SUITABLE FOR AREAS WHERE THERE IS ADJACENT BANK GRADING, PLENTY OF SUNLIGHT AND SHALLOW HARD SAND BOTTOMS EXTENDING OFF SHORE.

THE SILL IS LOCATED NEAR MEAN LOW WATER (MLW) WITH A SAND FILL GRADED BEHIND THE SILL RUNNING TO THE BANK AT AN AVERAGE 8:1 OR 10:1 SLOPE. THE HEIGHT OF THE SILL SHOULD BE BETWEEN 0-1' ABOVE MEAN HIGH WATER (MHW) IN LOW ENERGY SETTINGS (AVERAGE FETCH LESS THAN 0.5 MILES) TO ALLOW FOR REGULAR WAVE OVERTOPPING. SINCE THE TOTAL SILL LENGTH IS GREATER THAN 100 FT, TIDAL GAPS SHOULD BE STRATEGICALLY PLACED TO ALLOW FOR FLUSHING OF THE TIDAL MARSH BEHIND THE SILL, AS WELL AS PROVIDING CONNECTIVITY BETWEEN ECOSYSTEMS.

THE PLANTED MARSH BEHIND THE SILL WILL BE PLANTED WITH TWO TYPES OF VEGETATION. FROM THE BACK OF THE SILL TO THE MHW LINE A LOW MARSH WILL BE PLANTED WITH SPARTINA ALTERNIFLORA (SMOOTH CORDGRASS). ABOVE MHW TO APPROXIMATELY 3-4' ABOVE MLW A HIGH MARSH WILL BE PLANTED WITH SPARTINA PATENS (SALTMEADOW CORDGRASS) & DISTICHLIS SPICATA (SALTGRASS). BEHIND THE PLANTED MARSH A 4' WIDE TIDAL SHRUB ZONE WILL BE PLANTED TO HELP STABILIZE THE TOE OF THE SLOPE BEYOND, THIS AREA IS PLANTED WITH NATIVE TIDAL SHRUBS SUCH AS IVA FRUTESCENS (MARSH ELDER) & BACCHARIS HALIMIFOLIA (GROUNDSEL TREE).

BEYOND THE PLANTED MARSH BANK GRADING WILL BE UTILIZED TO PROPERLY CONNECT THE MARSH WITH THE UPLAND AREA. BANK GRADING IS RECOMMENDED IN AREAS WITH ACTIVE EROSION AT THE TOP AND BOTTOM OF THE BANK, AREAS WITH HIGH UNSTABLE BANKS, UNDERCUTTING OR FALLING TREES, AND WHERE SUNLIGHT WILL REACH THE GRADED SLOPES. TARGET SLOPES RANGE BETWEEN 6:1 AND 3:1 AND ARE CHOSEN BASED ON NATURAL SHORE TOPOGRAPHY, ADJACENT LAND USES AND DESIGN COMBINATIONS WITH OTHER SHORE PROTECTION METHODS. ONCE THE BANK GRADING IS COMPLETED TEMPORARY EROSION CONTROL METHODS ARE USED TO STABILIZE THE SOIL UNTIL SUITABLE NATIVE VEGETATION IS ESTABLISHED.

FOR THE LONG TERM SUCCESS OF THE PROJECT AND FOR THE PROTECTION OF AREAS NOT WITHIN THE BANK GRADING & REPLANTING AREAS A VEGETATION MANAGEMENT PROGRAM SHOULD BE UTILIZED TO PROTECT & ENHANCE THE NATURAL EROSION PROTECTION PROVIDED BY VEGETATION. VEGETATION MANAGEMENT WOULD INCLUDE SELECTIVE TREE PRUNING AND CLEARING, THE REMOVAL OF DEBRIS FROM THE SHORELINE (ESPECIALLY AFTER STORM EVENTS), AND SUPPLEMENTAL NATIVE UPLAND PLANTINGS TO STABILIZE ADJACENT BANKS.

CONSTRUCTION CONSIDERATIONS:

- CONSTRUCTION ACCESS MUST BE AVAILABLE TO THE BANK AND SHORELINE. THE EXISTING ACCESS ROAD TO THE PENINSULA CAN BE UTILIZED IN CONJUNCTION WITH TEMPORARY ACCESS ROADS TO PROVIDE ACCESS FOR CONSTRUCTION EQUIPMENT TO THE BANK AND SHORE.
- TEMPORARY MATERIAL AND EQUIPMENT STORAGE AREAS SHOULD BE LOCATED IN THE UPLAND AREA. IF POSSIBLE, THE EXISTING STORAGE AREA OFF OF THE ACCESS ROAD WOULD BE UTILIZED FOR CONSTRUCTION TO MINIMIZE ADDITIONAL LAND DISTURBANCE AND CLEARING.
- IF THE EXISTING SOIL TYPE IS SUITABLE CUT AND FILL QUANTITIES SHOULD BE BALANCED IN THE UPLAND AREAS TO MINIMIZE THE COST OF MATERIAL AND TRUCKING. TEMPORARY STOCKPILE AREAS MAY BE NECESSARY.
- TO BUILD THE TIDAL MARSH CLEAN COARSE-GRAINED SAND FILL WILL NEED TO BE BROUGHT IN. ONCE THE SAND FILL IS PLACED IT SHOULD BE ALLOWED TO SIT FOR AT LEAST 1-2 WEEKS TO ALLOW FOR SETTLEMENT, VERIFY ACTUAL TIDE LEVELS WITHIN THE PLANTING AREA, AND ADJUST SLOPE OR HEIGHT IF NECESSARY BEFORE PLANTING.
- PROPER PRECAUTIONS WILL NEED TO BE TAKEN TO ENSURE THAT THE PLANTED VEGETATION IS PROTECTED FROM WATERFOWL.

PERMITTING CONSIDERATIONS:
IN ACCORDANCE WITH THE CHESAPEAKE BAY PRESERVATION ACT A WATER QUALITY IMPACT ASSESSMENT AND ASSOCIATED REVEGETATION PLAN MAY BE REQUIRED DUE TO THE AMOUNT OF CLEARING PERFORMED AS PART OF THE BANK GRADING.

DEPENDING ON THE AMOUNT OF UPLAND DISTURBED MOST LIKELY A LAND DISTURBANCE PERMIT WILL BE REQUIRED.

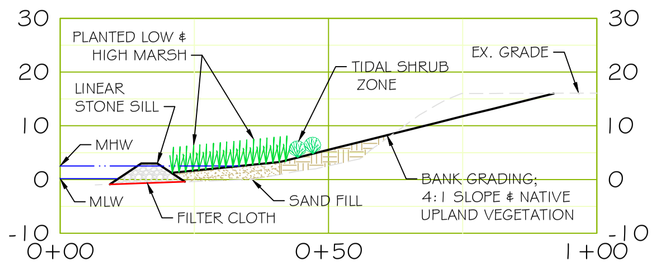
IN ORDER TO PERFORM WORK IN AREAS WITH JURISDICTIONAL WATER AND WETLAND, DUNE AND BEACH RESOURCES A JOINT PERMIT APPLICATION WILL BE REQUIRED. THIS WILL COVER THE NECESSARY PERMITTING WITH THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE), VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VA DEQ) AND THE VIRGINIA MARINE RESOURCES COMMISSION (VMRC).

LEGEND

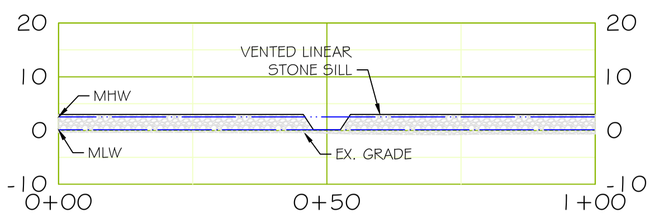
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. APPROX. MEAN HIGH WATER (MHW)
- EX. APPROX. MEAN LOW WATER (MLW)
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT
- PROPOSED MEAN HIGH WATER (MHW)
- PROPOSED MEAN LOW WATER (MLW)
- PROPOSED GRADE
- PROPOSED ROCK SILL
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE
- PROPOSED BANK GRADING
- COMPACTED SOIL FILL
- CLEAN COARSE-GRAINED SAND FILL

NOTES:
1. EXISTING TOPOGRAPHY BASED ON AN ACTUAL GROUND SURVEY PERFORMED BY TERRY HICKMAN, LS. ON 2-18-15. SEE SHEET 2 FOR ADDITIONAL NOTES.

2. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.

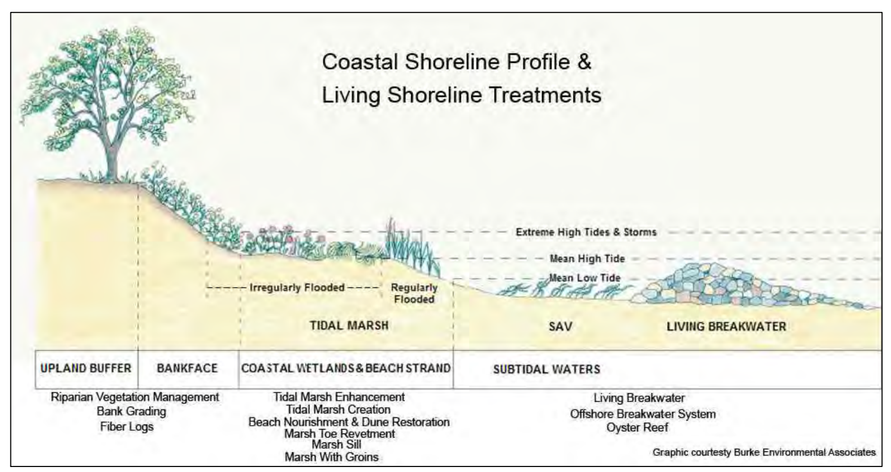


A-A TYPICAL BANK SECTION



B-B TYPICAL SILL SECTION

GRAPHIC SCALE: 1" = 20'
0 20 30 40



LIVING SHORELINE SCHEMATIC

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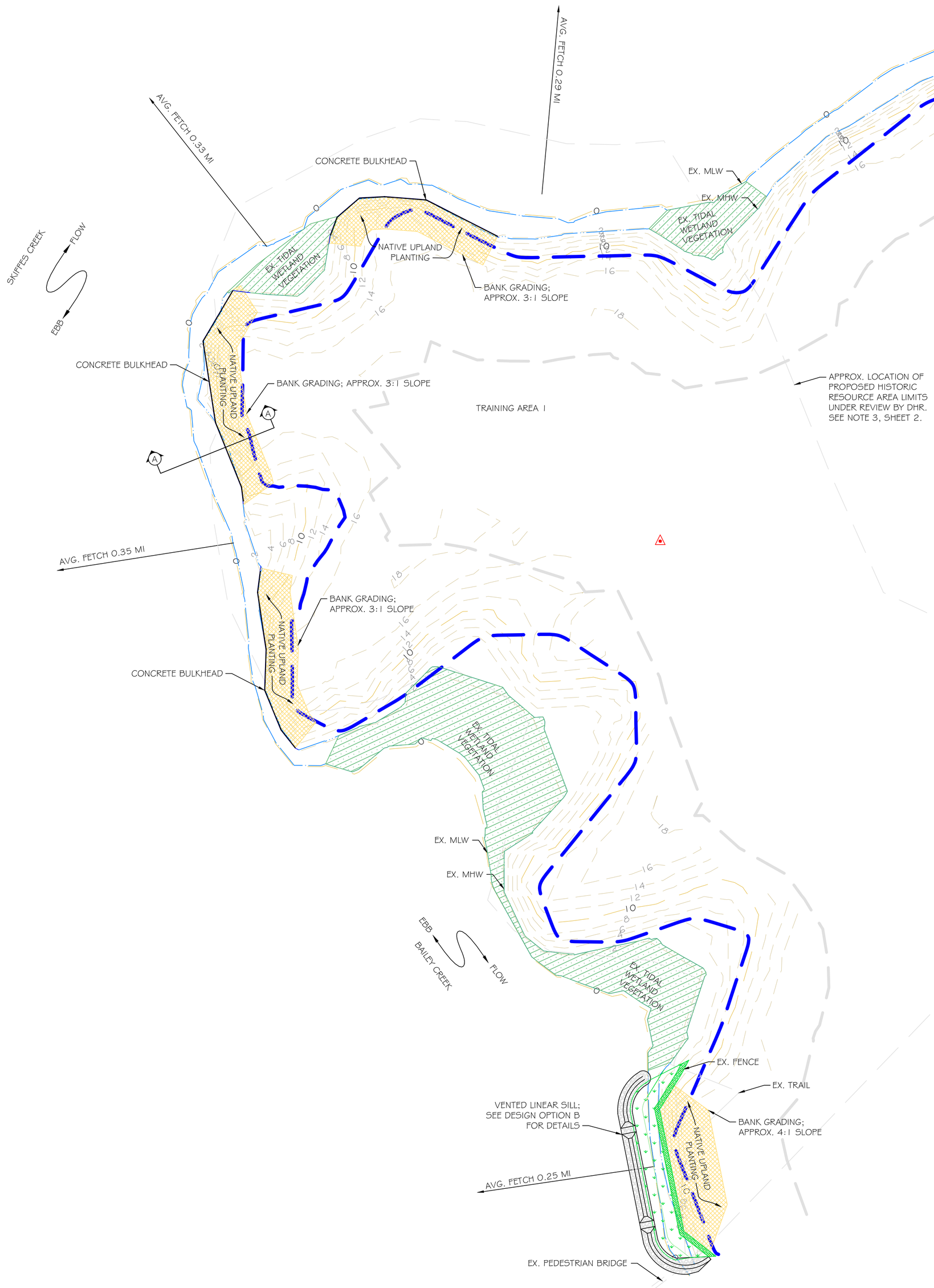
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

OPTION B

FORT EUSTIS, VIRGINIA

REVISIONS:
X

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	4 OF 5



GRAPHIC SCALE: 1" = 50'
0' 50' 100' 150'

NARRATIVE

DESIGN METHODOLOGY:
THIS DESIGN OPTION UTILIZES A PRECAST CONCRETE WALL TO STABILIZE SECTIONS OF ERODED SHORELINE, SPECIFICALLY IN BLUFF AREAS WITH TOE EROSION. THE PRECAST CONCRETE WALL IS PLACED INTO AN EXCAVATED TRENCH AND BACKFILL IS PLACED ON TOP OF A REAR ANCHOR TO HOLD THE WALL IN PLACE. BULKHEADS ARE APPROPRIATE IN AREAS WHERE THE CHANNEL IS USED FREQUENTLY FOR NAVIGATION AND WHERE A MORE ENVIRONMENTALLY PREFERRED DESIGN OPTION WILL IMPAIR THE USE OF THE CHANNEL FOR NAVIGATION.

AT THE LOCATION OF ERODED SHORELINE ADJACENT TO THE PEDESTRIAN BRIDGE A STONE SILL AND PLANTED MARSH, REFERENCE DESIGN OPTION B, ARE STILL BEING RECOMMENDED IN ORDER TO PROTECT THE FOUNDATION OF THE EXISTING PEDESTRIAN BRIDGE WITHOUT REQUIRING MODIFICATIONS TO THE STRUCTURE.

BEYOND THE BULK HEAD BANK GRADING WILL BE UTILIZED TO PROPERLY TIE THE BULK HEAD IN TO THE ADJACENT GRADE. TARGET SLOPES RANGE BETWEEN 6:1 AND 3:1 AND ARE CHOSEN BASED ON NATURAL SHORE TOPOGRAPHY, ADJACENT LAND USES AND DESIGN COMBINATIONS WITH OTHER SHORE PROTECTION METHODS. WITH THE USE OF A BULK HEAD A STEEPER SLOPE, 3:1, CAN BE USED SINCE THE UPLAND AREA WILL NOT BE EXPOSED TO WAVE ACTION REGULARLY. ONCE THE BANK GRADING IS COMPLETED TEMPORARY EROSION CONTROL METHODS ARE USED TO STABILIZE THE SOIL UNTIL SUITABLE NATIVE VEGETATION IS ESTABLISHED.

FOR THE LONG TERM SUCCESS OF THE PROJECT AND FOR THE PROTECTION OF AREAS NOT PROTECTED BY THE BULK HEAD A VEGETATION MANAGEMENT PROGRAM SHOULD BE UTILIZED TO PROTECT & ENHANCE THE NATURAL EROSION PROTECTION PROVIDED BY NATIVE VEGETATION. VEGETATION MANAGEMENT WOULD INCLUDE SELECTIVE TREE PRUNING AND CLEARING, THE REMOVAL OF DEBRIS FROM THE SHORELINE (ESPECIALLY AFTER STORM EVENTS), AND SUPPLEMENTAL NATIVE UPLAND PLANTINGS TO STABILIZE ADJACENT BANKS.

CONSTRUCTION CONSIDERATIONS:
- CONSTRUCTION ACCESS MUST BE AVAILABLE TO THE BANK AND SHORELINE. THE EXISTING ACCESS ROAD TO THE PENINSULA CAN BE UTILIZED IN CONJUNCTION WITH TEMPORARY ACCESS ROADS TO PROVIDE ACCESS FOR CONSTRUCTION EQUIPMENT TO THE BANK AND SHORE.
- TEMPORARY MATERIAL AND EQUIPMENT STORAGE AREAS SHOULD BE LOCATED IN THE UPLAND AREA. IF POSSIBLE, THE EXISTING STORAGE AREA OFF OF THE ACCESS ROAD WOULD BE UTILIZED FOR CONSTRUCTION TO MINIMIZE ADDITIONAL LAND DISTURBANCE AND CLEARING.
- IF THE EXISTING SOIL TYPE IS SUITABLE CUT AND FILL QUANTITIES SHOULD BE BALANCED IN THE UPLAND AREAS TO MINIMIZE THE COST OF MATERIAL AND TRUCKING. TEMPORARY STOCKPILE AREAS MAY BE NECESSARY.

PERMITTING CONSIDERATIONS:
IN ACCORDANCE WITH THE CHESAPEAKE BAY PRESERVATION ACT A WATER QUALITY IMPACT ASSESSMENT AND ASSOCIATED REVEGETATION PLAN MAY BE REQUIRED DUE TO THE AMOUNT OF CLEARING PERFORMED AS PART OF THE BANK GRADING.

DEPENDING ON THE AMOUNT OF UPLAND DISTURBED A LAND DISTURBANCE PERMIT WILL LIKELY BE REQUIRED.

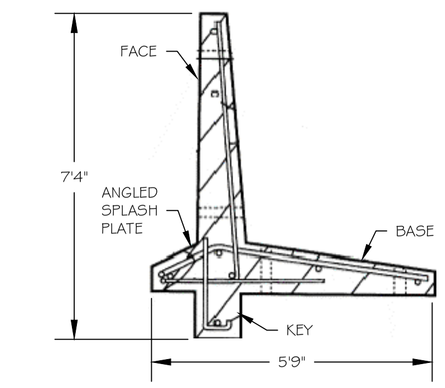
IN ORDER TO PERFORM WORK IN AREAS WITH JURISDICTIONAL WATER AND WETLAND, DUNE AND BEACH RESOURCES, A JOINT PERMIT APPLICATION WILL BE REQUIRED. THIS WILL COVER THE NECESSARY PERMITTING WITH THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE), VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VA DEQ) AND THE VIRGINIA MARINE RESOURCES COMMISSION (VMRC).

LEGEND

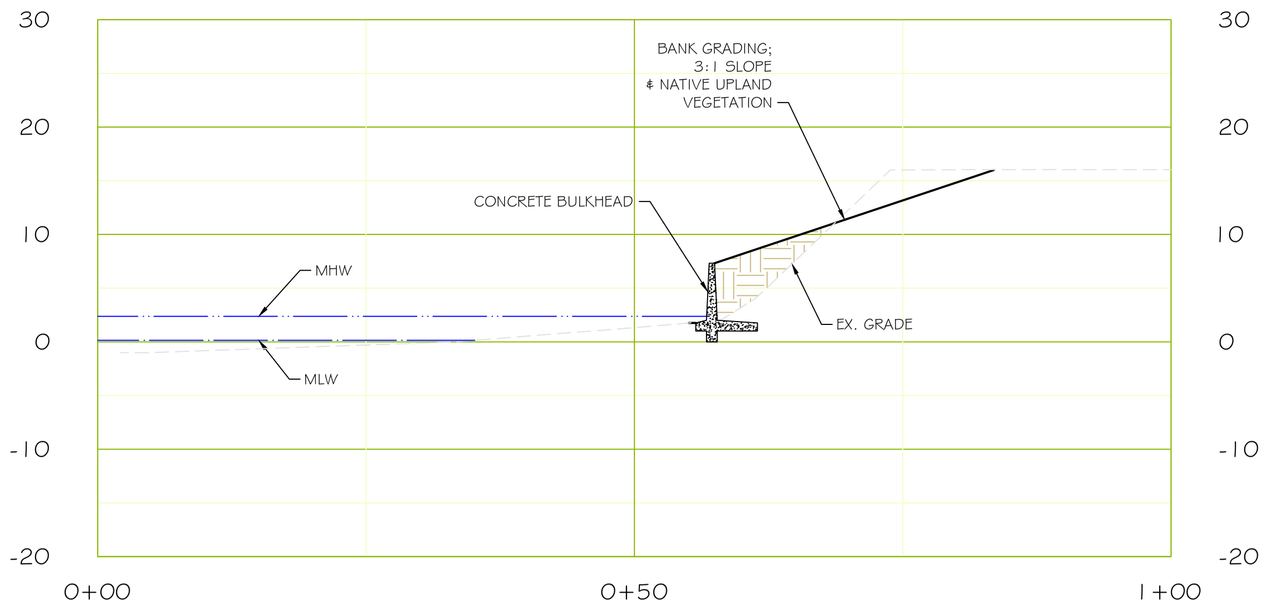
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. APPROX. MEAN HIGH WATER (MHW)
- EX. APPROX. MEAN LOW WATER (MLW)
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT
- PROPOSED MEAN HIGH WATER (MHW)
- PROPOSED GRADE
- PROPOSED BULKHEAD
- PROPOSED BANK GRADING
- COMPACTED SOIL FILL
- PROPOSED ROCK SILL
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE

NOTES:
1. EXISTING TOPOGRAPHY BASED ON AN ACTUAL GROUND SURVEY PERFORMED BY TERRY HICKMAN, LS. ON 2-18-15. SEE SHEET 2 FOR ADDITIONAL NOTES.

2. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.



TYP. PRECAST CONCRETE BULKHEAD
(BASIS OF DESIGN SEAMENT SHORELINE SYSTEMS L-WALL)



A-A TYPICAL BULKHEAD / BANK SECTION

GRAPHIC SCALE: 1" = 10'
0' 10' 20' 30'

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PROJECT: FT. EUSTIS TAI SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

OPTION C

FORT EUSTIS, VIRGINIA

REVISIONS:
1

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	5 OF 5

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ARCHAEOLOGICAL INVESTIGATIONS AT SITE 44NN0024

JOINT BASE LANGLEY-EUSTIS (JBLE-EUSTIS), NEWPORT NEWS, VIRGINIA

PREPARED FOR:
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OCTOBER 2019

AECOM

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ABSTRACT

Under contract to the United States Air Force Civil Engineer Center (AFCEC) and on behalf of Joint Base Langley-Eustis (JBLE-Eustis), AECOM conducted archaeological investigations at site 44NN0024 in conjunction with an Environmental Assessment (EA) of three proposed shoreline erosion mitigation options in Training Area 1, JBLE-Eustis, Newport News, Virginia. Shoreline mitigation may include structural and non-structural installations along with selective bank grading, tree removal, and access road/staging area construction. The Area of Potential Effects (APE) for the current study comprises approximately 2.74 hectares (ha) (6.78 acres [ac]) at the site's northwestern extent.

This study was initiated to assist AFCEC in meeting regulatory obligations under Section 106 of the *National Historic Preservation Act* of 1966, as amended (NHPA). The goals of this study were to determine if significant archaeological resources that contribute to the site's NRHP eligibility are located within the APE and, based on those results, whether the undertaking would constitute an adverse effect per 36 CFR 800.5(a).

Site 44NN0024 represents a 7.68-ha (18.98-ac) Woodland period base camp previously determined eligible for listing in the National Register of Historic Places (NRHP). While the APE was previously investigated, additional shovel test pit (STP) and test unit (TU) excavation was required to evaluate the area in accordance with JBLE-Eustis guidance and Virginia Department of Historic Resources guidelines.

Fieldwork consisted of the excavation of 63 STPs and four TUs, resulting in the recovery of 231 prehistoric artifacts and four faunal remains from largely intact soils. The prehistoric assemblage consists of nondiagnostic lithic artifacts representing early to late stage stone tool production, most of which were recovered from a discrete area near the center of the APE designated Artifact Cluster 4. This manufacturing area appears to have been intentionally isolated from the more intensively occupied site core that previous investigators identified southeast of the APE. Such patterns of site use are consistent with those visible on comparable Woodland sites elsewhere in the Mid-Atlantic coastal plain.

Given that Artifact Cluster 4 retains integrity, incorporates a variety of stone tools, and represents a discrete activity area devoted to stone tool production, it has the demonstrated ability to enhance the current understanding of how 44NN0024 was utilized. Furthermore, additional investigation could provide more detailed information on how and when this component of the site was used, which in turn can generate a more substantial case study for comparative analyses among similar regional site types. Given these considerations, AECOM recommends Artifact Cluster 4 to be a contributing site component as it has the demonstrated ability to yield important information that supports the site's existing NRHP eligibility under Criterion D.

While potential ground disturbances associated with any of the mitigation options could impact archaeological resources within the APE, the discrete nature and location of Artifact Cluster 4 will allow for the avoidance of impacts to significant deposits within the APE. It is recommended that the significant deposits of Artifact Cluster 4 be incorporated into the project design as a design constraint and that the project Limits of Disturbance avoid these deposits. With implementation of design avoidance, impacts associated with the proposed shoreline improvement options will not constitute an adverse effect to 44NN0024 under 36 CFR 800.5(a) as they would not impact elements of the site that contribute to its NRHP eligibility. No additional work is recommended within the APE.

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1.0 INTRODUCTION

On behalf of Joint Base Langley-Eustis (JBLE-Eustis) and under contract to the United States Air Force Civil Engineering Center (AFCEC), AECOM conducted archaeological investigations at 44NN0024 in support of an Environmental Assessment (EA) of proposed shoreline erosion mitigation in Training Area 1, JBLE-Eustis, Newport News, Virginia (Figure 1-1). The Area of Potential Effects (APE) for the current study corresponds to approximately 2.74 hectares (ha) (6.78 acres [ac]) of the 7.68-ha (18.98-ac) site and is bound to the north, west, and south by existing site boundaries along Skiffe's and Bailey creeks and to the east by a line denoting the extent of potential ground disturbance (Figure 1-2).

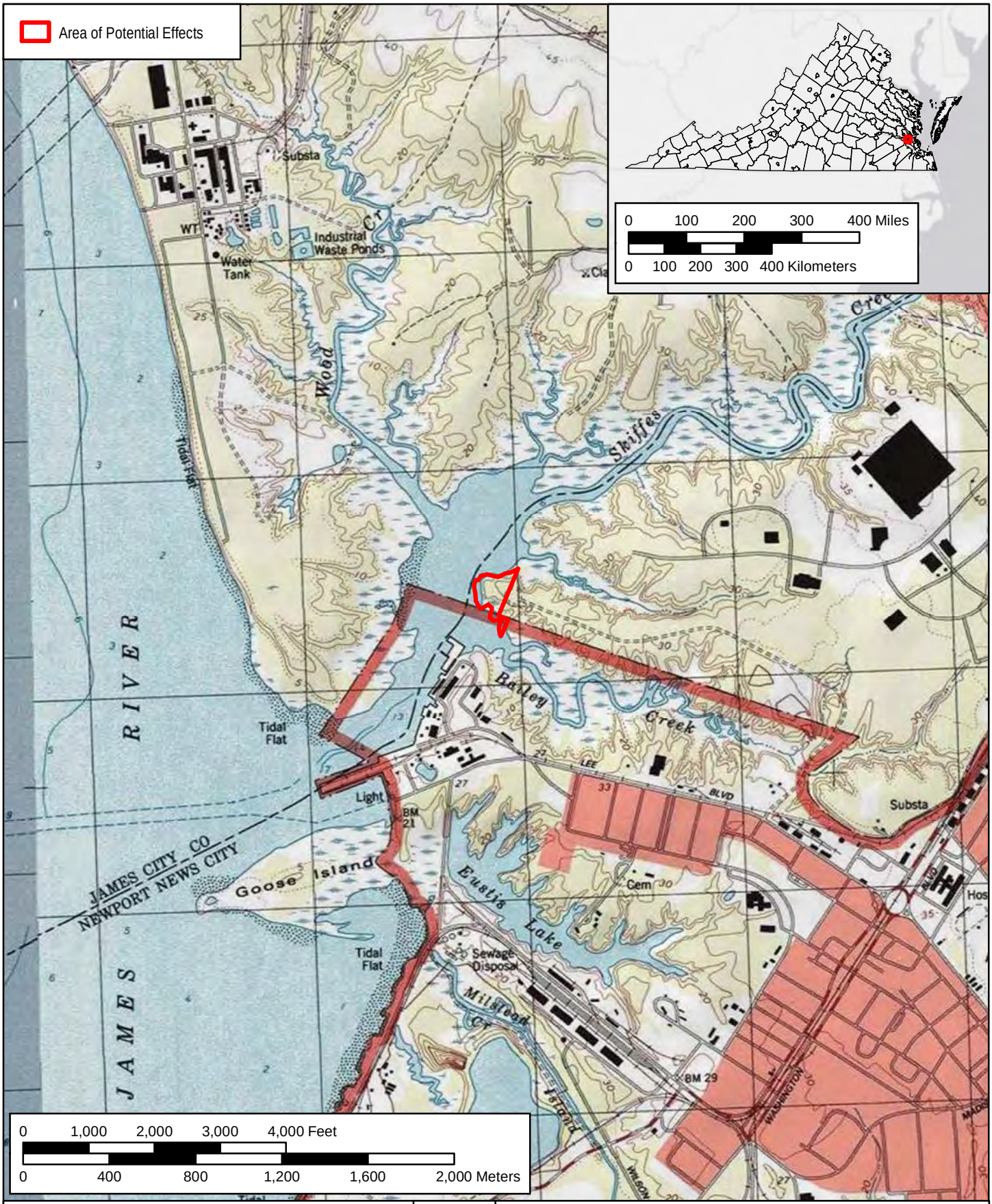
The three shoreline erosion mitigation options under consideration were presented to AECOM in a package produced by Angler Environmental and dated June 26, 2015. The measures presented in each option entail various combinations of structural and non-structural installations along with selective bank grading in vulnerable areas. Option A represents a non-structural alternative characterized by the use of a living shoreline and selective bank grading at a 2:1 slope. Option B utilizes a stone sill along the shoreline, tidal marsh plantings, and selective bank grading at 3:1 to 6:1 slopes. Lastly, Option C includes a cast concrete bulkhead along the shoreline in addition to native plantings and selective bank grading at 3:1 to 6:1 slopes. All three options potentially include the construction of temporary access roads/staging areas in level, upland portions of the APE.

Site 44NN0024 represents a 7.68-hectare (ha) (18.98-acre [ac]) Woodland period base camp previously determined eligible for listing in the National Register of Historic Places (NRHP). Louis Berger (Berger) conducted a Phase II evaluation in 2014 and presented the results and recommendations in a report entitled *National Register Evaluation of Archaeological Sites 44NN0024, 44NN0127, 44NN0213, and 44NN0214, Joint Base Langley-Eustis, City of Newport News, Virginia* (Wilkins et al. 2015); the current study is an addendum to that report. The goals of the current archaeological investigations were to determine if significant archaeological resources that contribute to the site's NRHP eligibility are located within the APE and, based on those results, whether the undertaking would constitute an adverse effect per 36 CFR 800.5(a).

All work was conducted pursuant to Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended; the Archaeological Resources Protection Act (United States Department of the Interior [USDI] 1979); the Native American Graves Protection Act (USDI 1990); and the Advisory Council on Historic Preservation's "Protection of Historic and Cultural Properties" (36 Code of Federal Regulations [CFR] 800; USDI 2004). This study was also conducted in accordance with Air Force Instruction 32-7065, Cultural Resources Management Program (USAF 2014), NRHP Criteria for Evaluation (36 CFR Part 60; USDI 2012); National Register Bulletin 15 *How to Apply the National Register Criteria for Evaluation* (National Park Service [NPS] 2002), the *Secretary of the Interior's Standards for Archeological Documentation* (USDI 1999); and the DHR *Guidelines for Conducting Cultural Resource Survey in Virginia* (DHR 2017).

Field investigations occurred between July 15 and 18, 2019. Scott Seibel was the Principal Investigator, Pete Regan was the Field Director, and Benjamin Stewart and Alison Cramer served as Field Technicians. Kayla Marciniszyn served as the Laboratory Director, while Benjamin Stewart conducted the artifact analysis. Nina Shinn served as the GIS Specialist.

Following this Introduction, the report includes four sections of text: Research Design; Results; Summary and Recommendations; and References Cited. Three appendices follow: Appendix A



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PROJ	44NN0042 Supplemental Phase II
SCALE	1:24,000
SOURCE	ESRI 2019
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N

TITLE

Project Location

AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

PROJ NO 60542271

FIGURE 1-1

CLIENT	AFCEC/JBLE
PROJ	44NN0042 Supplemental Phase II
SCALE	1:1,482
SOURCE	ESRI 2019

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N

TITLE

Area of Potential Effects

AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

PROJ NO 60542271

FIGURE 1-2

contains the Qualifications of Investigators; Appendix B contains the Artifact Catalog; and Appendix C contains the Archaeological Site Form. Please note that since this report is considered an addendum to Wilkins et al. (2015), sections on environmental setting, cultural contexts, and previous investigations are not duplicated here. Reference is hereby made to Wilkins et al. (2015) for relevant background information.

2.0 RESEARCH DESIGN

2.1 OBJECTIVE

The objective of the current archaeological investigations was to determine if portions of 44NN0024 within the APE contain significant archaeological resources that contribute to the site's previously determined NRHP eligibility. This information was then used to determine whether the proposed undertaking constitutes an adverse effect as defined under 36 CFR 800.5(a): "an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register [of Historic Places]" (USDI 2004:n.p.).

2.2 FIELD METHODS

Field testing consisted of STP and TU excavation. STPs were excavated at 15-meter (m) (49.2-foot [ft]) intervals along a controlled grid superimposed atop the 30-m (98.4-ft) grid Berger utilized during the initial 2014 site evaluation. Grid orientation was 35 degrees east of magnetic north. AECOM primary STPs were excavated at grid coordinate points, except where collocated with Berger STPs or in areas of open water, slope in excess of 15 percent, or modern disturbance (e.g., roadways, push piles, ditches). Radial STPs were excavated at 7.5-m (24.6-ft) intervals in cardinal directions around positive STPs. Each STP measured 40 centimeters (cm) (1.3 ft) in diameter and was stratigraphically excavated 10 cm (0.33 ft) into sterile subsoil. STPs were assigned identifiers tied to AECOM's system of survey grid coordinates (e.g., N1000 E1000, N1015 E1000).

Shovel testing was followed by the excavation of 1-x-1-m (3.3-x-3.3-ft) TUs in 10-cm (0.33-ft) levels within natural stratigraphy to a depth of 10 cm (0.33 ft) into culturally sterile subsoil or to the practical and safe extent of hand excavation (approximately 1.2 m [3.9 ft] in depth).

Field data were recorded on standard field forms and in general field notes. The forms included Munsell soil color, soil texture, profiles, features present, artifacts recovered, excavator's initials, and the date of excavation. The locations of STPs and TUs were noted on field maps and recorded using a global positioning system (GPS) unit. At least one wall of each TU was photographed and drawn in profile.

All soils were screened through 6.34-millimeter (mm) (0.25-inch [in]) hardware mesh to ensure uniform artifact recovery. Collected artifacts were bagged in plastic sealing bags labeled with all relevant provenience information, including project name, STP, TU, stratum, level, the number of artifacts recovered, excavator initials, and date. Obviously modern artifacts were generally noted on forms and discarded in the field. Faunal remains were sampled from proveniences where they occurred in high frequencies, with uncollected specimens weighed in bulk and discarded. All faunal remains were limited to marine mollusk shell.

2.3 LABORATORY METHODS

Artifacts were placed in plastic bags and transported to the AECOM laboratory in Gaithersburg, Maryland, where the artifacts were cleaned, analyzed, cataloged, and accessioned for curation at Fort Lee according to the *Guidelines for Conducting Historic Resources Survey in Virginia* (DHR 2017), the Secretary of the Interior's *Standards and Guidelines for Curation* (USDI 1991; 36 CFR Part 79) and the *Regional Archaeological Curation Facility Collection Standards* (Fort Lee 2012). The objectives of laboratory analysis and cataloging were to determine, to the extent possible, the date, function, cultural affiliation, and significance of the archaeological resources.

As appropriate, artifacts were gently washed using tap water and a soft toothbrush. Once prepared, the artifacts were analyzed, cataloged, and rebagged according to provenience. Artifact data were entered into a Microsoft Access 2010 database. The analysis of the artifacts included noting provenience, group, material, form, decoration, function, vessel segment, color, and quantity. Details of the analytical methods for specific artifact groups are described below.

2.3.1 Faunal Remains

Faunal remains were identified using a comparative collection housed at the AECOM archaeological laboratory. Only small quantities of faunal remains were recovered, all of which represent bivalve shells. These were cursorily analyzed and identified to taxonomic type. Faunal remains were assigned to the Foodways, Remains functional group/subgroup.

2.3.2 Prehistoric Artifacts

All prehistoric artifacts recovered during the current investigation of 44NN0024 represent lithic material, the particular groups of which are described below alongside methods of analysis.

The following basic information was recorded for lithics: count, weight, material type, group, class, and, as applicable, subclass. Weight was recorded to the nearest 0.01 gram (g) (0.003 ounce [oz]) using a digital Sartorius scale calibrated to 800 g (28.2 oz). A four-tiered system of classification (group, material, class, and subclass) was used; the broadest level of classification is the group.

Lithic groups include core/tested material, debitage, flaked stone tool, fire-cracked rock (FCR), ground/battered stone, and unmodified cultural artifacts. Lithic artifacts were initially classified based on group and material type, followed by sorting into applicable class and subclass categories. For example, biface is a lithic class of the group flaked stone tool, and can be further described using early, middle, and late stages subclasses.

Depending on the completeness and/or condition of an artifact, additional attributes were recorded, including thermal alteration, cortex percent, and cortex type. Thermal alteration is not necessarily intentional heat treatment and instead refers to whether an artifact exhibits evidence of being heated (luster or color change) or exposed to fire (pot lidding, crazing, burning, or crumbling).

Cortex percentage has widely been used as an indicator of core and biface reduction stages, as the amount of cortex present on debitage is generally related to the manufacturing process. A greater amount of cortex is perceived as being indicative of an earlier stage of reduction, while a lack of cortex is indicative of later reduction stages. When possible, the percentage of cortex on the dorsal flake surface was estimated (none [0], less than 50 percent [<50], or greater than or equal to 50 percent [≥50]) and the type of cortex was recorded. Cortex in the form of a rounded surface rind (e.g., from fluvial transport) was classified as smoothed. Angular remnant residual, or parent, material lacking evidence of fluvial transport was classified as residual/matrix. Cortex in the form of a heavily weathered exterior surface as yet unflaked was classified as weathering rind.

2.3.2.1 Identification of Raw Material Types

The following raw materials were identified during the survey of the project area: quartz, quartzite, orthoquartzite, sandstone, and metarhyolite. Stone material identification was based primarily on macroscopic observation; when necessary, a hand lens (10x magnification) or stereomicroscope (10 to 40x magnification) was used to aid determination.

2.3.2.2 Cores/Tested Material

Tested material and cores are produced via freehand or bipolar reduction in which lithic material is detached from a larger object for the purpose of producing a usable flake. Negative flake scars and remnant striking platforms are identifying attributes of a core. A core has at least four flake scars removed in an identifiable pattern. A piece of material with fewer flakes and no discernable flaking pattern is considered tested material.

Cores were sorted into classes based on flake removal direction(s). Classes include unidirectional, bidirectional, and multidirectional cores. Unidirectional cores have flakes scars in a single direction from a single striking platform. Bidirectional cores exhibit flake scars in at least two directions while multidirectional cores have three or more directions of removal (Andrefsky 2005).

2.3.2.3 Debitage

Debitage were sorted into classes based on percent body cortex on the dorsal surface. Classes include: primary cortex (retain ≥50 percent dorsal cortex), secondary cortex (retain <50 percent dorsal cortex), and non-cortex (0 percent cortex). Debitage subclasses were based on general morphology and/or completeness. Subclasses include complete/mostly complete flake, flake fragment, debris/shatter, blade/microblade, bipolar flake, and too small/indeterminate. Complete/mostly complete flakes possess striking platforms and have no more than lateral or distal portions absent. Flake fragments are the distal or lateral portions of flakes with either a missing or partially missing striking platform. Debris/shatters are those fragments that cannot be positively identified as a flake fragment.

The size of each debitage was determined by fitting it into one of a series of circles with graduated diameters. Size grades for debitage were determined by the diameter of the smallest circle into which it fit. Size grades begin at less than 0.95 cm (0.375 in; size grade G1) and end at 10.48 to 11.11 cm (4.125 to 4.375 in; size grade G17); size grades increase in 0.635-cm (0.25-in) increments. The intervals are roughly equivalent to the diagonals of squares that progressively increase in 0.635-cm (0.25-in) increments. This provides a general and relative characterization of debitage sizes rather than an exact measurement of length and width.

2.3.2.4 Fire-Cracked Rock

Fire-Cracked Rock (FCR) is a stone that has been reddened, cracked, crazed, and/or vitrified during exposure to heat and fire. These stones are byproducts from boiling receptacles, hearths, and earth-ovens. The FCR were primarily identified by distinct reddening and sharp angularity and were sorted by material type and weighed.

2.3.2.5 Flaked Stone Tools

Artifacts classified as flaked stone tools are the result of reductive bipolar, knapping, or pressure flaking processes; flaked stone tools exhibit edge modification and/or use-wear. Flaked stone tools were organized into classes and subclasses based on overall design and shape; tool types identified in the lithic assemblage are defined below.

Bifaces are tools that have been flaked across two opposing faces (Crabtree 1972); these faces meet to form an edge that circumscribes the entire artifact. Bifaces can also be opposing bifacially retouched margins, depending on the nature of the reduction complexity (e.g., the manufacture of

a biface from a very thin flake blank would not necessarily require invasive thinning). The general shape and edge characteristics of a biface become more regular as the form is reduced and shaped.

Bifaces were divided into early, middle, and late stage subclasses based on the extent of flaking and other modifications. The subclass categories refer to the bifacial reduction phase. Those classified as early stage bifaces were minimally/weakly bifacial. Early stage bifaces exhibit bulbar flake scars produced by percussion flaking, square to sinuous margin edges, and irregular topography. Middle stage bifaces exhibit bulbar flake scars that typically extend to at least the center of the biface, less sinuous margins, and a relatively continuous flake pattern on both faces. Middle stage bifaces may or may not have undergone initial shaping. Late stage bifaces have undergone shaping and exhibit a regularized topography, straighter margins, and a thinner cross-section relative to earlier stages. Faces may exhibit evidence of secondary thinning, which partially obliterates previous flake scars. The primary distinguishing factor between a late stage biface and a finished biface, or projective point/knife (PPK), is the presence of a diagnostic haft element. An unfinished biface exhibiting macroscopically visible use-wear is classified as an "unfinished biface used as a tool."

A PPK is a finished biface. It exhibits distally converging lateral margins that meet at an acute angle (i.e., the point) and a haft element at the opposing end (e.g., stem or notches). PPKs were analyzed based on morphology and attributes of manufacture. Cultural and temporal stylistic differences serve as diagnostic chronological markers, providing a means of relative site dating. Interpretations of morphology and temporal affiliation follow nomenclature by Hranicky (1994).

Scrapers are tools with wide working edges and a moderate to steep edge angle. Scrapers can be unifacially or bifacially worked complete tools. Scrapers are classed as a separate lithic class. Subclasses are based on the location of the working surface and/or overall size (e.g., end scraper, thumbnail scraper).

Debitage exhibiting use or retouch were classified as retouched/utilized debitage in the flaked stone tool group. Use causes the edge of a flake to have a regular pattern of edge damage manifested as either microflaking or grinding that can be attributed to tool use. Retouch is a deliberate modification (not microflaking) to the edge of a flake along one or more margins. Retouch can be unifacial or bifacial but does not extend too far from the margin (Odell 2003). A spokeshave is a tool with a single concave notch likely used for working wood or bone. Debitage were only classified as utilized/retouched if the modification was unmistakable.

2.3.2.6 Ground/Battered Stone

Ground or battered stones are manufactured via abrasion, polish, or impaction mechanisms that may be intentional or the result of general usage (Adams 2002). Grinding use creates a polished surface which is planar or rounded; impaction use creates a pitted, pecked, or even fractured surface. Ground/battered stone were sorted into classes based on overall morphology and general shape of the ground or battered surfaces. Examples of ground/battered stone tools include handstones, hammerstones, and abraders.

Handstones are a tool used in planar grinding against a larger milling slab, usually for food processing. They often have multiple grinding surfaces located on several facets. Hammerstones are tools used to strike or crush another object. They are often used for tool production, though it possible that they could also be used for food processing.

Abraders are used to grind or polish the surface of another object. They are primarily utilized in tool production and maintenance such as platform preparation for stone tool production or polishing and shaping wooden surfaces.

Where possible, a subclass was also assigned to the tool; these include descriptions of ground stone cross-section, grooves, or other secondary usage. The classes and subclasses are based on Wright's (1992) classification system.

2.3.2.7 Unmodified Cultural

Unmodified cultural lithics are natural stone or crystalline objects recovered from archaeological contexts that have not been intentionally modified. Context is the primary basis for the classification of artifacts in this group. The manuport class is the only one represented in this assemblage. Manuports are stone objects transported via human agency from a natural context and are otherwise unmodified.

2.4 EXPECTED RESULTS

Based on Wilkins et al.'s 2015 results, a light scatter of prehistoric artifacts was anticipated within the APE. Wilkins et al. (2015) recovered seven prehistoric artifacts from three STPs within the current APE. Recovered material included one core from an isolated STP as well as four FCR, one biface reduction flake, and one piece of shatter from two adjacent STPs. While the presence of FCR in adjacent STPs suggested that prehistoric hearth features may be present, the low-density distribution of cultural material across this portion of the site did not suggest intensive occupation. Wilkins et al. (2015) did not recover any prehistoric ceramics from this portion of 44NN0024, suggesting it was not utilized for the food preparation/consumption activities evident within the site core southeast of the APE. Therefore, it was expected that the current investigation would yield predominantly lithic artifacts, likely associated with stone tool production, with a low to moderate potential for archaeological features.

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3.0 RESULTS

The supplemental archaeological evaluation of 44NN0024 consisted of the excavation of 63 STPs and four TUs, resulting in the recovery of 231 prehistoric artifacts and four faunal remains (Figure 3-1). At the time of this study, the APE largely consisted of a forested upland environment near the tip of a peninsula above Skiffe's and Bailey creeks (Figure 3-2). Erosion is evident in several places along the peninsula's margins, where slopes in excess of 15 percent are common (Figures 3-3 3-4). Obvious ground disturbances include actively used gravel access roads, disused two-track dirt roads, spoil piles/fox holes attributed to military training activities, and drainage ditches (Figure 3-5).

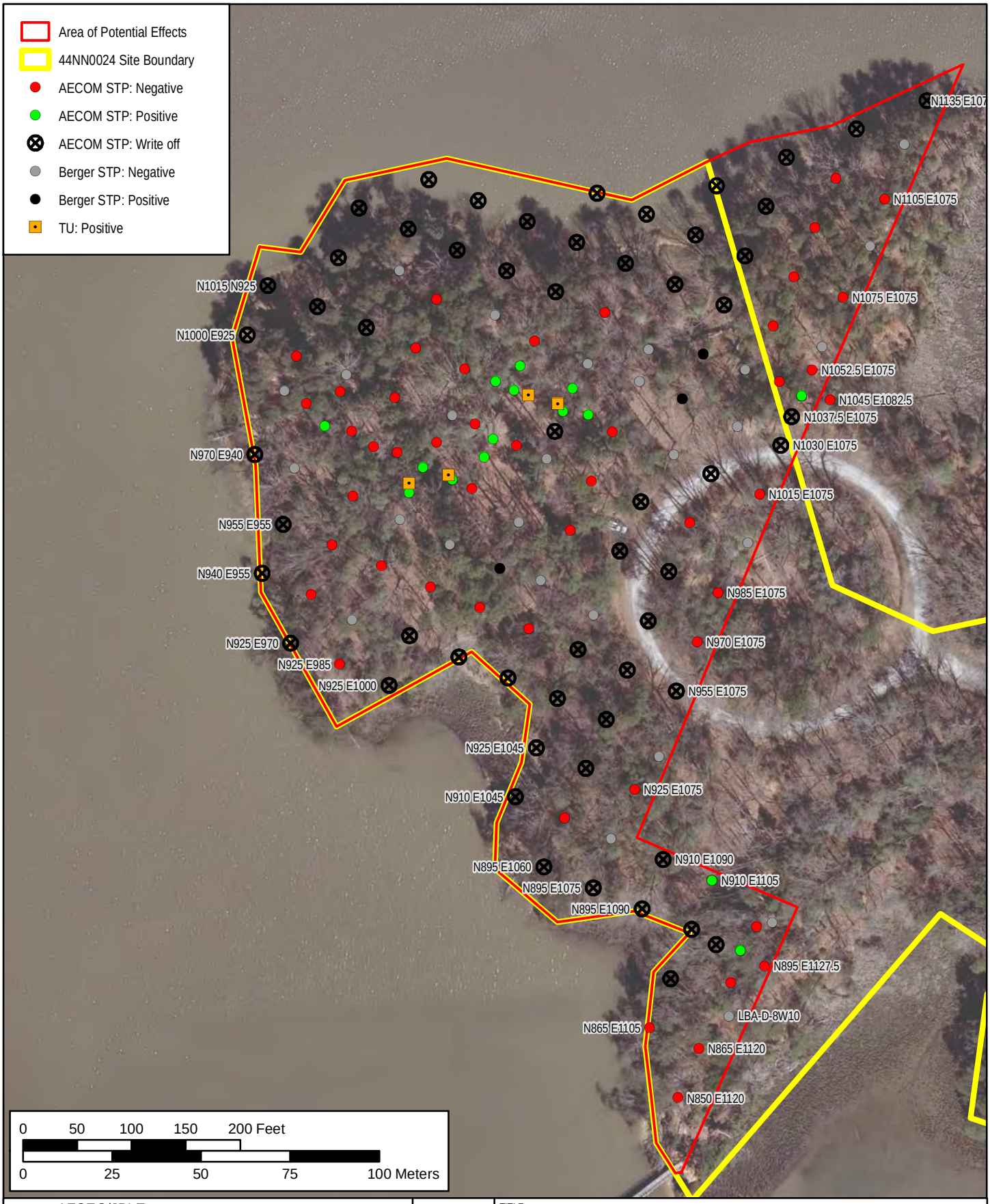
3.1 SHOVEL TESTING

A 15-m (49.2-ft) survey grid superimposed atop Berger's previous 30-m (98.4-ft) grid yielded a total of 127 primary STP locations within the APE. Of these, 84 were written off due to their collocation with a previous Berger STP (n=30) or their location in open water (n=34), on slopes greater than 15 percent (n=12), or within areas of modern ground disturbance (n=8). The remaining 43 primary STP locations were excavated, of which seven were positive for cultural material. An additional 20 radial STPs were excavated at 7.5-m (24.6-ft) intervals to delineate positive STPs.

Soil profiles were fairly consistent throughout the APE and generally revealed three strata. Stratum I typically consisted of dark grayish brown (10YR 4/2) to gray (10YR 5/1) silt loam representing the surface mineral layer (A horizon). In most instances, the first 2 to 5 cm (0.06 to 0.16 ft) of Stratum I was a distinct surficial organic layer (O horizon) consisting of the native root mat. While technically representing two distinct strata, they were screened as a single provenience during shovel testing given the difficulty of separating the thin O and A horizons; the combined thickness of these layers was generally less than 10 cm (0.33 ft). No evidence for a distinct plowzone (Ap horizon) was observed in any of the STPs.

Stratum II typically consisted of light brownish gray (10YR 6/2) to pale yellow (2.5Y 7/3) compact silt loam representing the eluvial zone (E horizon). The thickness of the E horizon generally ranged between 10 and 20 cm (0.33 and 0.66 ft). Lastly, Stratum III typically consisted of dark yellowish brown (10YR 4/6) to brownish yellow (10YR 6/8) compact silt loam or silty clay loam representing subsoil (B horizon). The density of the E and B horizons was pervasive but does not appear to be the result of mechanical compaction given its occurrence in every STP. Rather, native soils appear to have undergone some form of diagenetic consolidation likely related to water displacement, natural soil loading, and/or other processes. Figure 3-6 provides a representative STP profile.

In total, 54 nondiagnostic prehistoric lithic artifacts and three faunal remains were recovered from 15 STPs (Table 3-1). These artifacts are described in greater detail in section 3.3. Additionally, eight modern objects (e.g., bullet casings, plastic) and approximately 1.4 kilograms (kg) (3 pounds [lbs]) of marine shell were noted and discarded in the field. All modern debris is attributed to military training activities regularly conducted within 44NN0024. The discarded shell was identified within STP N910 E1105 but did not appear to represent a primary cultural deposit. The STP was located in a small, highly constricted area at the base of a swale adjacent to the tidal marsh, and the shell remains had clearly eroded from an unknown upslope location. Additionally, no prehistoric or historic artifacts were found in association with the shell remains.



CLIENT	AFCEC/JBLE
PROJ	44NN0042 Supplemental Phase II
SCALE	1:1,450
SOURCE	ESRI 2019
	U:\Projects\VA\FortEustis\920 GIS\Results20190813.mxd

TITLE

Plan of Excavations

AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

PROJ NO 60542271

FIGURE 3-1

Figure 3-2. Overview of Forested Uplands in Center of APE, Facing South

Figure 3-3. Overview of Erosion at Northwestern End of APE, Facing South

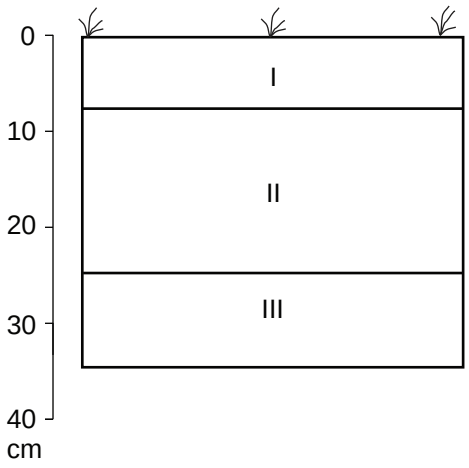
CLIENT AFCEC/JBLE		TITLE Project Photographs	
PROJ 44NN0024 Supplemental Phase II			
SCALE N/A			
SOURCE N/A			
S:\900-GIS and Graphics\930 Graphics\931 Illustrator		AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271 FIGURES 3-2 and 3-3

Figure 3-4. Overview of Slopes along North Side of APE, Facing Northeast

Figure 3-5. Overview of Road and Drainage Ditch Disturbances on West Side of APE, Facing South

CLIENT AFCEC/JBLE		TITLE Project Photographs
PROJ 44NN0024 Supplemental Phase II		
SCALE N/A		
SOURCE N/A		AECOM 12420 Milestone Center Dr. Germantown, MD 20876
S:\900-GIS and Graphics\930 Graphics\931 Illustrator		PROJ NO 60542271 FIGURES 3-4 and 3-5

STP N1015 E1000



I = Dark grayish brown (10YR 4/2) silty clay loam combined A/O horizon
II = Pale brown (10YR 6/3) compact silt loam E horizon
III = Dark yellowish brown (10YR 4/6) compact silty clay loam B horizon

CLIENT AFCEC/JBLE		TITLE Representative STP Profile	
PROJ 44NN0024 Supplemental Phase II			
SCALE As Shown		AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
SOURCE N/A			FIGURE 3-6
S:\900-GIS and Graphics\930 Graphics\931 Illustrator			

Table 3-1. STP Artifact Summary

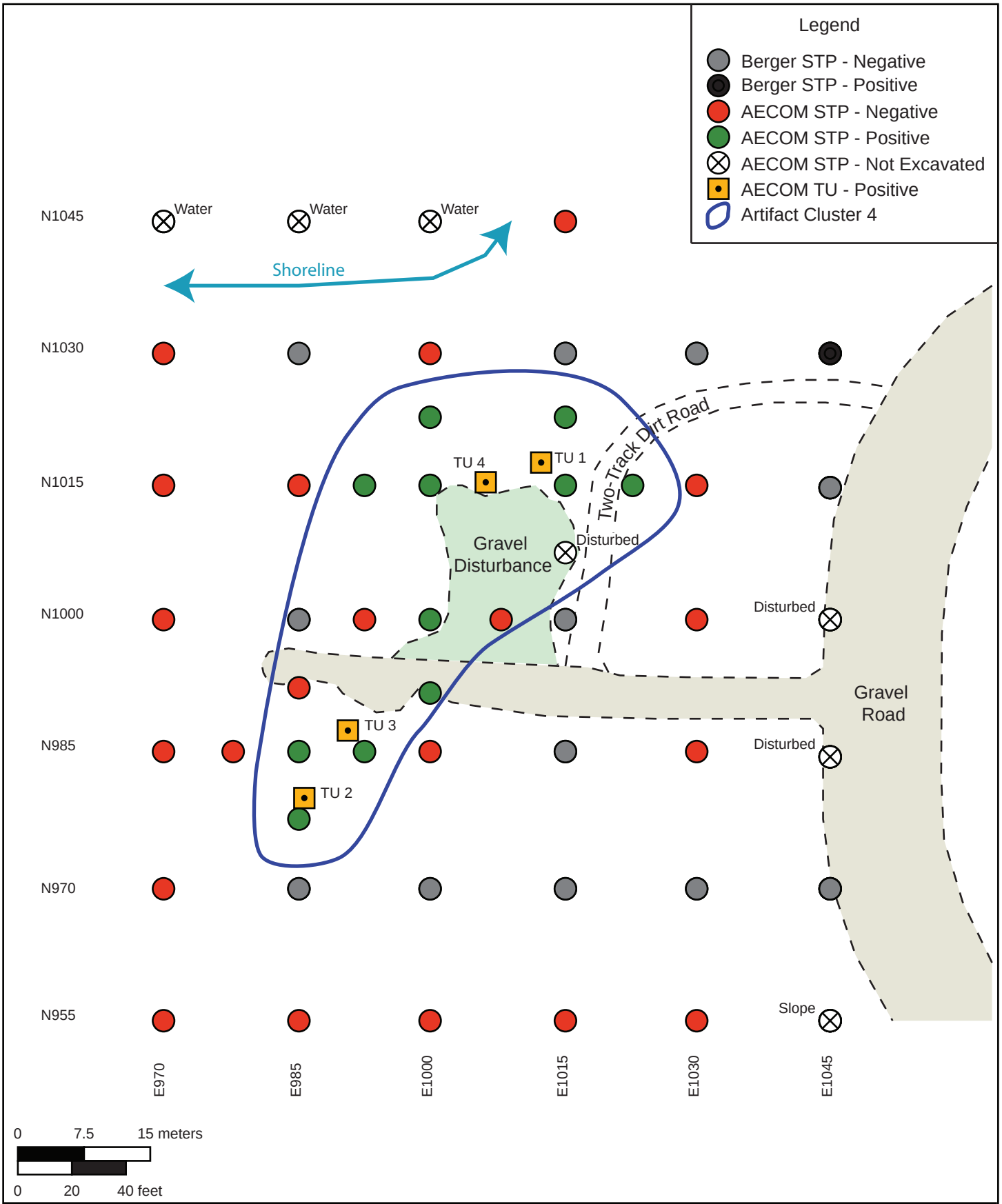
STP	Group					Count
	Core/Tested Material	Debitage	FCR	Flaked Stone Tool	Foodways	
N895 E1120	1				1	**2**
N910 E1105					2	**2**
N977.5 E985		17				**17**
N985 E955		2		1		**3**
N985 E985		2				**2**
N985 E992.5		4				**4**
N992.5 E1000		3				**3**
N1000 E1000		3				**3**
N1015 E992.5		2	1			**3**
N1015 E1000		1				**1**
N1015 E1015		5		1		**6**
N1015 E1022.5		2				**2**
N1022.5 E1000	1					**1**
N1022.5 E1015		5		1		**6**
N1045 E1075		1		1		**2**
Total	**2**	**47**	**1**	**4**	**3**	**57**

Nearly 89 percent (n=48) of the artifacts were recovered from an area broadly bound by the N977.5, N1022.5, E985, and E1022.5 transects. STPs excavated in this area revealed a light scatter of prehistoric lithic artifacts, whereas positive STPs elsewhere within the APE represent isolated find spots. This small prehistoric scatter was defined by 10 positive STPs along a southwest-northeast axis between radial STPs N977.5 E985 and N1022.5 E1015. Wilkins et al. (2015) previously identified three site loci, labeling each as an "Artifact Cluster". Following that nomenclature, the prehistoric scatter identified during the current shovel testing is designated Artifact Cluster 4 (Figure 3-7).

Central to Artifact Cluster 4, however, are areas of prior ground disturbance. An actively used gravel access road is present between the N985 and N1000 transects, while the area between transects N1000, N1015, E1000, and E1015 exhibits compacted construction gravel immediately below the surface. This area may have been used as a former parking/staging zone. Older growth oak and beech trees are evident along the exterior of this area, with substantially younger tree growth in the interior (Figures 3-8 and 3-9). The density of the gravel precluded excavation here.

3.2 TEST UNITS

Based on the results of STP excavation, four TUs were excavated to investigate artifact distributions within Artifact Cluster 4 (Figure 3-1). As noted, extensive ground disturbances characterize the center of the cluster, restricting TU placement to the cluster's periphery and in the vicinity of STPs yielding the greatest quantities/varieties of prehistoric material. The results of each TU are presented below with descriptions of stratigraphy and artifact content. TU coordinates correspond to each unit's southwest corner.



CLIENT	AFCEC/JBLE
PROJ	44NN0024 Supplemental Phase II
SCALE	As Shown
SOURCE	N/A
	S:\900-GIS and Graphics\930 Graphics\931 Illustrator

TITLE
Site Plan Detail Showing Artifact Cluster 4 and Local Disturbances

AECOM
12420 Milestone Center Dr.
Germantown, MD 20876

PROJ NO 60542271
FIGURE 3-7

Figure 3-8. Overview of Disturbed Parking/Staging Area at Center of Artifact Cluster 4, Facing North

Figure 3-9. Overview of Disturbed Parking/Staging Area at Center of Artifact Cluster 4, Facing South

CLIENT AFCEC/JBLE		TITLE Project Photographs
PROJ 44NN0024 Supplemental Phase II		
SCALE N/A		
SOURCE N/A	AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
S:\900-GIS and Graphics\930 Graphics\931 Illustrator		FIGURES 3-8 and 3-9

3.2.1 TU 1

TU 1 was placed at N1017 E1012 to investigate distributions at the northeastern end of Artifact Cluster 4. STP N1015 E1015 and radial STP N1022.5 E1015 each yielded five debitage and one flaked stone tool, while radial STP N1015 E1022.5 yielded two debitage. Given the relatively high quantity of material recovered from STPs N1015 E1015 and N1022.5 E1015, TU 1 was placed between the two where modern disturbances and tree growth would allow.

Excavation revealed four strata (Figure 3-10). Stratum I consisted of a 4-cm (1.6-in) thick brown (10YR 4/3) loam O horizon. Stratum II consisted of a 6-cm (0.2-ft) thick very dark grayish brown (10YR 3/2) loam A horizon. Stratum III consisted of a 24-cm (0.79-ft) thick pale yellow (2.5Y 7/3) compact silt loam E horizon. Lastly, Stratum IV consisted of the yellowish brown (10YR 5/4) compact silty clay loam B horizon extending to the base of excavation up to 43 cm (1.4 ft) below ground surface (bgs). A modern disturbance, potentially representing an auger hole associated with recent military site uses, was identified in the southwest corner of the unit as a straight-edge shaft of culturally sterile dark gray (10YR 4/1) loam extending from the ground surface to an unknown depth below the base of unit excavation.

In total, 30 prehistoric artifacts and one marine shell were recovered from TU 1, including three from the A horizon (Stratum II), 27 from the E horizon (Stratum III), and one from the B horizon interface (Stratum IV; Table 3-2). These artifacts are described in greater detail in section 3.3 below. Additionally, one modern brass bullet casing and one AA battery from Stratum I (O horizon), as well as a second bullet casing from Stratum II (A horizon), were discarded in the field.

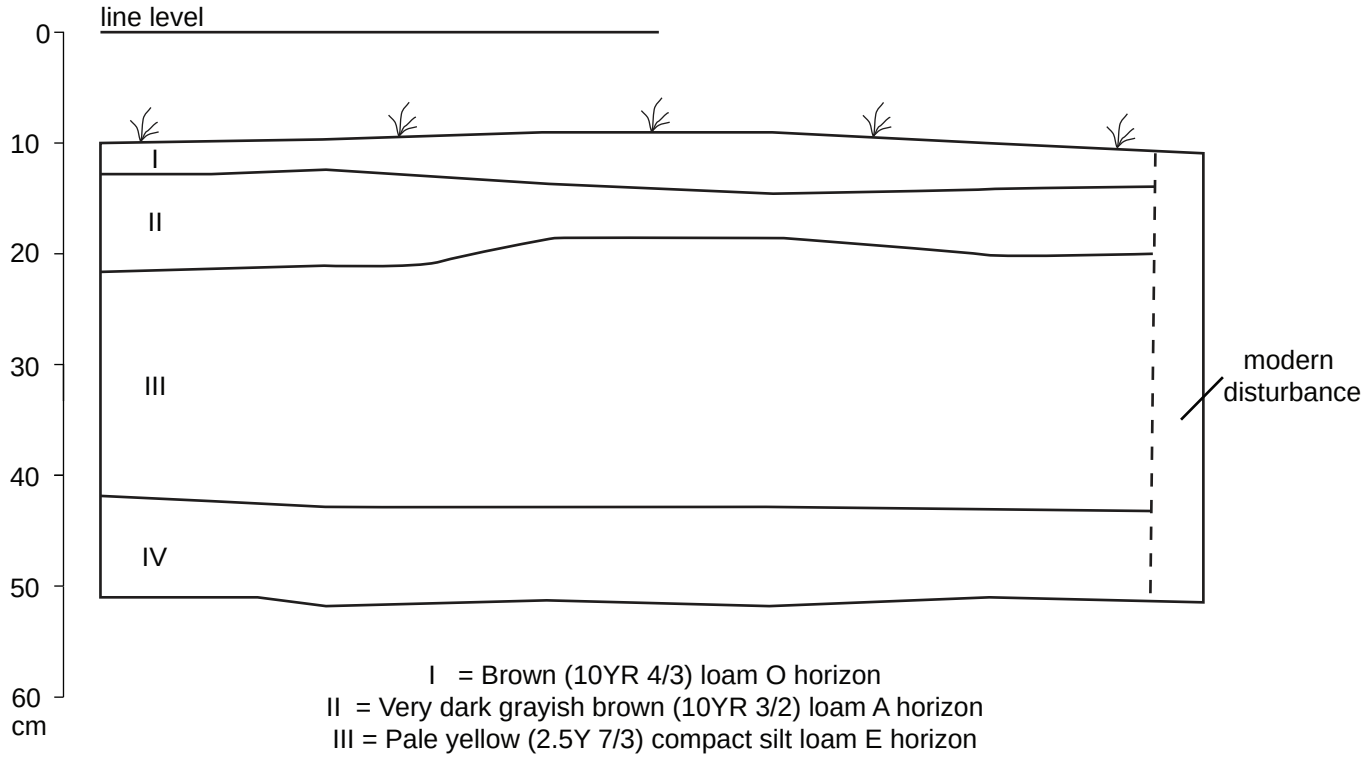
Table 3-2. TU 1 Artifact Summary

Group	Stratum II	Stratum III		Stratum IV	Count
	Level 1	Level 1	Level 2	Level 1	
Debitage	1	15	11	1	**28**
Flaked Stone Tool	1				**1**
Foodways	1				**1**
Ground/Battered Stone			1		**1**
Total	**3**	**15**	**12**	**1**	**31**

3.2.2 TU 2

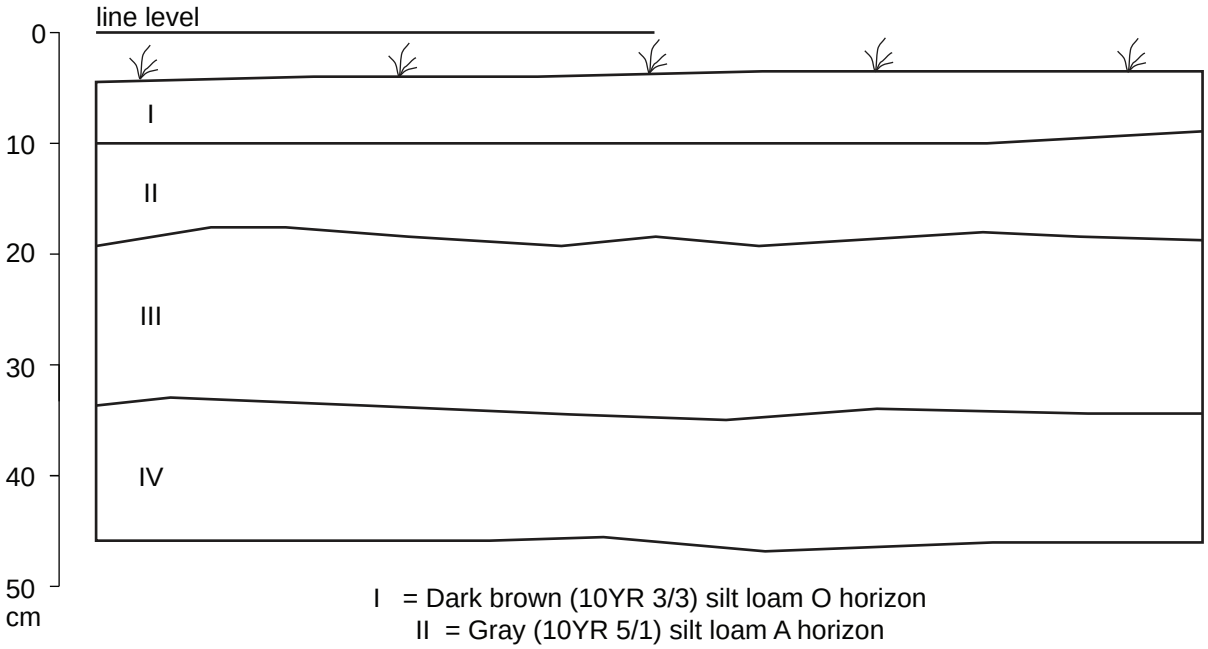
TU 2 was placed at N978 E985 to investigate the high quantity of lithic artifacts (n=17) recovered from radial STP N977.5 E985. The unit was placed slightly north-northeast of this STP given that it represents the southwesternmost positive STP in Artifact Cluster 4. Primary STP N985 E985 yielded two debitage while radial STP N985 E992.5 yielded four debitage; AECOM and Berger STPs to the south produced no cultural material. Therefore, while unit placement was largely determined by proximity to radial STP N977.5 E985, its position slightly north of that STP was based on local distributions.

Excavation revealed four strata (Figure 3-11). Stratum I consisted of a 9-cm (0.3-ft) thick dark brown (10YR 3/3) silt loam O horizon. Stratum II consisted of a 6-cm (0.2-ft) thick gray (10YR 5/1) silt loam A horizon. Stratum III consisted of a 17-cm (0.56-ft) thick pale yellow (2.5Y 7/3)



I = Brown (10YR 4/3) loam O horizon
II = Very dark grayish brown (10YR 3/2) loam A horizon
III = Pale yellow (2.5Y 7/3) compact silt loam E horizon
IV = Yellowish brown (10YR 5/4) compact silt loam B horizon
Modern Disturbance = Dark gray (10YR 4/1) loam

CLIENT	AFCEC/JBLE	TITLE	TU 1 South Profile
PROJ	44NN0024 Supplemental Phase II		
SCALE	As Shown		
SOURCE	N/A	AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
S:\900-GIS and Graphics\930 Graphics\931 Illustrator			FIGURE 3-10



I = Dark brown (10YR 3/3) silt loam O horizon
II = Gray (10YR 5/1) silt loam A horizon
III = Pale yellow (2.5Y 7/3) compact silt loam E horizon
IV = Brownish yellow (10YR 6/8) compact silt loam B horizon

CLIENT	AFCEC/JBLE	TITLE	TU 2 East Profile
PROJ	44NN0024 Supplemental Phase II		
SCALE	As Shown		
SOURCE	N/A	AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
S:\900-GIS and Graphics\930 Graphics\931 Illustrator			FIGURE 3-11

compact silt loam E horizon. Lastly, Stratum IV consisted of the brownish yellow (10YR 6/8) compact silt loam B horizon extending to the base of excavation up to 44 cm (1.4 ft) bgs.

In total, 93 prehistoric artifacts were recovered from TU 2, all of which were identified within the Stratum III (E horizon; Table 3-3). These artifacts are described in greater detail in section 3.3 below. Additionally, one modern bullet casing was found within Stratum I (O horizon) and discarded in the field.

Table 3-3. TU 2 Artifact Summary

Group	Stratum III		Count
	Level 1	Level 2	
Core/Tested Material	4	1	**5**
Debitage	71	16	**87**
Unmodified Cultural	1		**1**
Total	**76**	**17**	**93**

3.2.3 TU 3

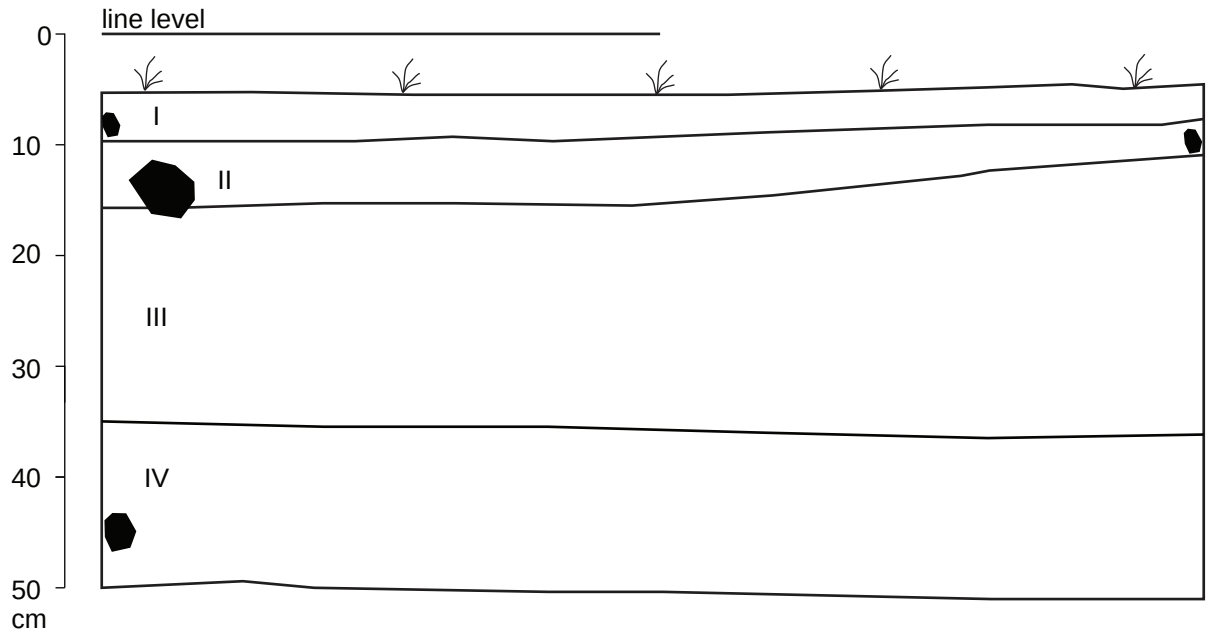
TU 3 was placed at N986 E991 to investigate artifact distributions immediately south of the disturbed area central to Artifact Cluster 4. The unit's specific location was based on four debitage recovered from radial STP N985 E992.5 and two debitage recovered from primary STP N985 E985. While these STPs did not yield high artifact counts, they represent the two positive STPs closest to the southern edge of the ground disturbance central to Artifact Cluster 4. Since TU 2 investigated the area around radial STP N977.5 E985, TU 3 was utilized to provide additional testing in the undisturbed portions of Artifact Cluster 4's southwestern half.

Excavation revealed four strata (Figure 3-12). Stratum I consisted of a 3-cm (0.1-ft) thick dark brown (10YR 3/3) silt loam O horizon. Stratum II consisted of a 5-cm (0.16-ft) thick gray (10YR 5/1) silt loam A horizon. Stratum III consisted of a 23-cm (0.75-ft) thick pale yellow (2.5Y 7/3) compact silt loam E horizon. Lastly, Stratum IV consisted of the brownish yellow (10YR 6/8) very compact silt loam B horizon extending to the base of excavation up to 45 cm (1.5 ft) bgs.

In total, 47 prehistoric artifacts were recovered from TU 3, all of which were identified within the Stratum III (E horizon; Table 3-4). These artifacts are described in greater detail in section 3.3 below.

Table 3-4. TU 3 Artifact Summary

Group	Stratum III		Count
	Level 1	Level 2	
Core/Tested Material	1		**1**
Debitage	28	15	**43**
FCR	1	1	**2**
Ground/Battered Stone		1	**1**
Total	**30**	**17**	**47**



I = Dark brown (10YR 3/3) silt loam O horizon
II = Gray (10YR 5/1) silt loam A horizon
III = Pale yellow (2.5Y 7/3) compact silt loam E horizon
IV = Brownish yellow (10YR 6/8) compact silt loam B horizon
● = Root

CLIENT	AFCEC/JBLE	TITLE	TU 3 East Profile
PROJ	44NN0024 Supplemental Phase II		
SCALE	As Shown		
SOURCE	N/A	AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
S:\900-GIS and Graphics\930 Graphics\931 Illustrator			FIGURE 3-12

3.2.4 TU 4

TU 4 was placed at N1015 E1005 to investigate artifact distributions immediately north of the disturbed area central to Artifact Cluster 4. Six positive STPs in this vicinity indicate that intact prehistoric deposits extend north of the disturbed area. Because artifact quantities in the north half of Artifact Cluster 4 generally increase toward the center, TU 4 was placed as close to the center as modern disturbances and tree growth would allow. Since the dense, subsurface construction gravel is generally present south of the N1015 transect, TU 4 could not be placed any farther south than this line.

Excavation revealed four strata (Figure 3-13). Stratum I consisted of a 3-cm (0.1-ft) thick brown (10YR 4/3) loam O horizon. Stratum II consisted of a 3-cm (0.1-ft) thick very dark grayish brown (10YR 3/2) silt loam A horizon. Stratum III consisted of a 23-cm (0.75-ft) thick very pale brown (10YR 7/3) compact silt loam E horizon. Lastly, Stratum IV consisted of the dark yellowish brown (10YR 4/4) very compact silty clay loam B horizon extending to the base of excavation up to 42 cm (1.4 ft) bgs.

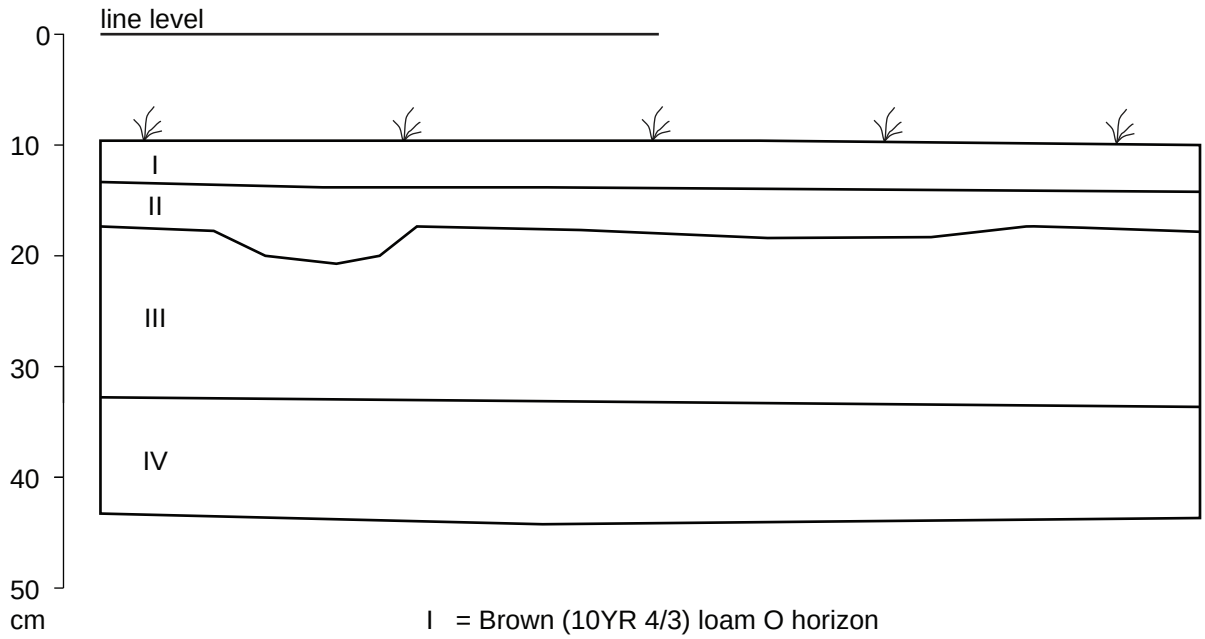
In total, seven prehistoric artifacts were recovered from TU 4, all of which were identified within the Stratum III (E horizon). These include six pieces of debitage and one ground/battered stone, which are described in greater detail in section 3.3 below. Additionally, 12 modern bullet casings, two plastic stakes, and three plastic tarp fragments were identified within Stratum I (O horizon) and discarded in the field, while two additional bullet casings were identified within Stratum II (A horizon) and discarded in the field.

3.3 ARTIFACTS

In total, 235 artifacts were recovered from 44NN0024, including 231 prehistoric artifacts and four faunal remains (Table 3-5). Seventeen modern bullet casings, eight pieces of plastic, one rope, and one AA battery were noted and discarded in the field. Additionally, approximately 1.4 (kg) (3 lbs) of shell were weighed and discarded in the field. Over 96 percent of the artifacts were recovered from the E horizon (n=226), with substantially smaller quantities recovered from the A (n=5) and B (n=1) horizons. Only three artifacts were recovered from a potentially disturbed surface layer in STP N1000 E1000.

Table 3-5. Artifact Summary

Group	Count	Percent
Core/Tested Material	8	3.40
Debitage	211	89.79
FCR	3	1.28
Flaked Stone Tool	5	2.13
Foodways	4	1.70
Ground/Battered Stone	3	1.28
Unmodified Cultural	1	0.43
Total	**235**	**100.00**



I = Brown (10YR 4/3) loam O horizon
II = Very dark grayish brown (10YR 3/2) silt loam A horizon
III = Very pale brown (10YR 7/3) compact silt loam E horizon
IV = Dark yellowish brown (10YR 4/4) compact silt loam B horizon

CLIENT	AFCEC/JBLE	TITLE	TU 4 North Profile
PROJ	44NN0024 Supplemental Phase II		
SCALE	As Shown		
SOURCE	N/A	AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
S:\900-GIS and Graphics\930 Graphics\931 Illustrator			FIGURE 3-13

3.3.1 Faunal Remains

Faunal remains account for less than 2 percent of the recovered artifacts (n=4) and are entirely represented by four oyster (*Crassostrea virginica*) shells assigned to the foodways group. Two of these were collected as samples from STP N895 E1105, while the other two represent the only faunal remains identified within their respective proveniences.

3.3.2 Prehistoric Artifacts

Prehistoric artifacts account for 98.3 percent (n=231) of the assemblage and include only lithic material (Table 3-6; Figure 3-14). Raw materials include quartzite, quartz, orthoquartzite, sandstone, and metarhyolite (Table 3-7). By weight, quartzite represents 56.25 percent (2,707.46 g [95.5 oz]) of the lithics, followed by sandstone at 24.33 percent (1,170.85 g [41.3 oz]), orthoquartzite at 16.28 percent (783.48 g [27.6 oz]), and smaller proportions of quartz and metarhyolite. By count, quartzite accounts for 82.25 percent (n=190) followed by quartz at 7.79 percent (n=18) and smaller quantities of orthoquartzite (n=10), sandstone (n=9), and metarhyolite (n=4). Each material type could have been sourced along the local shoreline, and the differing proportions of each material likely reflect selection preferences and resource availability.

Table 3-6. Prehistoric Artifact Summary

Group	Count	Percent
Core/Tested Material	8	3.46
Debitage	211	91.34
FCR	3	1.30
Flaked Stone Tool	5	2.16
Ground/Battered Stone	3	1.30
Unmodified Cultural	1	0.43
Total	**231**	**100.00**

Table 3-7. Summary of Lithic Groups by Material Type

Material		Group						Total	Percent
		CTM	DEB	FCR	FST	GBS	UC		
Metarhyolite	Count		3		1			**4**	**1.73**
	Wt (g)		*1.95*		*17.28*			***19.23***	***0.40***
Orthoquartzite	Count	1	8		1			**10**	**4.33**
	Wt (g)	*384.34*	*343.69*		*55.45*			***783.48***	***16.28***
Quartz	Count	1	16		1			**18**	**7.79**
	Wt (g)	*100.81*	*25.49*		*5.7*			***132***	***2.74***
Quartzite	Count	4	183		2	1		**190**	**82.25**
	Wt (g)	*1,866.18*	*715.63*		*24.65*	*101*		***2,707.46***	***56.25***
Sandstone	Count	2	1	3		2	1	**9**	**3.90**
	Wt (g)	*213.49*	*24.26*	*222.32*		*626.42*	*84.36*	***1,170.85***	***24.33***
Total Count		**8**	**211**	**3**	**5**	**3**	**1**	**231**	**100.00**
Total Weight (g)		***2,564.82***	***1,111.02***	***222.32***	***103.08***	***727.42***	***84.36***	***4,813.02***	***100.00***

CTM=Core/Tested Material; DEB=Debitage; FCR=Fire-Cracked Rock; FST=Flaked Stone Tool; GBS=Ground/Battered Stone; UC=Unmodified Cultural

Top Row: Metarhyolite Middle Phase Biface (9.01); Quartz Middle Phase Biface (18.01)
Middle Row: Quartzite Flakes (22.05)
Bottom Row: Quartzite Bipolar Flakes (28.02 and 12.01)

Sandstone Hammerstones (30.01 and 31.01)

CLIENT AFCEC/JBLE		TITLE Representative Prehistoric Artifacts
PROJ 44NN0024 Supplemental Phase II		
SCALE As Shown		
SOURCE N/A	AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
S:\900-GIS and Graphics\930 Graphics\931 Illustrator		FIGURE 3-14

3.3.2.1 Core/Tested Material

Core/tested material artifacts account for 3.46 percent of the prehistoric artifact assemblage (n=8). The group includes two tested sandstone cobbles, two tested quartzite cobbles, one tested orthoquartzite cobble, one bipolar quartz core with multidirectional flaking, one bifacial quartzite core with multidirectional flaking, and one formalized quartzite core with unidirectional flaking. These artifacts represent various stages of core reduction and the initial phases of lithic tool manufacture.

3.3.2.2 Debitage

Debitage dominates the prehistoric artifact assemblage, accounting for 91.34 percent (n=211). Raw material types include quartzite (n=183), quartz (n=16), orthoquartzite (n=8), metarhyolite (n=3), and sandstone (n=1). The group includes complete/mostly complete flakes (n=110), flake fragments (n=85), bipolar flakes (n=12), and debris/shatter (n=4). Of these 75.83 percent (n=160) have no cortex, 15.17 percent (n=32) have less than 50 percent cortex, and the remaining 9 percent (n=19) have more than 50 percent cortex. The large percentage of non-cortex flakes is indicative of biface reduction, retouch, sharpening, and finishing activities. It is assumed that larger flakes, with more cortical surface represent initial stages of tool production, while smaller flakes, with less external cortex, represent the later stages of tool making and retouch.

A review of complete and mostly complete flake size grades supports this assertion, as non-cortex flakes cluster within the smallest size grades (Table 3-8). Over 90 percent of non-cortex flakes (n=75) fall within a size grade between 15.88 and 28.58 mm (0.625 and 1.125 in). Flakes with less than 50 percent cortex tend to be somewhat larger, with over 83 percent (n=15) between 28.58 and 47.63 mm (1.125 and 1.875 in). These flakes may be more indicative of bifacial reduction. Large flakes more typical of the primary reduction stage are the least common, with 75 percent (n=6) measuring greater than 41.28 mm (1.625 in). These distributions suggest that while initial reduction was occurring, the production activities were more commonly dedicated to bifacial reduction and tool finishing/maintenance.

Table 3-8. Complete/Mostly Complete Flake Size Grades

Cortex %	Size Grade (in/mm)						Total
	0.625	0.875	1.125	1.375	1.625	1.875	
	15.88	22.23	28.58	34.93	41.28	47.63	
0	35	30	10	6	2		**83**
< 50	1	2	7	2	1	5	**18**
≥ 50		1	1	1	4	2	**8**
Total	**36**	**33**	**18**	**9**	**7**	**7**	**110**

3.3.2.3 FCR

FCR accounts for 1.3 percent (n=3) of the prehistoric assemblage, all of which represent broken sandstone cobbles. Individual pieces ranged from as little as 16.54 g (0.58 oz) to as much as 128.66 g (4.54 oz).

3.3.2.4 Flaked Stone Tool

Flaked stone tools account for 2.16 percent of the prehistoric assemblage (n=5). Artifact classes include retouched/reutilized debitage (n=2), bifaces (n=2), and scrapers (n=1). The retouched/reutilized debitage includes one quartzite spokeshave and one orthoquartzite utilized flake. The bifaces include two in the middle stage of production, one made of quartz and the other metarhyolite. Lastly, the scraper is a quartzite thumbnail scraper.

3.3.2.5 Ground/Battered Stone

Ground/battered stone artifacts account for 1.3 percent of the prehistoric assemblage (n=3). These include one quartzite hammerstone with more than 50 percent cortex, one sandstone hammerstone with less than 50 percent cortex, and a second sandstone hammerstone with 90 percent cortex.

3.3.2.6 Unmodified Cultural

Unmodified cultural artifacts account for 0.43 percent of the prehistoric artifacts and include a single sandstone manuport. This artifact is believed to have been transported to its location of discovery, an interpretation based on the lack of similar, naturally occurring materials in related site contexts. This 84.36-g (3-oz) cobble was recovered from the E horizon in TU 2 (Stratum III, Level 1), which contained no other unmodified cobbles. Additionally, its occurrence within a provenience containing 75 other prehistoric artifacts associated with lithic reduction activities suggests it was intentionally deposited via human agency.

3.4 INTERPRETATIONS

Site 44NN0024 represents a long-term base camp repeatedly occupied during the Early through Late Woodland periods. Initially recorded in 1975 and surveyed a decade later, 44NN0024 was most recently investigated in 2014 during Berger's assessment of the site's NRHP eligibility (Wilkins et al. 2015). Systematic shovel testing and TU excavation resulted in the recovery of 2,423 artifacts and the identification of two shell midden features. Artifacts included faunal remains (n=2,331) as well as prehistoric (n=87) and historic (n=5) material identified within three Artifact Clusters as well as in isolated locations. Faunal remains entirely consisted of marine shell, dominated by oyster (n=2,327). Prehistoric artifacts included lithics (n=68) and ceramics (n=19). Prehistoric lithics included debitage (n=43), FCR (n=20), bifaces (n=3), a cracked rock, a core, and a piece of hematite. The lithic assemblage is indicative of early to late stage tool production and includes quartzite (n=33), quartz (n=31), chert (n=2), and single examples of hematite and granite. The ceramic assemblage, which included a variety of tempers and surface treatments, was defined by specimens too eroded to assign to a particular ware type. Lastly, the minor historic assemblage included bricks (n=4) and a cut nail. Site investigations prior to Berger's evaluation have also identified similarly small quantities of historic artifacts at 44NN0024, but no evidence for significant historic occupation has been revealed to date.

Two shell midden features were also recorded during Berger's assessment. Both middens largely consisted of oyster shell and relatively small prehistoric artifact quantities. Prehistoric ceramics were recovered from both features, however, indicating that they were created at some point during the Woodland period. These features, as well as the majority of the artifacts Berger recovered, are located southeast of the current APE. Within the current APE, Berger identified seven prehistoric artifacts from three STPs. Artifacts included one core from an isolated STP as well as four FCR, one biface reduction flake, and one piece of shatter from two adjacent STPs.

The current study included the excavation of 63 STPs and four TUs, resulting in the recovery of 231 prehistoric artifacts and four faunal remains. The prehistoric assemblage is dominated by debitage (n=212), followed by cores/tested material (n=8), flaked stone tools (n=5), FCR (n=3), ground/battered stone (n=3), and unmodified cultural material (n=1). These artifacts indicate that stone tool production was the primary prehistoric activity still archaeologically visible within the APE. Correlations between debitage size grade and cortex percentage indicate that while all stages of stone tool production are evident, most of the debitage was produced during late stage manufacturing/tool maintenance. Nevertheless, cores and tested material, along with some of the debitage, attest to the initial phase of lithic reduction. Only a few finished tools were identified, including a spokeshave, utilized flake, and a thumbnail scraper.

Raw lithic materials include quartzite (n=190), quartz (n=18), orthoquartzite (n=10), sandstone (n=9), and metarhyolite (n=4). These all likely originated as fluvial deposits sourced from the local shoreline. The trend in lithic materials selection is generally consistent with distributions reported by Wilkins et al. (2015), where quartzite is dominant, distantly followed by quartz and other less commonly utilized materials.

Artifacts were recovered from the A (n=8), E (n=226), and B (n=1) horizons. While the A horizon showed minor disturbances in some cases, most of the artifacts were recovered from intact natural soil strata. This is consistent with Berger's findings elsewhere onsite (Wilkins et al. 2015), indicating that despite several obvious modern ground disturbances, the site's archaeological integrity has not been severely compromised.

Most of the recovered artifacts (n=226) were identified within a distinct cluster located toward the center of the APE. This large swath of level terrain may have been selected as a lithic production area for a variety of reasons. Slopes along the peninsula margins immediately north and south of Artifact Cluster 4 are comparatively gentle and may have provided relatively easy access to raw cobbles. Furthermore, wave action and erosional forces appear to be strongest at the tip of the peninsula and in the vicinity of Artifact Cluster 4, meaning raw materials may have become available in higher quantities more frequently in this area than elsewhere.

In addition to the ease of raw materials sourcing, this area may have been selected for lithic production to provide spatial segregation between manufacturing activities and the more intensively occupied site core to the southeast. Since lithic production inherently results in a scatter of sharp stone debris, removing these activities from more heavily trafficked portions of the site would have reduced the potential for injury. The tip of the peninsula offers a more isolated location where foot traffic would have been naturally limited by land's end, as opposed to areas farther up the peninsula where through-traffic may have been more regular.

The lack of diagnostic artifacts precludes being able to definitively assign the activities evident within Artifact Cluster 4 to a particular cultural period. However, given the intensive Woodland occupations that Wilkins et al. (2015) reported within the site core southeast of the APE, it is likely that Artifact Cluster 4 represents a Woodland period production site. That it is spatially isolated from the food preparation/consumption activities that characterize the subsistence-focused site core suggests a level of intentionality conscious of the site's broader functional layout. While it is true that Wilkins et al. (2015) reported lithic manufacturing artifacts within and around the site core, indicating that these activities may not have always been isolated from other site uses, it is important to emphasize that lithic production is the only prehistoric activity archaeologically visible in Artifact Cluster 4; there is no conclusive evidence for dwellings, middens, storage pits,

cooking hearths, or any other indication that it was ever used for anything other than lithic production. This suggests that while other site areas may have experienced functional overlap, the center of the APE remained deliberately devoted to lithic production and, seemingly, to the exclusion of other activities. Thus, it is likely that those who selected the APE for lithic production did so, at least in part, to keep it separate from other coeval activity areas. For these reasons, and despite the lack of diagnostic artifacts, the prehistoric activities evident within the APE are attributed to the Woodland period.

As the foregoing discussion indicates, the APE retains archaeological integrity and includes a discrete lithic production area within a larger, repeatedly-occupied Woodland period base camp. The current study has provided additional information on raw materials sourcing, tool production, and the spatial arrangement of site activities. Additional investigation could reveal higher resolution spatial patterning and diagnostic material, furthering the understanding of how this site was utilized and providing a comparative case study to examine similarities and differences between 44NN0024 and comparable Woodland period sites throughout Tidewater Virginia and the broader Mid-Atlantic region.

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4.0 SUMMARY AND RECOMMENDATIONS

Under contract to AFCEC and in support of JBLE-Eustis, AECOM conducted archaeological investigations at 44NN0024 in support of an EA designed to assess the impacts of erosion mitigation proposed for the shoreline at the far northwestern end of the peninsula on which the site is located. The primary objectives of this assessment were to determine whether significant archaeological deposits are present within the APE and, based upon that determination, to determine whether the proposed mitigation options would constitute an adverse effect as defined under 36 CFR 800.5(a). Under this regulation, "an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register [of Historic Places]" (USDI 2004:n.p.).

DHR determined 44NN0024 eligible for listing in the NRHP following the recommendations of Wilkins et al. (2015). The site's eligibility, however, is largely based on archaeological features and artifact distributions within the site core, located southeast of the APE. In order to assess the significance of archaeological deposits within the APE, and thus the potential for an adverse effect, AECOM conducted additional STP and TU excavation in accordance with JBLE-Eustis guidance and DHR guidelines.

The current archaeological investigations included the excavation of 63 STPs and four TUs, resulting in the recovery of 231 prehistoric artifacts and four faunal remains. While some artifacts were identified in isolated locations near the periphery of the APE, most were recovered from Artifact Cluster 4, an oblong concentration of lithic tools and debris roughly bound by the N977.5, N1022.5, E985, and E1022.5 transects. Here, relatively large quantities of debitage were found alongside smaller quantities of cores/tested cobbles, flaked stone tools, and hammerstones. All stages of stone tool production are represented within Artifact Cluster 4, which constitutes a discrete activity area spatially segregated from food production/consumption activities centered on the site core.

Central to Artifact Cluster 4, however, is an area that contains densely compacted construction gravel immediately below the surface and which may have served as a prior parking/staging area. It is unclear to what extent this disturbance has impacted any preexisting archaeological deposits, as it was not possible to manually excavate through the gravel layer.

While ground disturbances are evident throughout the APE in the form of roads, ditches, push piles, and possible parking/staging areas, most of the artifacts recovered during the current investigation originated in undisturbed, natural strata. Over 96 percent (n=226) were recovered from the E horizon and just over 2.5 percent collectively were recovered from the A (n=5) and B (n=1) horizons. The three remaining artifacts were recovered from potentially disturbed surficial soils. This indicates that, in general, the APE retains good archaeological integrity, a finding consistent with previous investigators' observations (Wilkins et al. 2015).

Based on the results of this study, archaeologically visible prehistoric activities within the APE are largely limited to stone tool production. While no diagnostic artifacts were recovered, if the deposits in the APE are contemporaneous with Woodland period occupations evident elsewhere onsite, then the APE may represent a discrete activity area within the sphere of a larger habitation. As noted, the site core is located southeast of the APE and is defined by two shell middens and associated artifacts. With the core area predominantly utilized for subsistence activities, the APE may have been specifically selected as a less heavily trafficked area where the sharp debris from stone processing would be kept at a distance from more intensively occupied site loci. Placing this

processing area at the tip of the site peninsula may have been based on raw material access as well, as more intense wave action on this headland may have more frequently eroded quartz/quartzite cobbles from the banks.

Given that the archaeological deposits identified within Artifact Cluster 4 retain integrity, incorporate a variety of stone tools, and represent a discrete activity area devoted to stone tool production, it has the potential to contribute significant information to the understanding of 44NN0024. These intact deposits augment the current knowledge of how 44NN0024 was utilized, revealing spatial planning strategies and some of the potential landform and resource access considerations underlying the decisions that resulted in Artifact Cluster 4. Additional investigations of Artifact Cluster 4 could provide more detailed information on how and when this component of the site was used, which in turn can generate a more substantial case study for comparative analyses among similar regional site types. Given these considerations, AECOM recommends Artifact Cluster 4 to be a contributing site component as it has the demonstrated ability to yield important information that supports the site's preexisting NRHP eligibility under Criterion D.

Erosion mitigation Options A, B, and C each include varying levels of ground disturbance, but those activities most likely to impact upland portions of the APE where archaeological resources are located include bank grading and access road/staging area construction. While bank grading will require the loss of upland ground surfaces in select locations, these are restricted to isolated areas along the peninsula's perimeter. Potential access road/staging area construction may occur anywhere with4-2in the APE and, while not defined in Angler Environmental's schematics, reasonably can be expected to include, at a minimum, some amount of grading, tree removal, and heavy equipment traffic. It is likely that these activities will exceed the minimum depth to intact archaeological deposits within the APE (less than 10 cm [0.33 ft] in many places).

While potential ground disturbances arising from any of the three mitigation options may impact archaeological resources within the APE, the location of Artifact Cluster 4 and its discrete nature will allow for the avoidance of impacts to significant archaeological deposits at 44NN0024 from the proposed project. It is recommended that the significant deposits of Artifact Cluster 4 be incorporated into the project design as a design constraint and that the project Limits of Disturbance avoid these deposits. The boundaries of these deposits are depicted on Figure 4-1 and exclude areas of modern disturbance, such as an existing access road and the gravel disturbance central to Artifact Cluster 4. Protection of the significant deposits of Artifact Cluster 4 can be implemented during construction by the installation of protective fencing and notations on design plans. With implementation of design avoidance, impacts associated with the proposed shoreline improvement options will not constitute an adverse effect to 44NN0024 under 36 CFR 800.5(a) as they would not impact elements of the site that contribute to its NRHP eligibility. No additional work is recommended within the APE.

CLIENT	AFCEC/JBLE
PROJ	44NN0042 Supplemental Phase II
SCALE	1:1,482
SOURCE	ESRI 2019
	U:\Projects\VA\FortEustis\920 GIS\ArtifactCluster20190910.mxd

N

TITLE

Artifact Cluster 4 Significant Deposits

AECOM
12420 Milestone Center Dr.
Germantown, MD 20876

PROJ NO 60542271

FIGURE 4-1

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Appendix A:
Qualifications of the Investigators

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Scott Seibel, MSc, has over 21 years of professional experience in archeological excavations, research and compliance studies and exceeds the *Secretary of the Interior's Professional Qualification Standards* (36CFR Part 61) for archeology and history. A Registered Professional Archeologist, Mr. Seibel has extensive cultural resource management experience for a wide range of private and governmental clients, having served as Principal Investigator or Field Director for tens of thousands of acres of Phase I archeological survey, dozens of Phase II evaluations and a dozen Phase III data recovery excavations across the United States. He received his Bachelor's Degree in Archeological Studies at the University of Texas at Austin in 1996 and his Master's Degree in Archeomaterials at the University of Sheffield in England in 1997.

Peter Regan, MA, is a Registered Professional Archaeologist (RPA) with over 11 years of experience in cultural resources management and exceeds the Secretary of the Interior's professional qualifications for archaeology and history. He specializes in historic site analyses, biological archaeology, historic research, and developing public outreach platforms for archaeological sites and other places of cultural interest. Mr. Regan has worked throughout the United States for numerous federal, state, municipal, and private clients on a wide variety of sites under all phases of excavation. In addition to extensive compliance-driven experience, Mr. Regan has served as a research consultant for archaeology and cultural outreach projects and is Vice Chairman of Frederick, Maryland's Historic Preservation Commission. As a Senior Archaeologist and Senior Historian with AECOM, he directs field projects, generates high quality technical documents, and contributes to numerous aspects of project execution, data analysis, and interagency coordination.

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Appendix B:
Artifact Catalog

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44NN0024 Ph II Artifact Catalog

Site #: 44NN0024 **Northing: 1045** **Easting: 1075** **TU #:** **Stratum: I**

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
1.1	1	Flaked Stone Tool		Orthoquartzite	Retouched/Utilized Debitage Utilized Flake		
1.2	1	Debitage		Quartzite	Primary Cortex Debris/Shatter		

Site #: 44NN0024 **Northing: 895** **Easting: 1120** **TU #:** **Stratum: II**

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
2.1	1	Core/Tested Material		Quartzite	Mulltidirectional Bifacial		Possibly utilized as a scraper
2.2	1	Foodways	Remains	Shell	Crassostrea virginica Mollusk		

Site #: 44NN0024 **Northing: 910** **Easting: 1105** **TU #:** **Stratum: II** ***~3 Lbs of Discarded oyster shell***

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
3.1	2	Foodways	Remains	Shell	Crassostrea virginica Mollusk		
3.2							~1.5 kg discarded oyster shell

Note: Additional attribute data is recorded in the electronic database.

Site #: ***44NN0024*** ***Northing:*** ***910*** ***Easting:*** ***1105*** ***TU #:*** ***Stratum:*** ***I*** ***20 Oyster Shell discarded***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
4.1	20						~20 oyster shell

Site #: ***44NN0024*** ***Northing:*** ***970*** ***Easting:*** ***1075*** ***TU #:*** ***Stratum:*** ***I*** ***1 Discarded Blank Bullet casing***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
5.1	1						1 modern blank cartridge

Site #: ***44NN0024*** ***Northing:*** ***1022.5*** ***Easting:*** ***1000*** ***TU #:*** ***Stratum:*** ***II***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
6.1	1	Core/Tested Material		Quartzite	Unidirectional Formalized		Material is of poor quality with many fracture planes not conducive to knapping

Site #: ***44NN0024*** ***Northing:*** ***985*** ***Easting:*** ***985*** ***TU #:*** ***Stratum:*** ***II***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
7.1	1	Debitage		Quartzite	Non-Cortex Complete/Mostly Complete F		
7.2	1	Debitage		Quartzite	Non-Cortex Complete/Mostly Complete F		

Site #: 44NN0024 Northing: 1022.5 Easting: 1015 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
8.1	1	Flaked Stone Tool		Quartzite	Retouched/Utilized Debitage Spokeshave		Size Grade G-6
8.2	1	Debitage		Quartzite	Non-Cortex Complete/Mostly Complete F		
8.3	1	Debitage		Quartzite	Non-Cortex Flake Fragment		
8.4	2	Debitage		Quartzite	Non-Cortex Flake Fragment		
8.5	1	Debitage		Quartzite	Non-Cortex Complete/Mostly Complete F		

Site #: 44NN0024 Northing: 985 Easting: 955 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
9.1	1	Flaked Stone Tool		Metarhyolite	Biface Middle		Broke during thinning of biface.
9.2	1	Debitage		Quartz	Non-Cortex Complete/Mostly Complete F		
9.3	1	Debitage		Quartzite	Non-Cortex Flake Fragment		

Site #: 44NN0024 Northing: 1015 Easting: 1000 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
10.1	1	Debitage		Orthoquartzite	Secondary Cortex Complete/Mostly Complete F		

Site #: 44NN0024 Northing: 1015 Easting: 1015 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
11.1	1	Flaked Stone Tool		Quartzite	Scraper Thumbnail Scraper		Manufactured from a G-8 sized flake
11.2	1	Debitage		Orthoquartzite	Secondary Cortex Bipolar Flake		
11.3	1	Debitage		Quartzite	Secondary Cortex Complete/Mostly Complete F		Striking platform is cortical in its entirety
11.4	1	Debitage		Quartz	Non-Cortex Complete/Mostly Complete F		
11.5	1	Debitage		Quartz	Non-Cortex Complete/Mostly Complete F		
11.6	1	Debitage		Quartzite	Non-Cortex Flake Fragment		

Site #: 44NN0024 Northing: 1000 Easting: 1000 TU #: Stratum: I 1 Blank Bullet Casing discarded

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments

12.1	1	Debitage		Quartzite			
					Non-Cortex Bipolar Flake		
12.2	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
12.3	1	Debitage		Quartz			
					Non-Cortex Complete/Mostly Complete F		
12.4	1						1 modern blank cartridge

Site #: 44NN0024 Northing: 992.5 Easting: 1000 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
13.1	1	Debitage		Orthoquartzite			
					Primary Cortex Flake Fragment		
13.2	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
13.3	1	Debitage		Quartzite			
					Secondary Cortex Complete/Mostly Complete F		Entire striking platform is cortical

Site #: 44NN0024 Northing: 985 Easting: 992.5 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
14.1	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		

14.2	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
14.3	2	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		

Site #: ***44NN0024*** ***Northing:*** ***977.5*** ***Easting:*** ***985*** ***TU #:*** ***Stratum:*** ***II***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
15.1	1	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
15.2	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
15.3	1	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
15.4	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
15.5	4	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
15.6	2	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
15.7	2	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
15.8	2	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		

15.9	3	Debitage		Quartzite	Non-Cortex Complete/Mostly Complete F		

Site #: 44NN0024 Northing: 1015 Easting: 1022.5 TU #: Stratum: III

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
16.1	1	Debitage		Quartzite	Non-Cortex Flake Fragment		
16.2	1	Debitage		Metarhyolite	Non-Cortex Flake Fragment		

Site #: 44NN0024 Northing: 1015 Easting: 992.5 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
17.1	1	Debitage		Quartzite	Secondary Cortex Bipolar Flake		
17.2	1	Debitage		Quartzite	Secondary Cortex Complete/Mostly Complete F		Cortex is present over entire striking platform
17.3	1	Fire-Cracked Rock		Sandstone	Fire-Cracked Rock		<50 Smooth Cortex

Site #: 44NN0024 Northing: Easting: TU #: 1 Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
18.1	1	Flaked Stone Tool		Quartz	Biface Middle		Base or Point fragment of an unfinished biface, likely broke while thinning

18.2	1	Debitage		Quartz			
					Non-Cortex Flake Fragment		
18.3	1	Foodways	Remains	Shell	Crassostrea virginica Mollusk		
18.4	1						1 modern blank cartridge

Site #: 44NN0024 Northing: Easting: TU #: 1 Stratum: IV

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
19.1	1	Debitage		Quartz			
					Primary Cortex Complete/Mostly Complete F		

Site #: 44NN0024 Northing: Easting: TU #: 1 Stratum: III

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
20.1	1	Debitage		Quartzite			
					Secondary Cortex Bipolar Flake		The Cortex is entirely present on the Striking platform
20.2	1	Debitage		Orthoquartzite			
					Primary Cortex Complete/Mostly Complete F		
20.3	1	Debitage		Quartzite			
					Secondary Cortex Complete/Mostly Complete F		
20.4	1	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		

20.5	1	Debitage		Orthoquartzite			
					Primary Cortex Complete/Mostly Complete F		
20.6	1	Debitage		Quartzite			
					Secondary Cortex Complete/Mostly Complete F		
20.7	2	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
20.8	1	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
20.9	1	Debitage		Quartzite			
					Secondary Cortex Flake Fragment		
20.10	1	Debitage		Metarhyolite			
					Non-Cortex Flake Fragment		
20.11	3	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
20.12	1	Debitage		Quartz			
					Non-Cortex Complete/Mostly Complete F		

Site #: 44NN0024 Northing: Easting: TU #: 1 Stratum: III Additional prehistoric artifact was point plotted within this provenience, see Bag 31

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
21.1	1	Debitage		Orthoquartzite			
					Primary Cortex Debris/Shatter		
21.2	1	Debitage		Quartzite			
					Secondary Cortex Bipolar Flake		

21.3	1	Debitage	Orthoquartzite	Secondary Cortex Flake Fragment		
21.4	1	Debitage	Quartzite	Secondary Cortex Bipolar Flake		All of cortex is present on the striking platform
21.5	1	Debitage	Quartzite	Secondary Cortex Bipolar Flake		
21.6	2	Debitage	Quartzite	Secondary Cortex Complete/Mostly Complete F		Cortex is present on striking platform
21.7	1	Debitage	Quartzite	Primary Cortex Complete/Mostly Complete F		
21.8	1	Debitage	Quartzite	Secondary Cortex Complete/Mostly Complete F		Cortex is present exclusively on Striking platform
21.9	1	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F		
21.10	1	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F		
21.11	2	Other	Sandstone			Non-Cultural

Site #: 44NN0024 Northing: Easting: TU #: 2 Stratum: III

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*

22.1	1	Core/Tested Material	Quartz	Mulltidirectional Bipolar
22.2	1	Core/Tested Material	Quartzite	Tested Material Rounded/Subrounded-Cobbl
22.3	1	Core/Tested Material	Quartzite	Tested Material Rounded/Subrounded-Cobbl
22.4	1	Core/Tested Material	Sandstone	Tested Material Rounded/Subrounded-Cobbl
22.5	2	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F
22.6	3	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F
22.7	9	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F
22.8	7	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F
22.9	1	Debitage	Quartzite	Non-Cortex Flake Fragment
22.10	3	Debitage	Quartzite	Non-Cortex Flake Fragment
22.11	7	Debitage	Quartzite	Non-Cortex Flake Fragment

22.12	13	Debitage	Quartzite		
				Non-Cortex Flake Fragment	
22.13	1	Debitage	Quartzite		
				Primary Cortex Complete/Mostly Complete F	
22.14	1	Debitage	Sandstone		
				Primary Cortex Complete/Mostly Complete F	
22.15	2	Debitage	Quartzite		
				Primary Cortex Flake Fragment	
22.16	1	Debitage	Quartzite		
				Secondary Cortex Bipolar Flake	
22.17	1	Debitage	Quartzite		
				Secondary Cortex Bipolar Flake	Cortex is present on striking platform
22.18	1	Debitage	Quartzite		
				Secondary Cortex Complete/Mostly Complete F	
22.19	1	Debitage	Quartzite		
				Non-Cortex Bipolar Flake	
22.20	1	Debitage	Quartzite		
				Non-Cortex Complete/Mostly Complete F	
22.21	2	Debitage	Quartzite		
				Non-Cortex Complete/Mostly Complete F	
22.22	5	Debitage	Quartzite		
				Non-Cortex Complete/Mostly Complete F	

22.23	3	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
22.24	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
22.25	1	Debitage		Quartz			
					Non-Cortex Complete/Mostly Complete F		
22.26	2	Debitage		Quartz			
					Non-Cortex Complete/Mostly Complete F		
22.27	1	Debitage		Quartz			
					Secondary Cortex Debris/Shatter		
22.28	1	Debitage		Quartz			
					Non-Cortex Flake Fragment		
22.29	1	Debitage		Quartz			
					Non-Cortex Debris/Shatter		
22.30	1	Unmodified Cultural		Sandstone			
					Manuport		

Site #: 44NN0024 Northing: Easting: TU #: 2 Stratum: III

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
23.1	1	Debitage		Quartzite			
					Secondary Cortex Complete/Mostly Complete F		
23.2	1	Debitage		Quartzite			
					Secondary Cortex Complete/Mostly Complete F		All of cortex is present on the striking platform

Note: Additional attribute data is recorded in the electronic database.

23.3	1	Debitage	Quartzite		Non-Cortex Complete/Mostly Complete F		
23.4	1	Debitage	Quartzite		Secondary Cortex Complete/Mostly Complete F		
23.5	1	Debitage	Quartzite		Primary Cortex Complete/Mostly Complete F		
23.6	2	Debitage	Quartzite		Non-Cortex Flake Fragment		
23.7	1	Debitage	Quartzite		Secondary Cortex Complete/Mostly Complete F		
23.8	3	Debitage	Quartzite		Non-Cortex Complete/Mostly Complete F		
23.9	1	Debitage	Quartzite		Non-Cortex Complete/Mostly Complete F		
23.10	2	Debitage	Quartzite		Non-Cortex Flake Fragment		
23.11	2	Debitage	Quartzite		Non-Cortex Flake Fragment		
23.12	1	Core/Tested Material	Sandstone		Tested Material Rounded/Subrounded-Cobbl		

Site #: ***44NN0024*** ***Northing:*** ***1045*** ***Easting:*** ***1082.5*** ***TU #:*** ***Stratum:*** ***I*** ***3 Plastic and 1 Bkank bullet casing discarded***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*

Note: Additional attribute data is recorded in the electronic database.

24.1	4						

3 plastic, 1 modern blank cartridge

Site #: 44NN0024 Northing: 1015 Easting: 1030 TU #: Stratum: II 1 Oyster shell fragment discarded

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
25.1	1						

oyster shell fragment

Site #: 44NN0024 Northing: 1015 Easting: 1015 TU #: Stratum: I 1 rope fragment discarded

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
26.1	1						

Length of modern rope

Site #: 44NN0024 Northing: Easting: TU #: 2 Stratum: I 1 Blank bullet casing discarded

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
27.1	1						

1 modern blank cartridge

Site #: 44NN0024 Northing: Easting: TU #: 4 Stratum: III

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
28.1	1	Ground/Battered Stone		Quartzite	Hammerstone		
28.2	1	Debitage		Quartzite	Primary Cortex Bipolar Flake		

28.3	1	Debitage		Quartzite			
					Primary Cortex Complete/Mostly Complete F		
28.4	1	Debitage		Quartzite			
					Primary Cortex Flake Fragment		
28.5	1	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
28.6	1	Debitage		Quartz			
					Non-Cortex Complete/Mostly Complete F		
28.7	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		

Site #: 44NN0024 Northing: Easting: TU #: 3 Stratum: III

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
29.1	1	Debitage		Quartzite			
					Secondary Cortex Bipolar Flake		
29.2	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
29.3	1	Debitage		Quartzite			
					Secondary Cortex Complete/Mostly Complete F		
29.4	1	Debitage		Quartzite			
					Primary Cortex Complete/Mostly Complete F		
29.5	1	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		

29.6	1	Debitage	Quartzite	
				Non-Cortex
				Complete/Mostly Complete F
29.7	1	Debitage	Quartzite	
				Primary Cortex
				Flake Fragment
29.8	1	Debitage	Quartzite	
				Non-Cortex
				Complete/Mostly Complete F
29.9	1	Debitage	Quartzite	
				Secondary Cortex
				Complete/Mostly Complete F
29.10	1	Debitage	Quartzite	
				Secondary Cortex
				Flake Fragment
29.11	1	Debitage	Quartzite	
				Non-Cortex
				Complete/Mostly Complete F
29.12	4	Debitage	Quartzite	
				Non-Cortex
				Flake Fragment
29.13	2	Debitage	Quartzite	
				Non-Cortex
				Complete/Mostly Complete F
29.14	2	Debitage	Quartzite	
				Non-Cortex
				Flake Fragment
29.15	1	Debitage	Quartzite	
				Secondary Cortex
				Complete/Mostly Complete F
29.16	1	Debitage	Quartz	
				Non-Cortex
				Flake Fragment

29.17	1	Debitage	Quartzite		Non-Cortex Complete/Mostly Complete F		
29.18	3	Debitage	Quartzite		Non-Cortex Flake Fragment		
29.19	2	Debitage	Quartzite		Non-Cortex Complete/Mostly Complete F		
29.20	1	Debitage	Quartzite		Non-Cortex Flake Fragment		
29.21	1	Core/Tested Material	Orthoquartzite		Tested Material Rounded/Subrounded-Cobbl		
29.22	1	Fire-Cracked Rock	Sandstone		Fire-Cracked Rock		
29.23	1	Other	Sandstone				Non-cultural

Site #: 44NN0024 ***Northing:*** ***Easting:*** ***TU #: 3*** ***Stratum: III***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
30.1	1	Ground/Battered Stone		Sandstone	Hammerstone		Worked flat cobble with facets on both ends and one margin. No evidence of use on cobble faces.
30.2	1	Debitage		Quartzite	Secondary Cortex Complete/Mostly Complete F		

30.3	1	Debitage	Quartzite		
				Non-Cortex	
				Flake Fragment	
30.4	1	Debitage	Quartzite		
				Non-Cortex	
				Complete/Mostly Complete F	
30.5	1	Debitage	Orthoquartzite		
				Primary Cortex	
				Flake Fragment	
30.6	1	Debitage	Quartzite		
				Secondary Cortex	
				Flake Fragment	
30.7	1	Debitage	Quartz		
				Primary Cortex	
				Flake Fragment	
30.8	2	Debitage	Quartzite		
				Non-Cortex	
				Complete/Mostly Complete F	
30.9	4	Debitage	Quartzite		
				Non-Cortex	
				Flake Fragment	
30.10	2	Debitage	Quartzite		
				Non-Cortex	
				Flake Fragment	
30.11	1	Debitage	Metarhyolite		
				Non-Cortex	
				Complete/Mostly Complete F	
30.12	1	Fire-Cracked Rock	Sandstone		
				Fire-Cracked Rock	
					Broke from single piece into six fragments

Site #: ***44NN0024*** ***Northing:*** ***Easting:*** ***TU #: 1*** ***Stratum: III*** ***Point Provenience of Artifact***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
31.1	1	Ground/Battered Stone		Sandstone	Hammerstone		Battering along two margins, with some pecking and grinding on the third margin.

Site #: ***44NN0024*** ***Northing:*** ***Easting:*** ***TU #: 1*** ***Stratum: I*** ***Discarded AA Battery and Bullet casing***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
32.1	2						1 AA Battery, 1 modern blank cartridge

Site #: ***44NN0024*** ***Northing:*** ***Easting:*** ***TU #: 4*** ***Stratum: I*** ***12 Bullet casings, 2 plastic stakes , and 3 Plastic tarp fragments discarded***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
33.1	17						12 modern blank cartridges, 2 plastic stakes, 3 plastic tarp fragments

Site #: ***44NN0024*** ***Northing:*** ***Easting:*** ***TU #: 4*** ***Stratum: II*** ***2 Bullet Casings discarded***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
34.1	2						2 modern blank cartridges

Grand Total 289

Appendix C:
Archaeological Site Form

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Snapshot

Date Generated: September 16, 2019

Site Name: No Data
Site Classification: Terrestrial, open air
Year(s): No Data
Site Type(s): Camp, base, Other, Shell midden
Other DHR ID: No Data
Temporary Designation: No Data

Site Evaluation Status

DHR Evaluation Committee:
Eligible

Locational Information

USGS Quad: YORKTOWN
County/Independent City: Newport News (Ind. City)
Physiographic Province: Coastal Plain
Elevation: 20
Aspect: Flat
Drainage: James
Slope: 0 - 2
Acreage: 18.980
Landform: Other, Terrace, Marine
Ownership Status: Federal Govt
Government Entity Name: U.S. Department of the Army

Site Components

Component 1

Category: Domestic
Site Type: Camp, base
Cultural Affiliation: Native American
DHR Time Period: Early Woodland, Late Woodland, Middle Woodland
Start Year: No Data
End Year: No Data
Comments: long-term occupation site

November 2014

July 2019 (AECOM): AECOM investigated the far western extent of 44NN0024 in advance of proposed shoreline mitigation alternatives. This site previously was recommended eligible for listing in the NRHP under criterion D. To summarize the work to date as well as the results of the current study, the following discussion is presented:

Site 44NN0024 represents a long-term base camp repeatedly occupied during the Early through Late Woodland periods. Initially recorded in 1975 and surveyed a decade later, 44NN0024 was most recently investigated in 2014 during Berger's assessment of the site's NRHP eligibility (Wilkins et al. 2015). Systematic shovel testing and TU excavation resulted in the recovery of 2,423 artifacts and the identification of two shell midden features. Artifacts included faunal remains (n=2,331) as well as prehistoric (n=87) and historic (n=5) material identified within three Artifact Clusters as well as in isolated locations. Faunal remains entirely consisted of marine shell, dominated by oyster (n=2,327). Prehistoric artifacts included lithics (n=68) and ceramics (n=19). Prehistoric lithics included debitage (n=43), FCR (n=20), bifaces (n=3), a cracked rock, a core, and a piece of hematite. The lithic assemblage is indicative of early to late stage tool production and includes quartzite (n=33), quartz (n=31), chert (n=2), and single examples of hematite and granite. The ceramic assemblage, which included a variety of tempers and surface treatments, was defined by specimens too eroded to assign to a particular ware type. Lastly, the minor historic assemblage included bricks (n=4) and a cut nail. Site investigations prior to Berger's evaluation have also identified similarly small quantities of historic artifacts at 44NN0024, but no evidence for significant historic occupation has been revealed to date.
Two shell midden features were also recorded during Berger's assessment. Both middens largely consisted of oyster shell and relatively small prehistoric artifact quantities. Prehistoric ceramics were recovered from both features, however, indicating that they were created at some point during the Woodland period. These features, as well as the majority of the artifacts Berger recovered, are located southeast of the current APE. Within the current APE, Berger identified seven prehistoric artifacts from three STPs. Artifacts included

one core from an isolated STP as well as four FCR, one biface reduction flake, and one piece of shatter from two adjacent STPs.

The current study included the excavation of 63 STPs and four TUs, resulting in the recovery of 231 prehistoric artifacts and four faunal remains. The prehistoric assemblage is dominated by debitage (n=212), followed by cores/tested material (n=8), flaked stone tools (n=5), FCR (n=3), ground/battered stone (n=3), and unmodified cultural material (n=1). These artifacts indicate that stone tool production was the primary prehistoric activity still archaeologically visible within the APE. Correlations between debitage size grade and cortex percentage indicate that while all stages of stone tool production are evident, most of the debitage was produced during late stage manufacturing/tool maintenance. Nevertheless, cores and tested material, along with some of the debitage, attest to the initial phase of lithic reduction. Only a few finished tools were identified, including a spokeshave, utilized flake, and a thumbnail scraper.

Raw lithic materials include quartzite (n=190), quartz (n=18), orthoquartzite (n=10), sandstone (n=9), and metarhyolite (n=4). These all likely originated as fluvial deposits sourced from the local shoreline. The trend in lithic materials selection is generally consistent with distributions reported by Wilkins et al. (2015), where quartzite is dominant, distantly followed by quartz and other less commonly utilized materials.

Artifacts were recovered from the A (n=8), E (n=226), and B (n=1) horizons. While the A horizon showed minor disturbances in some cases, most of the artifacts were recovered from intact natural soil strata. This is consistent with Berger's findings elsewhere onsite (Wilkins et al. 2015), indicating that despite several obvious modern ground disturbances, the site's archaeological integrity has not been severely compromised.

Most of the recovered artifacts (n=226) were identified within a distinct cluster located toward the center of the APE. This large swath of level terrain may have been selected as a lithic production area for a variety of reasons. Slopes along the peninsula margins immediately north and south of Artifact Cluster 4 are comparatively gentle and may have provided relatively easy access to raw cobbles. Furthermore, wave action and erosional forces appear to be strongest at the tip of the peninsula and in the vicinity of Artifact Cluster 4, meaning raw materials may have become available in higher quantities more frequently in this area than elsewhere.

In addition to the ease of raw materials sourcing, this area may have been selected for lithic production to provide spatial segregation between manufacturing activities and the more intensively occupied site core to the southeast. Since lithic production inherently results in a scatter of sharp stone debris, removing these activities from more heavily trafficked portions of the site would have reduced the potential for injury. The tip of the peninsula offers a more isolated location where foot traffic would have been naturally limited by land's end, as opposed to areas farther up the peninsula where through-traffic may have been more regular.

The lack of diagnostic artifacts precludes being able to definitively assign the activities evident within Artifact Cluster 4 to a particular cultural period. However, given the intensive Woodland occupations that Wilkins et al. (2015) reported within the site core southeast of the APE, it is likely that Artifact Cluster 4 represents a Woodland period production site. That it is spatially isolated from the food preparation/consumption activities that characterize the subsistence-focused site core suggests a level of intentionality conscious of the site's broader functional layout. While it is true that Wilkins et al. (2015) reported lithic manufacturing artifacts within and around the site core, indicating that these activities may not have always been isolated from other site uses, it is important to emphasize that lithic production is the only prehistoric activity archaeologically visible in Artifact Cluster 4; there is no conclusive evidence for dwellings, middens, storage pits, cooking hearths, or any other indication that it was ever used for anything other than lithic production. This suggests that while other site areas may have experienced functional overlap, the center of the APE remained deliberately devoted to lithic production and, seemingly, to the exclusion of other activities. Thus, it is likely that those who selected the APE for lithic production did so, at least in part, to keep it separate from other coeval activity areas. For these reasons, and despite the lack of diagnostic artifacts, the prehistoric activities evident within the APE are attributed to the Woodland period.

As the foregoing discussion indicates, the APE retains archaeological integrity and includes a discrete lithic production area within a larger, repeatedly-occupied Woodland period base camp. The current study has provided additional information on raw materials sourcing, tool production, and the spatial arrangement of site activities. Additional investigation could reveal higher resolution spatial patterning and diagnostic material, furthering the understanding of how this site was utilized and providing a comparative case study to examine similarities and differences between 44NN0024 and comparable Woodland period sites throughout Tidewater Virginia and the broader Mid-Atlantic region.

Component 2

Category: Indeterminate
Site Type: Other
Cultural Affiliation: Indeterminate
DHR Time Period: Antebellum Period, Civil War, Reconstruction and Growth
Start Year: No Data
End Year: No Data
Comments: minor historic component of indeterminate function dating to the nineteenth century
---
November 2014

Component 3

Category: Domestic

Site Type:	Shell midden
Cultural Affiliation:	Native American
DHR Time Period:	Middle Woodland
Start Year:	No Data
End Year:	No Data
Comments:	August 1986 ---------- November 2014

Bibliographic Information

Bibliography:

Talbott, A.R.
1957Camp Abraham Eustis, Virginia, Index to Property Maps. Original drawing in 1919 by J. B. Ferguson and Co. Reissued by Office of the Post Engineer, Fort Eustis, Virginia.

Informant Data:

No Data

CRM Events

Event Type: Survey:Phase II

Project Staff/Notes:

Principal Investigator: Scott Seibel
Field Director: Pete Regan
Field Techs: Benjamin Stewart and Alison Cramer
Lab Director: Kayla Marciniszyn

Project Review File Number: No Data
Sponsoring Organization: No Data
Organization/Company: AECOM Germantown
Investigator: Peter Regan
Survey Date: 7/15/2019

Survey Description:

This project represents a supplemental Phase II, the results of which serve as an addendum to National Register Evaluation of Archaeological Sites 44NN0024, 44NN0127, 44NN0213, and 44NN0214, Joint Base Langley-Eustis, City of Newport News, Virginia (Wilkins et al. 2015). The project was undertaken to assess a previously surveyed portion of 44NN0024 in advance of potential ground disturbances associated with proposed erosion mitigation options. Fieldwork consisted of the excavation of 63 STPs and four TUs, resulting in the recovery of 231 prehistoric artifacts and four faunal remains from largely intact soils. The prehistoric assemblage consists of nondiagnostic lithic artifacts representing early to late stage stone tool production, most of which were recovered from a discrete area near the center of the APE. This manufacturing area appears to have been intentionally isolated from the more intensively occupied site core that previous investigators identified southeast of the APE. Such patterns of site use are consistent with those visible on comparable Woodland sites elsewhere in the Mid-Atlantic coastal plain.

Current Land Use	Date of Use	Comments
Military base/facility	9/9/2019 12:00:00 AM	*No Data*

Threats to Resource: Erosion
Site Conditions: Subsurface Integrity
Survey Strategies: Subsurface Testing, Surface Testing
Specimens Collected: Yes
Specimens Observed, Not Collected: Yes

Artifacts Summary and Diagnostics:

AECOM (2019):

No diagnostics were recovered.

In total, 235 artifacts were recovered from 44NN0024, including 231 prehistoric artifacts and four faunal remains. Seventeen modern bullet casings, eight pieces of plastic, one rope, and one AA battery were noted and discarded in the field. Additionally, approximately 1.4 (kg) (3 lbs) of shell were weighed and discarded in the field. Over 96 percent of the artifacts were recovered from the E horizon (n=226), with substantially smaller quantities recovered from the A (n=5) and B (n=1) horizons. Only three artifacts were recovered from a potentially disturbed surface layer in STP N1000 E1000.

Faunal remains account for less than 2 percent of the recovered artifacts (n=4) and are entirely represented by four oyster (Crassostrea virginica) shells assigned to the foodways group. Two of these were collected as samples from STP N895 E1105, while the other two represent the only faunal remains identified within their respective proveniences.

Prehistoric artifacts account for 98.3 percent (n=231) of the assemblage and include only lithic material. Raw materials include quartzite, quartz, orthoquartzite, sandstone, and metarhyolite. By weight, quartzite represents 56.25 percent (2,707.46 g [95.5 oz]) of the lithics, followed by sandstone at 24.33 percent (1,170.85 g [41.3 oz]), orthoquartzite at 16.28 percent (783.48 g [27.6 oz]), and smaller proportions of quartz and metarhyolite. By count, quartzite accounts for 82.25 percent (n=190) followed by quartz at 7.79 percent (n=18) and smaller quantities of orthoquartzite (n=10), sandstone (n=9), and metarhyolite (n=4). Each material type could have been sourced along the local shoreline, and the differing proportions of each material likely reflect selection preferences and resource availability.

Core/tested material artifacts account for 3.46 percent of the prehistoric artifact assemblage (n=8). The group includes two tested sandstone cobbles, two tested quartzite cobbles, one tested orthoquartzite cobble, one bipolar quartz core with multidirectional flaking, one bifacial quartzite core with multidirectional flaking, and one formalized quartzite core with unidirectional flaking. These artifacts represent various stages of core reduction and the initial phases of lithic tool manufacture.

Debitage dominates the prehistoric artifact assemblage, accounting for 91.34 percent (n=211). Raw material types include quartzite (n=183), quartz (n=16), orthoquartzite (n=8), metarhyolite (n=3), and sandstone (n=1). The group includes complete/mostly complete flakes (n=110), flake fragments (n=85), bipolar flakes (n=12), and debris/shatter (n=4). Of these 75.83 percent (n=160) have no cortex, 15.17 percent (n=32) have less than 50 percent cortex, and the remaining 9 percent (n=19) have more than 50 percent cortex. The large percentage of non-cortex flakes is indicative of biface reduction, retouch, sharpening, and finishing activities. It is assumed that larger flakes, with more cortical surface represent initial stages of tool production, while smaller flakes, with less external cortex, represent the later stages of tool making and retouch.
A review of complete and mostly complete flake size grades supports this assertion, as non-cortex flakes cluster within the smallest size grades. Over 90 percent of non-cortex flakes (n=75) fall within a size grade between 15.88 and 28.58 mm (0.625 and 1.125 in). Flakes with less than 50 percent cortex tend to be somewhat larger, with over 83 percent (n=15) between 28.58 and 47.63 mm (1.125 and 1.875 in). These flakes may be more indicative of bifacial reduction. Large flakes more typical of the primary reduction stage are the least common, with 75 percent (n=6) measuring greater than 41.28 mm (1.625 in). These distributions suggest that while initial reduction was occurring, the production activities were more

commonly dedicated to bifacial reduction and tool finishing/maintenance.

FCR accounts for 1.3 percent (n=3) of the prehistoric assemblage, all of which represent broken sandstone cobbles. Individual pieces ranged from as little as 16.54 g (0.58 oz) to as much as 128.66 g (4.54 oz).

Flaked stone tools account for 2.16 percent of the prehistoric assemblage (n=5). Artifact classes include retouched/reutilized debitage (n=2), bifaces (n=2), and scrapers (n=1). The retouched/reutilized debitage includes one quartzite spokeshave and one orthoquartzite utilized flake. The bifaces include two in the middle stage of production, one made of quartz and the other metarhyolite. Lastly, the scraper is a quartzite thumbnail scraper.

Ground/battered stone artifacts account for 1.3 percent of the prehistoric assemblage (n=3). These include one quartzite hammerstone with more than 50 percent cortex, one sandstone hammerstone with less than 50 percent cortex, and a second sandstone hammerstone with 90 percent cortex.

Unmodified cultural artifacts account for 0.43 percent of the prehistoric artifacts and include a single sandstone manuport. This artifact is believed to have been transported to its location of discovery, an interpretation based on the lack of similar, naturally occurring materials in related site contexts. This 84.36-g (3-oz) cobble was recovered from the E horizon in TU 2 (Stratum III, Level 1), which contained no other unmodified cobbles. Additionally, its occurrence within a provenience containing 75 other prehistoric artifacts associated with lithic reduction activities suggests it was intentionally deposited via human agency.

Summary of Specimens Observed, Not Collected:

Seventeen modern bullet casings, eight pieces of plastic, one rope, and one AA battery were noted and discarded in the field.

Current Curation Repository: AECOM Laboratory, Gaithersburg, MD

Permanent Curation Repository: Fort Lee, Virginia

Field Notes: Yes

Field Notes Repository: Currently AECOM Laboratory, Gaithersburg, MD

Photographic Media: Digital

Survey Reports: Yes

Survey Report Information:

Regan, Pete.
2019
Supplemental Phase II Archaeological Evaluation of Site 44NN0024, Joint Base Langley-Eustis (Ft. Eustis), Newport News, Virginia. Prepared by AECOM for the United States Air Force Civil Engineer Center

Survey Report Repository: AECOM, will go to DHR

DHR Library Reference Number: No Data

Significance Statement: Though the archaeological assemblage is relatively small, the presence of intact subsurface cultural features and feature clusters associated with temporally diagnostic artifacts indicates that Site 44NN0024 has the potential to yield information that would further understanding of Woodland-period occupation sites in the coastal plain of Virginia. Though only shell middens were encountered during the archaeological evaluations, the intact nature of these deposits in relatively shallow stratigraphy suggests that other subsurface cultural features related to long-term occupation sites, such as postholes, pits, or hearths, may also be present. Research themes pertinent to sites with intact Woodland period components include the settlement patterns of indigenous groups prior to the contact period, subsistence practices, diet, and the spatial organization of Woodland occupation sites.

As Site 44NN0024 has the potential to yield information important to subsistence practices, settlement patterns, and domestic activities at Woodland-period long-term occupation sites, Louis Berger recommends the site as eligible for inclusion in the National Register under Criterion D. Louis Berger further concludes that the minor historic component present at the site does not contribute to the eligibility of the site. Louis Berger further recommends that the original site boundaries be revised to exclude locations devoid of cultural materials or features. Louis Berger does not recommend the site as eligible for the National Register under Criterion A or Criterion B, as the site is not associated with events important to the broad pattern of local, state, or national history, or with individuals of local, state, or national significance. Criterion C was applied and found to be not applicable to the site.

AECOM (2019): The far western portion of 44NN0024 that could be impacted by proposed erosion mitigation measures was evaluated to determine if it represents a contributing component of the site. Given that the archaeological deposits identified within Artifact Cluster 4 retain integrity, incorporate a variety of stone tools, and represent a discrete activity area devoted to stone tool production, it has the potential to contribute significant information to the understanding of 44NN0024. These intact deposits augment the current knowledge of how 44NN0024 was utilized, revealing spatial planning strategies and some of the potential landform and resource access considerations underlying the decisions that resulted in Artifact Cluster 4. Additional investigations of Artifact Cluster 4 could provide more detailed information on how and when this component of the site was used, which in turn can generate a more substantial case study for comparative analyses among similar regional site types. Given these considerations, AECOM recommends Artifact Cluster 4 to be a contributing site component as it has the demonstrated ability to yield important information that supports the site's preexisting NRHP eligibility under Criterion D.

Surveyor's Eligibility Recommendations: Recommended Eligible

Surveyor's NR Criteria Recommendations, : D

Surveyor's NR Criteria Considerations: No Data

Event Type: DHR Evaluation Committee: Eligible

DHR ID: 44NN0024
Staff Name: Archaeology E-Team
Event Date: 4/14/2016
Staff Comment 2016-0338. This multicomponent site, evaluated for significance under Criterion D, was found to be eligible for listing in the National Register with a total of 37 points for the prehistoric component. It was the committee's opinion that the minor 19th century historic component did not contribute to the site's eligibility. The committee concurred with the consultant's recommendation.

Event Type: Survey:Phase II

Project Staff/Notes:

Project Manager: Eric Voigt

Principal Investigator: Andrew Wilkins

Field Directors: Andrew Wilkins, Tracey Jones

Project Review File Number: 2016-0338
Sponsoring Organization: No Data
Organization/Company: The Louis Berger Group
Investigator: Tracey Jones
Survey Date: 11/4/2014
Survey Description:

Archaeological evaluation of four sites (44NN0024, 44NN0127, 44NN0213, and 44NN0214) located on the Fort Eustis military base.

Subsurface testing included shovel testing on grid alignments excavated at all sites, with 30-meter interval with 15-meter close interval tests at 44NN0024 and a 10-meter interval at Site 44NN0127, 44NN0213, and 44NN0214. 1x1-meter test units were hand-excavated at three of the four sites, but not at 44NN0214, as the close interval shovel testing indicated that that site had been destroyed. A total of 355 shovel tests, 20 1x1-meter test units, and two 50x50-centimeter test units were excavated at the site.

158 shovel tests and 12 test units were excavated at Site 44NN0024, with an additional 81 placements not excavated due to modern disturbance, slope, or water. Prehistoric and limited historic artifacts were recovered from 25 shovel tests and the test units, and two subsurface cultural features (prehistoric shell middens/pits) were identified, in addition to the presence of a surface scatter of shell within the core of the site.

54 shovel tests, four test units, and 2 50x50-centimeter test unit quads were excavated at Site 44NN0127. Two shovel test locations were not excavated due to a delineated wetland. Prehistoric and historic artifacts were recovered from six shovel tests, and all of the test units, and one subsurface feature (historic brick pier) was identified at the site, in addition to an associated adjacent surface brick rubble pile.

92 shovel tests and four test units were excavated in or adjacent to Site 44NN0213. One shovel test location was not excavated due to a modern pushpile disturbance. Prehistoric and historic artifacts were recovered from ten shovel tests and all four test units at the site, and two subsurface features (cultural shell middens/pits, cultural affiliation not determined) were identified. In addition, seven surface features (six prick piers and one brick rubble pile) were identified at the site. These surface features formed the outline for a historic rectangular foundation labeled as Structure 1.

51 shovel tests were excavated at Site 44NN0214. No artifacts were recovered from the shovel tests, nor were any surface artifacts encountered, and so no test units were excavated at this site. The site is believed to be destroyed.

Current Land Use	Date of Use	Comments
Forest	8/6/2015 12:00:00 AM	Training Area for US Army military exercises

Threats to Resource: None Known
Site Conditions: Subsurface Integrity
Survey Strategies: Subsurface Testing
Specimens Collected: Yes
Specimens Observed, Not Collected: Yes
Artifacts Summary and Diagnostics:

Total Artifacts= 2423- 87 Prehistoric, historic=5, faunal= 2331
Faunal Specimens: 2331
Freshwater Snail= 1
Oyster= 2327
Unidentified Gastropod= 2
Unidentified Shell= 1

Historic Artifacts:
Brick= 4
Machine Cut Nail=1

Lithics: (n=68), quartzite, quartz, minor amount of chert, milky quartz, granite
Biface, General= 1- not diagnostic
Biface Reduction Flake= 16
Core, General= 1
Cracked Rock= 1
Debitage, General= 7
Decortication Flake= 6
Early Reduction Flake= 2
Early Stage Biface= 1- not diagnostic
FCR= 20
Flake Fragment= 3
Groundstone Debitage= 1
Hematite= 1
Middle-stage Biface= 2
Shatter= 6

Prehistoric Ceramics (n=19) (Cordmarked= 7; Indeterminate=12) ;
Indeterminate Exterior Decoration=10
Interior: Plain/ Burnished=4, Plain/Smoothed= 5, or Indeterminate=10) Tempers: grit=5, shell=4, quartz=1, or multiple=4; indeterminate=5
Specific Ware Types could not be determined
Body Sherd= 16
Neck Sherd= 2
Rimsherd= 1

Stratum A: 41 artifacts (47 percent)
Stratum B: 31 artifacts (36 percent)
Feature Stratum A: 13 prehistoric artifacts (15 percent)
Feature Stratum B: 2 artifacts (2 percent)

Summary of Specimens Observed, Not Collected:

Oyster- sampled; remainder weighed and discarded in the field

Test Unit 4: 3.2 kilograms (7.1 pounds) discarded
Test Unit 10: 0.8 kilograms (1.8 pounds) discarded
Feature 1: 23.8 kilograms (52.5 pounds) discarded
Feature 2: 1.4 kilograms (3.1 pounds) discarded

Current Curation Repository: Louis Berger

Permanent Curation Repository: Fort Lee Curation Facility (Army)

Field Notes: Yes

Field Notes Repository: Fort Lee Curation Facitlity (Army)

Photographic Media: Digital

Survey Reports: Yes

Survey Report Information:

National Register Evaluation of Archaeological Sites 44NN0024, 44NN0127, 44NN0213, and 44NN0214, Joint Base Langley-Eustis, City of Newport News, Virginia. Andrew Wilkins, Tracey Jones< Eric Barr, Eric Voight. 2015

Survey Report Repository: VDHR

DHR Library Reference Number: NN-130

Significance Statement: Though the archaeological assemblage is relatively small, the presence of intact subsurface cultural features and feature clusters associated with temporally diagnostic artifacts indicates that Site 44NN0024 has the potential to yield information that would further understanding of Woodland-period occupation sites in the coastal plain of Virginia. Though only shell middens were encountered during the archaeological evaluations, the intact nature of these deposits in relatively shallow stratigraphy suggests that other subsurface cultural features related to long-term occupation sites, such as postholes, pits, or hearths, may also be present. Research themes pertinent to sites with intact Woodland period components include the settlement patterns of indigenous groups prior to the contact period, subsistence practices, diet, and the spatial organization of Woodland occupation sites.

As Site 44NN0024 has the potential to yield information important to subsistence practices, settlement patterns, and domestic activities at Woodland-period long-term occupation sites, Louis Berger recommends the site as eligible for inclusion in the National Register under Criterion D. Louis Berger further concludes that the minor historic component present at the site does not contribute to the eligibility of the site. Louis Berger further recommends that the original site boundaries be revised to exclude locations devoid of cultural materials or features. Louis Berger does not recommend the site as eligible for the National Register under Criterion A or Criterion B, as the site is not associated with events important to the broad pattern of local, state, or national history, or with individuals of local, state, or national significance. Criterion C was applied and found to be not applicable to the site.

Surveyor's Eligibility Recommendations: Recommended Eligible

Surveyor's NR Criteria Recommendations, : D

Surveyor's NR Criteria Considerations: No Data

Event Type: NRHP Nomination

DHR ID: 44NN0024
Staff Name: VDHR-James Christian Hill
Event Date: 7/27/1993
Staff Comment No Data

Event Type: Survey:Phase I/Reconnaissance

Project Staff/Notes:

No Data

Project Review File Number: No Data
Sponsoring Organization: No Data
Organization/Company: Unknown (DSS)
Investigator: MAI
Survey Date: 8/1/1986

Survey Description:

Site was initially identified through surface collection and shovel testing.
The presence of exposed and intact shell midden deposits suggest this site to be entirely undisturbed except for the recent road grading and troop training activities. Systematic shovel testing and test excavation revealed in situ subsurface features and additional subsurface shell deposits. Additional occupational loci of various temporal periods were identified. Site is presently unused, though increased levels of troop training activities are anticipated. Site is undisturbed and apparently never cutlivated.

Current Land Use	Date of Use	Comments
Other	*No Data*	military facility

Threats to Resource: No Data
Site Conditions: Site Condition Unknown
Survey Strategies: Subsurface Testing
Specimens Collected: Yes
Specimens Observed, Not Collected: Yes

Artifacts Summary and Diagnostics:

quartzite cobble, FCR, quartzite core, chipping debris (quartz, quartzite, rhyolite), decortication flakes (qquartz and quartzite), processual flakes (quartzite, quartz, chert, rhyolite), quartzite preform, quartzite bifacial blades, quartzite projectile point fragments, quartzite contracting stem projectile point fragment, quartzite triangular concave base projectile point, coarse sand tempered pottery (plain, net impressed), sand tempered pottery, shell tempered pottery (net impressed and cord marked), Townsend Ware, English kaolin pipestem (5/64"), 18th century window glass, phial glass

Summary of Specimens Observed, Not Collected:

No Data

Current Curation Repository: U.S. Army Transportation Museum, Va
Permanent Curation Repository: No Data
Field Notes: Yes
Field Notes Repository: MAI
Photographic Media: No Data
Survey Reports: No Data

Survey Report Information:

An Archaeological Overview and Management Plan of Fort Eustis and Fort Story, Cities of Newport News and Virginia Beach, Virginia by Antony F. Opperman on file at VDHL [VDHR] in Richmond; Special Military Map, Camp Abraham Eustis, Virginia, Corps of Engineers, U.S. Army, 1918; An Archaelolgical Survey of Mulberry Island by Mary C. Beaudry, 1975; Archaeological Evaluations of Significance, 44NN24, 44NN102, 44NN120, 44NN164, 44NN165, Fort Eustis, Virginia, by Harding Polk II, Antony F. Opperman, Stephen J. Hinks on file at VDHL [VDHR] in Richmond

Survey Report Repository: No Data
DHR Library Reference Number: No Data
Significance Statement: No Data
Surveyor's Eligibility Recommendations: No Data
Surveyor's NR Criteria Recommendations, : No Data
Surveyor's NR Criteria Considerations: No Data

From: McDaid, Christopher L CIV USAF 733 MSG (USA) <christopher.l.mcdaid.civ@mail.mil>
Sent: Thursday, September 24, 2020 2:23 PM
To: Holma, Marc (DHR); Calder, Donald W Jr CIV USAF 733 MSG (USA); Bateman, Joanna G CIV USAF 733 MSG (USA); Sugg, Tracey L CIV USAF (USA)
Subject: FW: [Non-DoD Source] stabalization shoreline of Training Area (TA) 1 at Fort Eustis--Phase II archaeological evaluation on Site 44NN0024 (2016-1148)
Attachments: CCF03062020.pdf; Access road TA1.pdf; Access road TA1 showing existing gravel road.pdf

Hello Marc,
In your attached letter of 6 March you asked two questions.
1. Where and how will the Air Force construct the access roads?
Please see the attached map (Access road TA1) that shows the proposed location of an access road and turn around area that avoids the significant archaeological deposits that were identified during the supplemental archaeological fieldwork conducted by AECOM and documented in the report sent earlier. Also be aware that there is a gravel road in Training Area 1 that is more clearly shown in the map labeled as showing the existing gravel road.

The statement of Work (SOW) will give the contractor the proposed location of the road and instruct the contractor to stay away from the significant archaeological deposits which will be marked. The SOW will also provide the contractor the technical specifications suggesting they construct the road as follows: The gravel road will be constructed by the contactor performing the shoreline stabilization. The contractor would use a front end loader with a grader attachment and compact the area. The entry road will not be excavated with the stones placed at the current grade. The contractor will also fill the holes left after he cuts the trees and grinds the stumps. Typically they use #57 or larger stone depending on the size of the construction vehicles (larger if a crane will be onsite).
The proposed road avoids the significant archaeological deposits of Archaeological Site 44NN0024. The boundaries of the deposits will be marked/flagged during the road construction. In addition the contractor will be required to maintain this entrance the entire length of the contract and remove the road after the project ends. The contractor will come back and seed the site to return it to the original status.

2. What protective measures will the Air Force employ to ensure that the construction will not impact Site 44NN0024?
The Air Force will require all vehicles remain on established roads and the proposed access road and turn around area. During the limited timber removal no skidding or dragging of downed trees will be allowed. The stabilization of the TA 1 shoreline will provide for the long term protection of Site 44NN0024 and has been planned to avoid impacting the significant intact archaeological deposits. This allows the Air Force to determine that the action will have no adverse effect on the characteristics that make Archaeological Site 44NN0024 eligible for listing on the National Register of Historic Places.

Hope this answers your concerns. If you need anything else please let me know.
Thanks
McDaid

Dr. Christopher L. McDaid
Archaeologist
Cultural Resources Manager
Environmental Element
Civil Engineer Division
733d Mission Support Group

Joint Base Langley-Eustis (Eustis)
(757) 878-7365
EMAIL ADDRESS: christopher.l.mcdaid.civ@mail.mil

-----Original Message-----
From: Holma, Marc [mailto:marc.holma@dhr.virginia.gov]
Sent: Friday, March 6, 2020 2:46 PM
To: McDaid, Christopher L CIV USAF 733 MSG (USA) <christopher.l.mcdaid.civ@mail.mil>
Subject: [Non-DoD Source] stabalization shoreline of Training Area (TA) 1 at Fort Eustis--Phase II archaeological evaluation on Site 44NN0024 (2016-1148)

All active links contained in this email were disabled. Please verify the identity of the sender, and confirm the authenticity of all links contained within the message prior to copying and pasting the address to a Web browser.

_____

Chris,

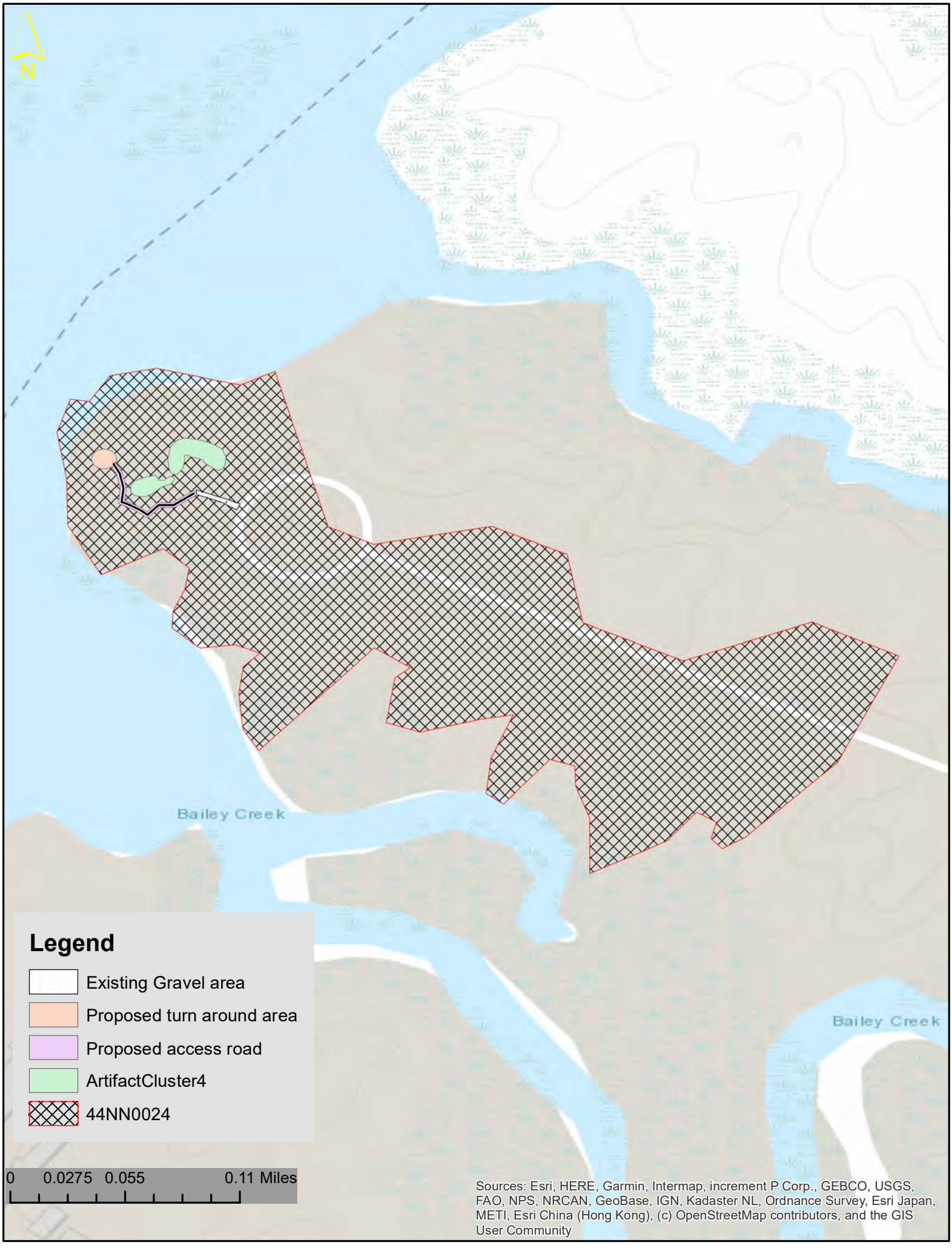
Apparently the report went directly to Greg without going to me first. As a result, it didn't get logged into the database so I believe we had not received it. Sorry for the confusion.

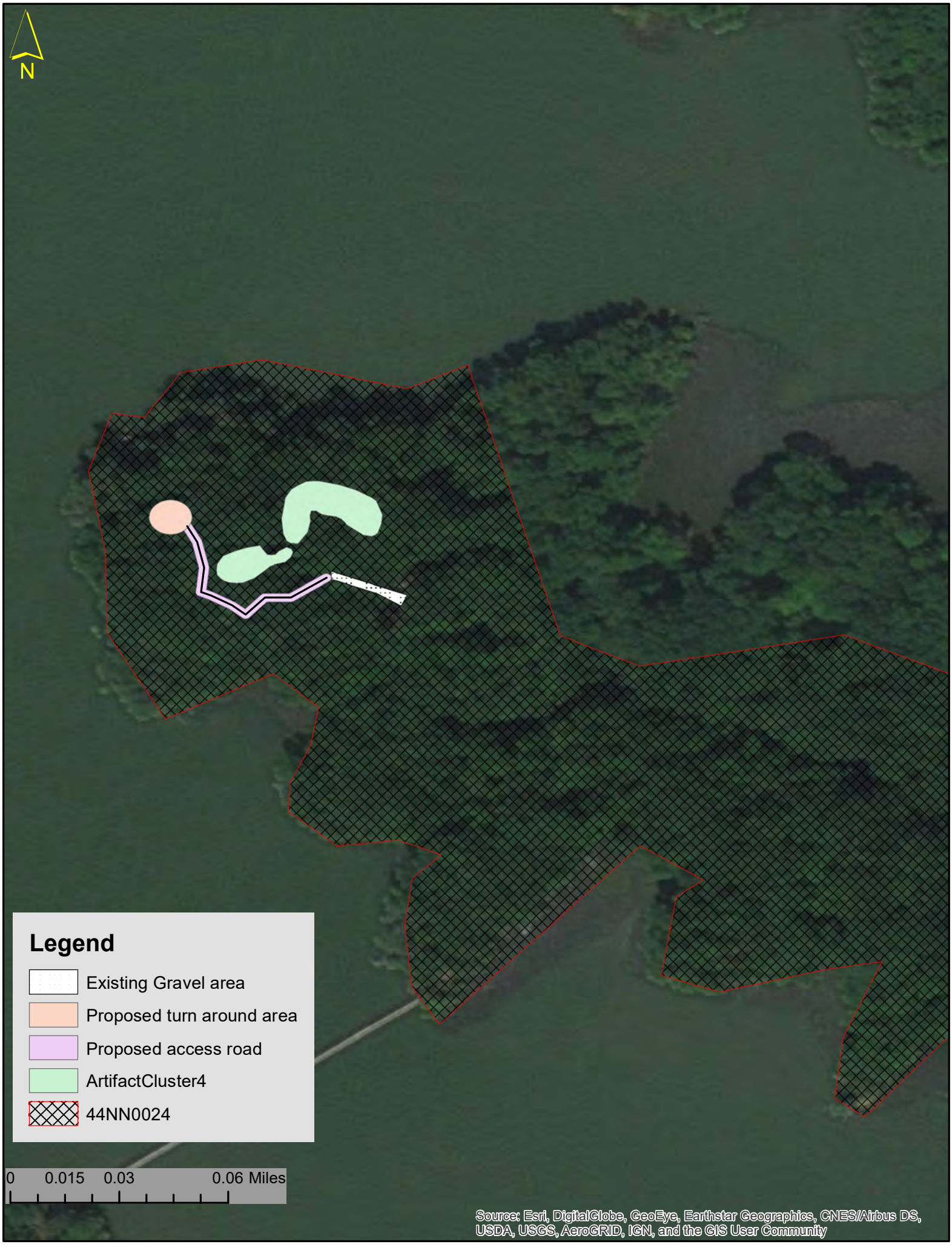
Have a nice weekend.

Marc

--

Marc Holma
Architectural Historian
Division of Review and Compliance
(804) 482-6090
marc.holma@dhr.virginia.gov < Caution-mailto:marc.holma@dhr.virginia.gov >


N
Bailey Creek
Bailey Creek
Legend
Existing Gravel area
Proposed turn around area
Proposed access road
ArtifactCluster4
44NN0024
0 0.0275 0.055 0.11 Miles
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community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Legend
Existing Gravel area
Proposed turn around area
Proposed access road
ArtifactCluster4
44NN0024
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0.015
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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733D MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA 23604

NOV 0 7 2016

Civil Engineering Division

Ms. Nekole Alligood,
Cultural Preservation
Delaware Nation
31064 State Highway #281
Building 100
Anadarko, OK 73005

Dear Director Alligood,

The Air Force plans to stabilize the shoreline of Training Area (TA) 1 on the Fort Eustis portion of Joint Base Langley Eustis. We are at the beginning of the planning process for this action and are working to develop an environmental assessment of the action in order to comply with the National Environmental Policy Act. Depending on how the shoreline in TA1 is stabilized there is a potential to effect Archaeological Site 44NN0024. Site 44NN0024 is primarily a prehistoric base camp and long-term occupation site with components dating to the Early, Middle, and Late Woodland periods as well as a minor nineteenth-century historic component (enclosure). The site was determined eligible for the National Register of Historic Places in April of 2016.

We would like to keep you informed on this project as we move through its development and take any input you may have on this project into account as the project is developed. At this time we cannot make a determination of effect for this undertaking. We have also contacted the Pamunkey Tribe, the Catawba Nation, the Delaware Tribe, and the Virginia Department of Historic Resources regarding this matter.

If you would like additional information regarding this action please contact Dr. Christopher L. McDaid at (757) 878-7365 or email christopher.l.mcdaid.civ@mail.mil.

Sincerely,

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division

Enclosure

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733D MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA 23604

NOV 0 7 2016

Civil Engineering Division

Ms. Susan Bachor
Delaware Tribe Historic Preservation Representative
P.O. Box 64 Pocono Lake, PA 18347

Dear Ms. Bachor

The Air Force plans to stabilize the shoreline of Training Area (TA) 1 on the Fort Eustis portion of Joint Base Langley Eustis. We are at the beginning of the planning process for this action and are working to develop an environmental assessment of the action in order to comply with the National Environmental Policy Act. Depending on how the shoreline in TA1 is stabilized there is a potential to effect Archaeological Site 44NN0024. Site 44NN0024 is primarily a prehistoric base camp and long-term occupation site with components dating to the Early, Middle, and Late Woodland periods as well as a minor nineteenth-century historic component (enclosure). The site was determined eligible for the National Register of Historic Places in April of 2016.

We would like to keep you informed on this project as we move through its development and take any input you may have on this project into account as the project is developed. At this time we cannot make a determination of effect for this undertaking. We have also contacted the Pamunkey Tribe, the Catawba Nation, the Delaware Nation, and the Virginia Department of Historic Resources regarding this matter.

If you would like additional information regarding this action please contact Dr. Christopher L. McDaid at (757) 878-7365 or email christopher.l.mcdaid.civ@mail.mil.

Sincerely,

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division

Enclosure

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733D MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA 23604

NOV 0 7 2016

Civil Engineering Division

Dr. Wenonah G. Haire
THPO and Director
Catawba Cultural Preservation Project
1536 Tom Steven Road
Rock Hill, SC 29730

Dear Dr. Haire,

The Air Force plans to stabilize the shoreline of Training Area (TA) 1 on the Fort Eustis portion of Joint Base Langley Eustis. We are at the beginning of the planning process for this action and are working to develop an environmental assessment of the action in order to comply with the National Environmental Policy Act. Depending on how the shoreline in TA1 is stabilized there is a potential to effect Archaeological Site 44NN0024. Site 44NN0024 is primarily a prehistoric base camp and long-term occupation site with components dating to the Early, Middle, and Late Woodland periods as well as a minor nineteenth-century historic component (enclosure). The site was determined eligible for the National Register of Historic Places in April of 2016.

We would like to keep you informed on this project as we move through its development and take any input you may have on this project into account as the project is developed. At this time we cannot make a determination of effect for this undertaking. We have also contacted the Pamunkey Indian Tribe, the Delaware Tribe, the Delaware Nation and the Virginia Department of Historic Resources regarding this matter.

If you would like additional information regarding this action please contact Dr. Christopher L. McDaid at (757) 878-7365 or email christopher.l.mcdaid.civ@mail.mil.

Sincerely,

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division

Enclosure

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733D MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA 23604

NOV 0 7 2016

Civil Engineering Division

Dr. Ashley Atkins-Spivey
191 Lay Landing Rd
Pamunkey Indian Reservation
King William, VA 23086

Dear Dr. Atkins-Spivey,

The Air Force plans to stabilize the shoreline of Training Area (TA) 1 on the Fort Eustis portion of Joint Base Langley Eustis. We are at the beginning of the planning process for this action and are working to develop an environmental assessment of the action in order to comply with the National Environmental Policy Act. Depending on how the shoreline in TA1 is stabilized there is a potential to effect Archaeological Site 44NN0024. Site 44NN0024 is primarily a prehistoric base camp and long-term occupation site with components dating to the Early, Middle, and Late Woodland periods as well as a minor nineteenth-century historic component (enclosure). The site was determined eligible for the National Register of Historic Places in April of 2016.

We would like to keep you informed on this project as we move through its development and take any input you may have on this project into account as the project is developed. At this time we cannot make a determination of effect for this undertaking. We have also contacted the Catawba Nation, the Delaware Tribe, the Delaware Nation, and the Virginia Department of Historic Resources regarding this matter.

If you would like additional information regarding this action please contact Dr. Christopher L. McDaid at (757) 878-7365 or email christopher.l.mcdaid.civ@mail.mil.

Sincerely,

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division

Enclosure

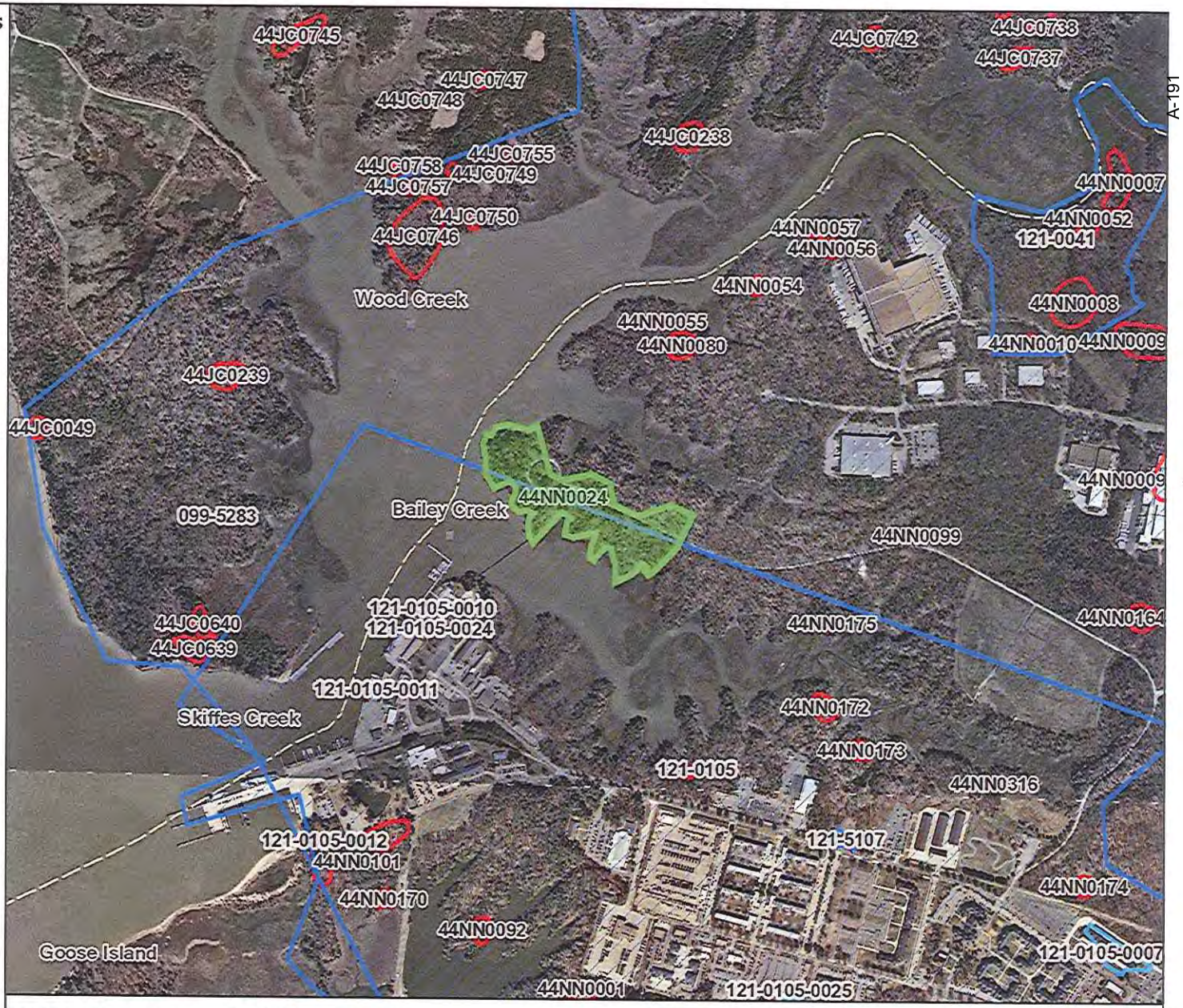
Virginia Dept. of Historic Resources

V-CRIS

Virginia Cultural Resource Information System

Legend

- Architecture Resources
- Architecture Labels
- Individual Historic District Properties
- Archaeological Resources
- Archaeology Labels
- USGS GIS Place names
- County Boundaries



N

Feet

0 500 1000 1500 2000

1:18,056 / 1"=1,505 Feet

Title: Archaeological Resources

Date: 10/28/2016

DISCLAIMER:Records of the Virginia Department of Historic Resources (DHR) have been gathered over many years from a variety of sources and the representation depicted is a cumulative view of field observations over time and may not reflect current ground conditions.The map is for general information purposes and is not intended for engineering, legal or other site-specific uses. Map may contain errors and is provided "as-is". More information is available in the DHR Archives located at DHR's Richmond office.

Notice if AE sites:Locations of archaeological sites may be sensitive the National Historic Preservation Act (NHPA), and the Archaeological Resources Protection Act (ARPA) and Code of Virginia §2.2-3705.7 (10). Release of precise locations may threaten archaeological sites and historic resources.

Snapshot

Date Generated: October 28, 2016

Site Name:	No Data
Site Classification:	Terrestrial, open air
Year(s):	No Data
Site Type(s):	Camp, base, Other, Shell midden
Other DHR ID:	No Data
Temporary Designation:	No Data

Site Evaluation Status

Not Evaluated

Locational Information

USGS Quad:	YORKTOWN
County/Independent City:	Newport News (Ind. City)
Physiographic Province:	Coastal Plain
Elevation:	20
Aspect:	Flat
Drainage:	James
Slope:	0 - 2
Acreage:	18.980
Landform:	Other, Terrace, Marine
Ownership Status:	Federal Govt
Government Entity Name:	U.S. Department of the Army

Site Components

Component 1

Category:	Domestic
Site Type:	Camp, base
Cultural Affiliation:	Native American
DHR Time Period:	Early Woodland, Late Woodland, Middle Woodland
Start Year:	No Data
End Year:	No Data
Comments:	long-term occupation site

Component 2

Category:	Indeterminate
Site Type:	Other
Cultural Affiliation:	Indeterminate
DHR Time Period:	Antebellum Period, Civil War, Reconstruction and Growth
Start Year:	No Data
End Year:	No Data
Comments:	minor historic component of indeterminate function dating to the nineteenth century

Component 3

Category:	Domestic
Site Type:	Shell midden
Cultural Affiliation:	Native American
DHR Time Period:	Middle Woodland
Start Year:	No Data
End Year:	No Data
Comments:	August 1986

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

Bibliographic Information

Bibliography:

Talbott, A.R.
1957Camp Abraham Eustis, Virginia, Index to Property Maps. Original drawing in 1919 by J. B. Ferguson and Co. Reissued by Office of the Post Engineer, Fort Eustis, Virginia.

Informant Data:

No Data

CRM Events

Event Type: Survey:Phase II

Project Staff/Notes:

Project Manager: Eric Voigt

Principal Investigator: Andrew Wilkins

Field Directors: Andrew Wilkins, Tracey Jones

Project Review File Number: 2016-0338
Sponsoring Organization: No Data
Organization/Company: The Louis Berger Group
Investigator: Tracey Jones
Survey Date: 11/4/2014

Survey Description:

Archaeological evaluation of four sites (44NN0024, 44NN0127, 44NN0213, and 44NN0214) located on the Fort Eustis military base.

Subsurface testing included shovel testing on grid alignments excavated at all sites, with 30-meter interval with 15-meter close interval tests at 44NN0024 and a 10-meter interval at Site 44NN0127, 44NN0213, and 44NN0214. 1x1-meter test units were hand-excavated at three of the four sites, but not at 44NN0214, as the close interval shovel testing indicated that that site had been destroyed. A total of 355 shovel tests, 20 1x1-meter test units, and two 50x50-centimeter test units were excavated at the site.

158 shovel tests and 12 test units were excavated at Site 44NN0024, with an additional 81 placements not excavated due to modern disturbance, slope, or water. Prehistoric and limited historic artifacts were recovered from 25 shovel tests and the test units, and two subsurface cultural features (prehistoric shell middens/pits) were identified, in addition to the presence of a surface scatter of shell within the core of the site.

54 shovel tests, four test units, and 2 50x50-centimeter test unit quads were excavated at Site 44NN0127. Two shovel test locations were not excavated due to a delineated wetland. Prehistoric and historic artifacts were recovered from six shovel tests, and all of the test units, and one subsurface feature (historic brick pier) was identified at the site, in addition to an associated adjacent surface brick rubble pile.

92 shovel tests and four test units were excavated in or adjacent to Site 44NN0213. One shovel test location was not excavated due to a modern pushpile disturbance. Prehistoric and historic artifacts were recovered from ten shovel tests and all four test units at the site, and two subsurface features (cultural shell middens/pits, cultural affiliation not determined) were identified. In addition, seven surface features (six prick piers and one brick rubble pile) were identified at the site. These surface features formed the outline for a historic rectangular foundation labeled as Structure 1.

51 shovel tests were excavated at Site 44NN0214. No artifacts were recovered from the shovel tests, nor were any surface artifacts encountered, and so no test units were excavated at this site. The site is believed to be destroyed.

Current Land Use	Date of Use	Comments
Forest	8/6/2015 12:00:00 AM	Training Area for US Army military exercises

Threats to Resource: None Known
Site Conditions: Subsurface Integrity
Survey Strategies: Subsurface Testing
Specimens Collected: Yes
Specimens Observed, Not Collected: Yes

Artifacts Summary and Diagnostics:

Total Artifacts= 2423- 87 Prehistoric, historic=5, faunal= 2331
Faunal Specimens: 2331
Freshwater Snail= 1
Oyster= 2327
Unidentified Gastropod= 2
Unidentified Shell= 1

Historic Artifacts:
Brick= 4
Machine Cut Nail=1

Lithics: (n=68), quartzite, quartz, minor amount of chert, milky quartz, granite
Biface, General= 1- not diagnostic
Biface Reduction Flake= 16
Core, General= 1
Cracked Rock= 1
Debitage, General= 7
Decortication Flake= 6
Early Reduction Flake= 2
Early Stage Biface= 1- not diagnostic
FCR= 20
Flake Fragment= 3

Groundstone Debitage= 1
Hematite= 1
Middle-stage Biface= 2
Shatter= 6

Prehistoric Ceramics (n=19) (Cordmarked= 7; Indeterminate=12) ;
Indeterminate Exterior Decoration=10
Interior: Plain/ Burnished=4, Plain/Smoothed= 5, or Indeterminate=10) Tempers: grit=5, shell=4, quartz=1, or multiple=4; indeterminate=5
Specific Ware Types could not be determined
Body Sherd= 16
Neck Sherd= 2
Rimsherd= 1

Stratum A: 41 artifacts (47 percent)
Stratum B: 31 artifacts (36 percent)
Feature Stratum A: 13 prehistoric artifacts (15 percent)
Feature Stratum B: 2 artifacts (2 percent)

Summary of Specimens Observed, Not Collected:

Oyster- sampled; remainder weighed and discarded in the field

Test Unit 4: 3.2 kilograms (7.1 pounds) discarded
Test Unit 10: 0.8 kilograms (1.8 pounds) discarded
Feature 1: 23.8 kilograms (52.5 pounds) discarded
Feature 2: 1.4 kilograms (3.1 pounds) discarded

Current Curation Repository:	Louis Berger
Permanent Curation Repository:	Fort Lee Curation Facility (Army)
Field Notes:	Yes
Field Notes Repository:	Fort Lee Curation Facitlity (Army)
Photographic Media:	Digital
Survey Reports:	Yes

Survey Report Information:

National Register Evaluation of Archaeological Sites 44NN0024, 44NN0127, 44NN0213, and 44NN0214, Joint Base Langley-Eustis, City of Newport News, Virginia. Andrew Wilkins, Tracey Jones< Eric Barr, Eric Voight. 2015

Survey Report Repository:	VDHR
DHR Library Reference Number:	NN-130
Significance Statement:	Though the archaeological assemblage is relatively small, the presence of intact subsurface cultural features and feature clusters associated with temporally diagnostic artifacts indicates that Site 44NN0024 has the potential to yield information that would further understanding of Woodland-period occupation sites in the coastal plain of Virginia. Though only shell middens were encountered during the archaeological evaluations, the intact nature of these deposits in relatively shallow stratigraphy suggests that other subsurface cultural features related to long-term occupation sites, such as postholes, pits, or hearths, may also be present. Research themes pertinent to sites with intact Woodland period components include the settlement patterns of indigenous groups prior to the contact period, subsistence practices, diet, and the spatial organization of Woodland occupation sites. As Site 44NN0024 has the potential to yield information important to subsistence practices, settlement patterns, and domestic activities at Woodland-period long-term occupation sites, Louis Berger recommends the site as eligible for inclusion in the National Register under Criterion D. Louis Berger further concludes that the minor historic component present at the site does not contribute to the eligibility of the site. Louis Berger further recommends that the original site boundaries be revised to exclude locations devoid of cultural materials or features. Louis Berger does not recommend the site as eligible for the National Register under Criterion A or Criterion B, as the site is not associated with events important to the broad pattern of local, state, or national history, or with individuals of local, state, or national significance. Criterion C was applied and found to be not applicable to the site.
Surveyor's Eligibility Recommendations:	Recommended Eligible
Surveyor's NR Criteria Recommendations, :	D
Surveyor's NR Criteria Considerations:	No Data

Event Type: NRHP Nomination

DHR ID:	44NN0024
Staff Name:	VDHR-James Christian Hill
Event Date:	7/27/1993
Staff Comment	No Data

Event Type: Survey:Phase I/Reconnaissance

Project Staff/Notes:

No Data

Project Review File Number: No Data

Sponsoring Organization: No Data

Organization/Company: Unknown (DSS)

Investigator: MAI

Survey Date: 8/1/1986

Survey Description:

Site was initially identified through surface collection and shovel testing.
The presence of exposed and intact shell midden deposits suggest this site to be entirely undisturbed except for the recent road grading and troop training activities. Systematic shovel testing and test excavation revealed in situ subsurface features and additional subsurface shell deposits. Additional occupational loci of various temporal periods were identified. Site is presently unused, though increased levels of troop training activities are anticipated. Site is undisturbed and apparently never cultivated.

Current Land Use	Date of Use	Comments
Other	*No Data*	military facility

Threats to Resource: No Data

Site Conditions: Site Condition Unknown

Survey Strategies: Subsurface Testing

Specimens Collected: Yes

Specimens Observed, Not Collected: Yes

Artifacts Summary and Diagnostics:

quartzite cobble, FCR, quartzite core, chipping debris (quartz, quartzite, rhyolite), decortication flakes (qquartz and quartzite), processual flakes (quartzite, quartz, chert, rhyolite), quartzite preform, quartzite bifacial blades, quartzite projectile point fragments, quartzite contracting stem projectile point fragment, quartzite triangular concave base projectile point, coarse sand tempered pottery (plain, net impressed), sand tempered pottery, shell tempered pottery (net impressed and cord marked), Townsend Ware, English kaolin pipestem (5/64"), 18th century window glass, phial glass

Summary of Specimens Observed, Not Collected:

No Data

Current Curation Repository: U.S. Army Transportation Museum, Va

Permanent Curation Repository: No Data

Field Notes: Yes

Field Notes Repository: MAI

Photographic Media: No Data

Survey Reports: No Data

Survey Report Information:

An Archaeological Overview and Management Plan of Fort Eustis and Fort Story, Cities of Newport News and Virginia Beach, Virginia by Antony F. Opperman on file at VDHL [VDHR] in Richmond; Special Military Map, Camp Abraham Eustis, Virginia, Corps of Engineers, U.S. Army, 1918; An Archaelolgical Survey of Mulberry Island by Mary C. Beaudry, 1975; Archaeological Evaluations of Significance, 44NN24, 44NN102, 44NN120, 44NN164, 44NN165, Fort Eustis, Virginia, by Harding Polk II, Antony F. Opperman, Stephen J. Hinks on file at VDHL [VDHR] in Richmond

Survey Report Repository: No Data

DHR Library Reference Number: No Data

Significance Statement: No Data

Surveyor's Eligibility Recommendations: No Data

Surveyor's NR Criteria Recommendations, : No Data

Surveyor's NR Criteria Considerations: No Data

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

MAR 0 9 2017

Civil Engineering Division

Ms. Nekole Alligood,
Cultural Preservation
Delaware Nation
31064 State Highway #281
Building 100
Anadarko, OK 73005

Dear Director Alligood,

The Air Force is planning a project in Training Area 1 on the Fort Eustis portion of Joint Base Langley-Eustis. In October, I wrote to you letting you know of this project and inviting you to consult on the issue, as we develop the project. We currently have three possible courses of action to control the erosion of the land in TA 1. All three of the courses of action will have a direct physical effect on Archaeological Site 44NN0024. Site 44NN0024 was determined to be eligible for the National Register of Historic Places in 2016.

Included with this letter is a document that outlines the courses of action and maps (enclosure 1) that illustrate the three options to be examined as we develop an Environmental Assessment of this project. At this time we are not able to make a determination of effect of this action on Site 44NN0024. Since we cannot determine what effect this undertaking will have on Site 44NN0024, we are proposing to develop a "Programmatic Agreement." The agreement will guide how we will address the possible effect to Site 44NN0024. A preliminary draft of the agreement is at enclosure 2.

Please review the enclosed documents. Dr. Christopher L. McDaid will be in contact with you to further discuss the consultation process and provide additional information as it becomes available as we work through the process of developing this project.

If you have any questions regarding this undertaking please contact Dr. Christopher L. McDaid at (757) 878-7365 or email christopher.l.mcdaid.civ@mail.mil.

Sincerely,

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division

Enclosures

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

MAR 0 9 2017

Civil Engineering Division

Ms. Susan Bachor
Delaware Tribe Historic Preservation Representative
P.O. Box 64 Pocono Lake, PA 18347

Dear Ms. Bachor,

The Air Force is planning a project in Training Area 1 on the Fort Eustis portion of Joint Base Langley-Eustis. In October, I wrote to you letting you know of this project and inviting you to consult on the issue, as we develop the project. We currently have three possible courses of action to control the erosion of the land in TA 1. All three of the courses of action will have a direct physical effect on Archaeological Site 44NN0024. Site 44NN0024 was determined to be eligible for the National Register of Historic Places in 2016.

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If you have any questions regarding this undertaking please contact Dr. Christopher L. McDaid at (757) 878-7365 or email christopher.l.mcdaid.civ@mail.mil.

Sincerely,

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division

Enclosures

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

MAR 0 9 2017

Civil Engineering Division

Dr. Wenonah G. Haire
THPO and Director
Catawba Cultural Preservation Project
1536 Tom Steven Road
Rock Hill, SC 29730

Dear Dr. Haire,

The Air Force is planning a project in Training Area 1 on the Fort Eustis portion of Joint Base Langley-Eustis. In October, I wrote to you letting you know of this project and inviting you to consult on the issue, as we develop the project. We currently have three possible courses of action to control the erosion of the land in TA 1. All three of the courses of action will have a direct physical effect on Archaeological Site 44NN0024. Site 44NN0024 was determined to be eligible for the National Register of Historic Places in 2016.

Included with this letter is a document that outlines the courses of action and maps (enclosure 1) that illustrate the three options to be examined as we develop an Environmental Assessment of this project. At this time we are not able to make a determination of effect of this action on Site 44NN0024. Since we cannot determine what effect this undertaking will have on Site 44NN0024, we are proposing to develop a "Programmatic Agreement." The agreement will guide how we will address the possible effect to Site 44NN0024. A preliminary draft of the agreement is at enclosure 2.

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If you have any questions regarding this undertaking please contact Dr. Christopher L. McDaid at (757) 878-7365 or email christopher.l.mcdaid.civ@mail.mil.

Sincerely,

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division

Enclosures

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

MAR 0 9 2017

Civil Engineering Division

Dr. Ashley Atkins-Spivey
191 Lay Landing Rd
Pamunkey Indian Reservation
King William, VA 23086

Dear Dr. Atkins-Spivey,

The Air Force is planning a project in Training Area 1 on the Fort Eustis portion of Joint Base Langley-Eustis. In October, I wrote to you letting you know of this project and inviting you to consult on the issue, as we develop the project. We currently have three possible courses of action to control the erosion of the land in TA 1. All three of the courses of action will have a direct physical effect on Archaeological Site 44NN0024. Site 44NN0024 was determined to be eligible for the National Register of Historic Places in 2016.

Included with this letter is a document that outlines the courses of action and maps (enclosure 1) that illustrate the three options to be examined as we develop an Environmental Assessment of this project. At this time we are not able to make a determination of effect of this action on Site 44NN0024. Since we cannot determine what effect this undertaking will have on Site 44NN0024, we are proposing to develop a "Programmatic Agreement." The agreement will guide how we will address the possible effect to Site 44NN0024. A preliminary draft of the agreement is at enclosure 2.

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If you have any questions regarding this undertaking please contact Dr. Christopher L. McDaid at (757) 878-7365 or email christopher.l.mcdaid.civ@mail.mil.

Sincerely,

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division

Enclosures

From:	Morrow, D Keith CIV USAF 733 MSG (USA)
To:	samflyingeagle48@yahoo.com
Cc:	MCDAID, CHRISTOPHER L GS-12 USAF 733 MSG 733 MISSION SUPPORT GP/CED-CEIE; SUGG, TRACEY L GS-12 USAF 733 MSG 733 MISSION SUPPORT GP/AFRC-CIE; Calder, Donald W Jr CIV USAF 733 MSG (USA)
Subject:	Shoreline stabilization project in Training Area 1 on Fort Eustis Nansemond (UNCLASSIFIED)
Date:	Wednesday, January 29, 2020 3:42:08 PM
Attachments:	Atch 1. Training Area 1 Shoreline Corrective Action Plan.pdf Atch 2. Training Area 1 Shoreline Stabilization Corrective Action Plan maps.pdf Atch 3. Technical Reports Archaeological Investigations at Site 44NN0024.pdf

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CLASSIFICATION: UNCLASSIFIED

Dear Chief Bass,

The Air Force is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with shoreline stabilization and erosion protection at Joint Base Langley-Eustis - Eustis (JBLE-Eustis) Training Area 1 in Newport News, Virginia (Proposed Action) (attachment). The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, et seq.), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989).

The Air Force is considering four proposed alternatives, including the No Action Alternative, to the Proposed Action. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated. The first two attachments to this email provide information about Alternatives A,B, and C.

As part of the data gathering for this EA archaeological fieldwork was conducted on Archaeological Site 44NN0024 to determine if the proposed shoreline stabilization would have an adverse effect on the site (see attached report). Site 44NN0024 was occupied during the Woodland period 1200 B.C. to A.D. 1600 and was determined eligible for the National Register of Historic Places (NRHP) in 2016. The purpose of the limited fieldwork was to assess the potential for the site to be adversely affected by the proposed alternatives being considered to stabilize the shoreline in TA 1.

The recently concluded fieldwork on Site 44NN0024 has allowed the Air Force to determine the execution of any of the proposed alternatives will have no adverse effect on the qualities of Site 44NN0024 that make it eligible for the NRHP. The site was determined eligible for the NRHP due to its potential to provide information about the past. The proposed stabilization actions all are on the edge of the site and will not damage the portions of the site that make it eligible for the NRHP. Attachment 3 to this e-mail is the technical archaeological report on the field work. The Air Force has

determined that selecting and executing any of the three identified alternatives will result in no adverse effect to Site 44NN0024. However, if the additional environmental analysis undertaken during the development of the EA indicates that our determination was erroneous we will contact your office to continue consultation on the matter.

We invite you to join us as a consulting party as we conduct this EA in accordance with 36 CFR Part 800.2, Executive Order 13175, and Air Force Instruction 90-2002 - Interactions with Federally Recognized Tribes. Please review the attached documents to become familiar with the various Alternatives and the relationship between the Alternatives and Archaeological Site 44NN0024. With your advice and assistance, we hope to maintain an ongoing cooperative relationship between your Nation and the Air Force.

If you have any questions regarding this undertaking, please contact Dr. Christopher L. McDaid, via telephone phone at (757) 878-7365, or via email at Christopher.l.mcdaid.civ@mail.mil.

Sincerely
D. Keith Morrow
Deputy Commander
733d Mission Support Group
Fort Eustis, VA 23604
DSN: 826-2908
Comm: 757-878-2908
Cell: 757-272-5497
Fax: 757-878-5722
email: david.k.morrow.civ@mail.mil

CLASSIFICATION: UNCLASSIFIED

From:	Morrow, D Keith CIV USAF 733 MSG (USA)
To:	wfrankadams@verizon.net
Cc:	McDaid, Christopher L CIV USAF 733 MSG (USA); Sugg, Tracey L CIV USAF (USA); Calder, Donald W Jr CIV USAF 733 MSG (USA)
Subject:	Shoreline stabilization project in Training Area 1 on Fort Eustis Upper Mattaponi (UNCLASSIFIED)
Date:	Wednesday, January 29, 2020 3:43:04 PM
Attachments:	Atch 1. Training Area 1 Shoreline Corrective Action Plan.pdf Atch 2. Training Area 1 Shoreline Stabilization Corrective Action Plan maps.pdf Atch 3. Technical Reports Archaeological Investigations at Site 44NN0024.pdf

CLASSIFICATION: UNCLASSIFIED

Dear Chief Adams,

The Air Force is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with shoreline stabilization and erosion protection at Joint Base Langley-Eustis - Eustis (JBLE-Eustis) Training Area 1 in Newport News, Virginia (Proposed Action) (attachment). The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, et seq.), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989).

The Air Force is considering four proposed alternatives, including the No Action Alternative, to the Proposed Action. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated. The first two attachments to this email provide information about Alternatives A,B, and C.

As part of the data gathering for this EA archaeological fieldwork was conducted on Archaeological Site 44NN0024 to determine if the proposed shoreline stabilization would have an adverse effect on the site (see attached report). Site 44NN0024 was occupied during the Woodland period 1200 B.C. to A.D. 1600 and was determined eligible for the National Register of Historic Places (NRHP) in 2016. The purpose of the limited fieldwork was to assess the potential for the site to be adversely affected by the proposed alternatives being considered to stabilize the shoreline in TA 1.

The recently concluded fieldwork on Site 44NN0024 has allowed the Air Force to determine the execution of any of the proposed alternatives will have no adverse effect on the qualities of Site 44NN0024 that make it eligible for the NRHP. The site was determined eligible for the NRHP due to its potential to provide information about the past. The proposed stabilization actions all are on the edge of the site and will not damage the portions of the site that make it eligible for the NRHP. Attachment 3 to this e-mail is the technical archaeological report on the field work. The Air Force has

determined that selecting and executing any of the three identified alternatives will result in no adverse effect to Site 44NN0024. However, if the additional environmental analysis undertaken during the development of the EA indicates that our determination was erroneous we will contact your office to continue consultation on the matter.

We invite you to join us as a consulting party as we conduct this EA in accordance with 36 CFR Part 800.2, Executive Order 13175, and Air Force Instruction 90-2002 - Interactions with Federally Recognized Tribes. Please review the attached documents to become familiar with the various Alternatives and the relationship between the Alternatives and Archaeological Site 44NN0024. With your advice and assistance, we hope to maintain an ongoing cooperative relationship between your Nation and the Air Force.

If you have any questions regarding this undertaking, please contact Dr. Christopher L. McDaid, via telephone phone at (757) 878-7365, or via email at Christopher.l.mcdaid.civ@mail.mil.
Sincerely

D. Keith Morrow
Deputy Commander
733d Mission Support Group
Fort Eustis, VA 23604
DSN: 826-2908
Comm: 757-878-2908
Cell: 757-272-5497
Fax: 757-878-5722
email: david.k.morrow.civ@mail.mil

CLASSIFICATION: UNCLASSIFIED

From:	Calder, Donald W Jr CIV USAF 733 MSG (USA)
To:	sbachor@delawaretribe.org
Cc:	McDaid, Christopher L CIV USAF 733 MSG (USA); Sugg, Tracey L CIV USAF (USA)
Subject:	National Environmental Policy Act (NEPA)/National Historic Preservation Act (NHPA) Native American Consultation Request for Shoreline Stabilization Project in Training Area 1 on Fort Eustis. (UNCLASSIFIED)
Date:	Thursday, January 30, 2020 11:32:09 AM
Attachments:	Atch 1. Training Area 1 Shoreline Corrective Action Plan.pdf Atch 2. Training Area 1 Shoreline Stabilization Corrective Action Plan maps.pdf Atch 3. Technical Reports Archaeological Investigations at Site 44NN0024.pdf

CLASSIFICATION: UNCLASSIFIED

Dear Ms. Bachor,

We invite you to be a consulting party with the U.S. Air Force as we prepare an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with our Proposed Action of shoreline stabilization and erosion protection at Joint Base Langley-Eustis - Fort Eustis (JBLE-Eustis), Training Area 1, in Newport News, Virginia. The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, et seq.), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989). We're sending you this consultation request in accordance with 36 CFR Part 800.2, Executive Order 13175, and Air Force Instruction 90-2002 - Interactions with Federally Recognized Tribes. Please let us know if you'd like to be a consulting party by 28 Feb 2020.

Our EA project will consider 3 action alternatives for the proposed action, as well as the No Action Alternative. A summary of the 3 action alternatives for this effort is in the Training Area 1 Shoreline Corrective Action Plan at Attachment 1, and additional site maps are provided at Attachment 2 for further clarification. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated. The first two attachments to this email provide information about Alternatives A,B, and C.

As part of the data gathering for this EA, archaeological fieldwork was conducted on Archaeological Site 44NN0024 to determine if the proposed shoreline stabilization would have an adverse effect on the site. Our formal technical report for this effort is at Attachment 3. Site 44NN0024 was occupied during the Woodland period 1200 B.C. to A.D. 1600 and was determined eligible for the National Register of Historic Places (NRHP) in 2016. The purpose of the limited fieldwork was to assess the potential for the site to be adversely affected by the proposed alternatives being considered to stabilize the shoreline in TA 1.

The recently concluded fieldwork on Site 44NN0024 has allowed the Air Force to determine the execution of any of the proposed alternatives will have no adverse effect on the qualities of Site 44NN0024 that make it eligible for the NRHP. The site was determined eligible for the NRHP due to its potential to provide information about the past. The proposed stabilization actions all are on the edge of the site and will not damage the portions of the site that make it eligible for the NRHP. Attachment 3 to this e-mail is the technical archaeological report on the field work. The Air Force has determined that selecting and executing any of the three identified alternatives will result in no adverse effect to Site 44NN0024. However, if the additional environmental analysis undertaken during the development of the EA indicates that our determination was erroneous we will contact your office to continue consultation on the matter.

If you decide to join us as a consulting party as we conduct this EA, we encourage you to review the attached documents and become familiar with the various Alternatives and their relationship with Archaeological Site 44NN0024. With your advice and assistance, we hope to maintain an ongoing cooperative relationship between your Nation and the Air Force.

If you have any questions regarding this undertaking, please contact our Cultural Resources Manager, Dr. Christopher L. McDaid, via telephone at (757) 878-7365, or via email at Christopher.l.mcdaid.civ@mail.mil.

//Signed//
Donald W. Calder, Jr.
Chief, Environmental Element (CEIE)
Installation Management Flight
733d Civil Engineer Division
1407 Washington Boulevard
JBLE-Eustis, VA 23604
Donald.W.Calder.Civ@mail.mil

3 Attachments:
1. TA-1 Shoreline Corrective Action Plan
2. TA-1 Corrective Action Plan Site Maps
3. Archaeological Technical Report for Site 44NN0024

CLASSIFICATION: UNCLASSIFIED

From:	Calder, Donald W Jr CIV USAF 733 MSG (USA)
To:	Remedios.holmes@cied.org
Cc:	McDaid, Christopher L CIV USAF 733 MSG (USA); Sugg, Tracey L CIV USAF (USA)
Subject:	National Environmental Policy Act (NEPA)/National Historic Preservation Act (NHPA) Native American Consultation Request for Shoreline Stabilization Project in Training Area 1 on Fort Eustis. (UNCLASSIFIED)
Date:	Thursday, January 30, 2020 11:04:02 AM

CLASSIFICATION: UNCLASSIFIED

Dear Ms. Holmes,

We invite you to be a consulting party with the U.S. Air Force as we prepare an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with our Proposed Action of shoreline stabilization and erosion protection at Joint Base Langley-Eustis - Fort Eustis (JBLE-Eustis), Training Area 1, in Newport News, Virginia. The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, et seq.), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989). We're sending you this consultation request in accordance with 36 CFR Part 800.2, Executive Order 13175, and Air Force Instruction 90-2002 - Interactions with Federally Recognized Tribes. Please let us know if you'd like to be a consulting party by 28 Feb 2020.

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The recently concluded fieldwork on Site 44NN0024 has allowed the Air Force to determine the execution of any of the proposed alternatives will have no adverse effect on the qualities of Site 44NN0024 that make it eligible for the NRHP. The site was determined eligible for the NRHP due to its potential to provide information about the past. The proposed stabilization actions all are on the edge of the site and will not damage the portions of the site that make it eligible for the NRHP. Attachment 3 to this e-mail is the technical archaeological report on the field work. The Air Force has determined that selecting and executing any of the three identified alternatives will result in no adverse effect to Site 44NN0024. However, if the additional environmental analysis undertaken during the development of the EA indicates that our determination was erroneous we will contact your office to continue consultation on the matter.

If you decide to join us as a consulting party as we conduct this EA, we encourage you to review the attached documents and become familiar with the various Alternatives and their relationship with Archaeological Site 44NN0024. With your advice and assistance, we hope to maintain an ongoing cooperative relationship between your Nation and the Air Force.

If you have any questions regarding this undertaking, please contact our Cultural Resources Manager, Dr. Christopher L. McDaid, via telephone at (757) 878-7365, or via email at Christopher.l.mcdaid.civ@mail.mil.

//Signed//
Donald W. Calder, Jr.
Chief, Environmental Element (CEIE)
Installation Management Flight
733d Civil Engineer Division
1407 Washington Boulevard
JBLE-Eustis, VA 23604
Donald.W.Calder.Civ@mail.mil

3 Attachments:
1. TA-1 Shoreline Corrective Action Plan
2. TA-1 Corrective Action Plan Site Maps
3. Archaeological Technical Report for Site 44NN0024

CLASSIFICATION: UNCLASSIFIED

From:	Calder, Donald W Jr CIV USAF 733 MSG (USA)
To:	wayne.adkins@att.net
Cc:	McDaid, Christopher L CIV USAF 733 MSG (USA); Sugg, Tracey L CIV USAF (USA)
Subject:	National Environmental Policy Act (NEPA)/National Historic Preservation Act (NHPA) Native American Consultation Request for Shoreline Stabilization Project in Training Area 1 on Fort Eustis (UNCLASSIFIED)
Date:	Thursday, January 30, 2020 11:17:21 AM
Attachments:	Atch 1. Training Area 1 Shoreline Corrective Action Plan.pdf Atch 2. Training Area 1 Shoreline Stabilization Corrective Action Plan maps.pdf Atch 3. Technical Reports Archaeological Investigations at Site 44NN0024.pdf

CLASSIFICATION: UNCLASSIFIED

Dear Assistant Chief Adkins

We invite you to be a consulting party with the U.S. Air Force as we prepare an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with our Proposed Action of shoreline stabilization and erosion protection at Joint Base Langley-Eustis - Fort Eustis (JBLE-Eustis), Training Area 1, in Newport News, Virginia. The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, et seq.), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989). We're sending you this consultation request in accordance with 36 CFR Part 800.2, Executive Order 13175, and Air Force Instruction 90-2002 - Interactions with Federally Recognized Tribes. Please let us know if you'd like to be a consulting party by 28 Feb 2020.

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If you decide to join us as a consulting party as we conduct this EA, we encourage you to review the attached documents and become familiar with the various Alternatives and their relationship with Archaeological Site 44NN0024. With your advice and assistance, we hope to maintain an ongoing cooperative relationship between

your Nation and the Air Force.

If you have any questions regarding this undertaking, please contact our Cultural Resources Manager, Dr. Christopher L. McDaid, via telephone at (757) 878-7365, or via email at Christopher.l.mcdaid.civ@mail.mil.

//Signed//
Donald W. Calder, Jr.
Chief, Environmental Element (CEIE)
Installation Management Flight
733d Civil Engineer Division
1407 Washington Boulevard
JBLE-Eustis, VA 23604
Donald.W.Calder.Civ@mail.mil

3 Attachments:
1. TA-1 Shoreline Corrective Action Plan
2. TA-1 Corrective Action Plan Site Maps
3. Archaeological Technical Report for Site 44NN0024

CLASSIFICATION: UNCLASSIFIED

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

FEB 0 4 2020

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division
1407 Washington Blvd
Fort Eustis, VA 23604

Wenonah G. Haire DMD
THPO and Director, Catawba Cultural Preservation Project
1536 Tom Steven Road
Rock Hill, SC 29730

Dear Dr. Haire,

We invite you to be a consulting party with the U.S. Air Force as we prepare an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with our Proposed Action of shoreline stabilization and erosion protection at Joint Base Langley-Eustis - Fort Eustis (JBLE-Eustis), Training Area 1, in Newport News, Virginia. The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, et seq.), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989). We're sending you this consultation request in accordance with 36 CFR Part 800.2, Executive Order 13175, and Air Force Instruction 90-2002 – Interactions with Federally Recognized Tribes. Please let us know if you'd like to be a consulting party by 28 Feb 2020.

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As part of the data gathering for this EA, archaeological fieldwork was conducted on Archaeological Site 44NN0024 to determine if the proposed shoreline stabilization would have an adverse effect on the site. Our formal technical report for this effort is at Attachment 2. Site 44NN0024 was occupied during the Woodland period 1200 B.C. to A.D. 1600 and was determined eligible for the National Register of Historic Places (NRHP) in 2016. The purpose of the limited fieldwork was to assess the potential for the site to be adversely affected by the proposed alternatives being considered to stabilize the shoreline in TA 1.

The recently concluded fieldwork on Site 44NN0024 has allowed the Air Force to determine the execution of any of the proposed alternatives will have no adverse effect on the qualities of Site 44NN0024 that make it eligible for the NRHP. The site was determined eligible for the NRHP due to its potential to provide information about the past. The proposed stabilization actions all are on the edge of the site and will not damage the portions of the site that make it eligible for the NRHP. Attachment 3 to this e-mail is the technical archaeological report on the field work. The Air Force has determined that selecting and executing any of the three identified alternatives will result in no adverse effect to Site 44NN0024. However, if the additional environmental analysis undertaken during the development of the EA indicates that our determination was erroneous we will contact your office to continue consultation on the matter.

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With your advice and assistance, we hope to maintain an ongoing cooperative relationship between your Nation and the Air Force. If you have any questions regarding this undertaking, please contact Dr. Christopher L. McDaid, via telephone phone at (757) 878-7365, or via email at Christopher.l.mcdaid.civ@mail.mil.

Sincerely,

Donald W. Calder, Jr.
Chief, Environmental Element
733d Civil Engineer Division

2 Attachments
1. Training Area 1 Shoreline erosion Corrective Action Plan
2. Technical report Archaeological Investigations at Site 44NN0024

From:	Calder, Donald W Jr CIV USAF 733 MSG (USA)
To:	ethompson@delawarenation-nsn.gov
Cc:	Sugg, Tracey L CIV USAF (USA); McDaid, Christopher L CIV USAF 733 MSG (USA)
Subject:	RE: National Environmental Policy Act (NEPA)/National Historic Preservation Act (NHPA) Native American Consultation Request for Shoreline Stabilization Project in Training Area 1 on Fort Eustis. (UNCLASSIFIED)
Date:	Thursday, February 6, 2020 1:56:18 PM
Attachments:	Atch 1. Training Area 1 Shoreline Corrective Action Plan.pdf Atch 2. Training Area 1 Shoreline Stabilization Corrective Action Plan maps.pdf Atch 3. Technical Archaeological report.pdf

CLASSIFICATION: UNCLASSIFIED

Dear Ms. Thompson,

We invite you to be a consulting party with the U.S. Air Force as we prepare an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with our Proposed Action of shoreline stabilization and erosion protection at Joint Base Langley-Eustis - Fort Eustis (JBLE-Eustis), Training Area 1, in Newport News, Virginia. The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, et seq.), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989). We're sending you this consultation request in accordance with 36 CFR Part 800.2, Executive Order 13175, and Air Force Instruction 90-2002 - Interactions with Federally Recognized Tribes. Please let us know if you'd like to be a consulting party by 28 Feb 2020.

Our EA project will consider 3 action alternatives for the proposed action, as well as the No Action Alternative. A summary of the 3 action alternatives for this effort is in the Training Area 1 Shoreline Corrective Action Plan at Attachment 1, and additional site maps are provided at Attachment 2 for further clarification. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated. The first two attachments to this email provide information about Alternatives A,B, and C.

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The recently concluded fieldwork on Site 44NN0024 has allowed the Air Force to determine the execution of any of the proposed alternatives will have no adverse effect on the qualities of Site 44NN0024 that make it eligible for the NRHP. The site was determined eligible for the NRHP due to its potential to provide information about the past. The proposed stabilization actions all are on the edge of the site and will not damage the portions of the site that make it eligible for the NRHP. Attachment 3 to this e-mail is the technical archaeological report on the field work. The Air Force has determined that selecting and executing any of the three identified alternatives will result in no adverse effect to Site 44NN0024. However, if the additional environmental analysis undertaken during the development of the EA indicates that our determination was erroneous we will contact your office to continue consultation on the matter.

If you decide to join us as a consulting party as we conduct this EA, we encourage you to review the attached documents and become familiar with the various Alternatives and their relationship with Archaeological Site 44NN0024. With your advice and assistance, we hope to maintain an ongoing cooperative relationship between your Nation and the Air Force.

If you have any questions regarding this undertaking, please contact our Cultural Resources Manager, Dr. Christopher L. McDaid, via telephone at (757) 878-7365, or via email at Christopher.l.mcdaid.civ@mail.mil.

//Signed//
Donald W. Calder, Jr.
Chief, Environmental Element (CEIE)
Installation Management Flight
733d Civil Engineer Division
1407 Washington Boulevard
JBLE-Eustis, VA 23604
Donald.W.Calder.Civ@mail.mil

3 Attachments:
1. TA-1 Shoreline Corrective Action Plan
2. TA-1 Corrective Action Plan Site Maps
3. Archaeological Technical Report for Site 44NN0024

CLASSIFICATION: UNCLASSIFIED

CLASSIFICATION: UNCLASSIFIED

From:	Calder, Donald W Jr CIV USAF 733 MSG (USA)
To:	allyn.cook-swartz@pamunkey.org
Cc:	McDaid, Christopher L CIV USAF 733 MSG (USA); Sugg, Tracey L CIV USAF (USA)
Subject:	National Environmental Policy Act (NEPA)/National Historic Preservation Act (NHPA) Native American Consultation Request for Shoreline Stabilization Project in Training Area 1 on Fort Eustis, VA (UNCLASSIFIED)
Date:	Thursday, February 6, 2020 1:56:16 PM
Attachments:	Atch 1. Training Area 1 Shoreline Corrective Action Plan.pdf Atch 2. Training Area 1 Shoreline Stabilization Corrective Action Plan maps.pdf Atch 3. Technical Archaeological report.pdf

CLASSIFICATION: UNCLASSIFIED

Dear Ms. Cook-Swartz,

We invite you to be a consulting party with the U.S. Air Force as we prepare an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with our Proposed Action of shoreline stabilization and erosion protection at Joint Base Langley-Eustis - Fort Eustis (JBLE-Eustis), Training Area 1, in Newport News, Virginia. The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, et seq.), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989). We're sending you this consultation request in accordance with 36 CFR Part 800.2, Executive Order 13175, and Air Force Instruction 90-2002 - Interactions with Federally Recognized Tribes. Please let us know if you'd like to be a consulting party by 28 Feb 2020.

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//Signed//
Donald W. Calder, Jr.
Chief, Environmental Element (CEIE)
Installation Management Flight
733d Civil Engineer Division
1407 Washington Boulevard
JBLE-Eustis, VA 23604
Donald.W.Calder.Civ@mail.mil

3 Attachments:
1. TA-1 Shoreline Corrective Action Plan
2. TA-1 Corrective Action Plan Site Maps
3. Archaeological Technical Report for Site 44NN0024

CLASSIFICATION: UNCLASSIFIED

From:	Calder, Donald W Jr CIV USAF 733 MSG (USA)
To:	info@rappahannocktribe.org
Cc:	McDaid, Christopher L CIV USAF 733 MSG (USA); Sugg, Tracey L CIV USAF (USA)
Subject:	National Environmental Policy Act (NEPA)/National Historic Preservation Act (NHPA) Native American Consultation Request for Shoreline Stabilization Project in Training Area 1 on Fort Eustis (UNCLASSIFIED)
Date:	Thursday, February 6, 2020 1:56:24 PM
Attachments:	Atch 3. Technical Archaeological report.pdf Atch 2. Training Area 1 Shoreline Stabilization Corrective Action Plan maps.pdf Atch 1. Training Area 1 Shoreline Corrective Action Plan.pdf

CLASSIFICATION: UNCLASSIFIED

Dear Assistant Chief Fortune,

We invite you to be a consulting party with the U.S. Air Force as we prepare an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with our Proposed Action of shoreline stabilization and erosion protection at Joint Base Langley-Eustis - Fort Eustis (JBLE-Eustis), Training Area 1, in Newport News, Virginia. The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, et seq.), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989). We're sending you this consultation request in accordance with 36 CFR Part 800.2, Executive Order 13175, and Air Force Instruction 90-2002 - Interactions with Federally Recognized Tribes. Please let us know if you'd like to be a consulting party by 28 Feb 2020.

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If you have any questions regarding this undertaking, please contact our Cultural Resources Manager, Dr. Christopher L. McDaid, via telephone at (757) 878-7365, or via email at Christopher.l.mcdaid.civ@mail.mil.

//Signed//
Donald W. Calder, Jr.
Chief, Environmental Element (CEIE)
Installation Management Flight
733d Civil Engineer Division
1407 Washington Boulevard
JBLE-Eustis, VA 23604
Donald.W.Calder.Civ@mail.mil

3 Attachments:
1. TA-1 Shoreline Corrective Action Plan
2. TA-1 Corrective Action Plan Site Maps
3. Archaeological Technical Report for Site 44NN0024

CLASSIFICATION: UNCLASSIFIED

Training Area 1 Shoreline Erosion Corrective Action Plan

For

THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY EUSTIS, FORT EUSTIS, VIRGINIA

Contract No. W91278-12-D-0028
Task Order No. 0007

Prepared By
Angler Environmental
3751 Westerre Parkway, Suite A
Richmond, Virginia 23233

August 2015

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EXECUTIVE SUMMARY

This Corrective Action Plan (CAP) was developed to provide an analysis, conceptual design options for consideration, and recommended project budget estimates to incorporate into future scope of work proposals. This design options were developed in order to address ongoing shoreline erosion and bluff failure located along the terminus of Training Area 1 (TA1) at Fort Eustis, Virginia. Training Area 1 is located at the western terminus of an east to west trending peninsula at the confluence of Skiffes Creek and Bailey Creek. This peninsula was identified by the Environmental Element (EE) of the 733D Mission Support Group, Civil Engineering Division, of Joint Base Langley Eustis as an important resource for military training, recreational use, and contains a documented archaeological resource.

In order to develop the conceptual plans and other components of the CAP, Angler conducted an initial site visit to assess and document current site conditions, completed a topographic survey along the shoreline, and researched available tide range data. Based on the data obtained from the site assessment, topographic survey, and available tide range data, three alternatives were developed that will address the ongoing erosion and provide long term stability of the shoreline along TA1. Angler developed an analysis of the regulatory requirements for each alternative and developed project cost estimates for final design; federal, state, and local permitting requirements; and construction (materials and labor) for planning and funding purposes.

I. BACKGROUND INFORMATION

A. Existing Site Conditions and Land Use

The area of concern is located at the western terminus of an east to west trending peninsula that extends into Skiffes Creek. The project area for this CAP includes approximately 1,800 linear feet (approx. 8 acres) of shoreline. Based on information provided by the ASA, Training Division, and the Range Control ITAM Program Manager, the usage of TA1 is primarily land navigation, tactical bivouac, small unit training and military dog handling training. In addition, recreational uses include deer hunting and fishing. Angler Environmental (Angler) conducted a site evaluation on October 28, 2014 to assess existing conditions. During the site assessment active erosion was observed along the entire shoreline within the project area. The loss of marsh grass, loss of marsh root structure, loss of sand substrate, and the inundation of marsh grass by upland erosion was observed. The long term shoreline erosion rate along Skiffes Creek have been estimated to be -0.6 ft./yr. based on the *Shoreline Evolution: City of Newport News, Virginia, James River and Hampton Roads Shoreline Data Report* published by the Virginia Institute of Marine Science (VIMS) in March 2010, however, localized erosion rates may be greater. The upland bluff is eroding in four (4) separate sections within the project area. This erosion can be observed by tree arching along the bluff rim, tree collapse along the shoreline and into the waterway, vertical or cantilevered bluff faces, exposed bluff faces exceeding 8 to 12 feet in height, and the loss of soil from within the bluff to Skiffes Creek. The bluff erosion appears to be attributed to tide and wave action along the toe-slope, the boat traffic that compounds the influence of the wave action, and the subsequent undermining of the tree root zone which is perpetuating the tree collapse and unstable bluff face. All of the land loss is collapsing onto the shoreline and is subsequently transported into Skiffes Creek delivering a substantial amount of sand and sediment offshore, below mean low water.

Average fetch estimates to the project area, as shown on the attached CAP, includes 0.29 mile to the north, 0.33 mile to the northwest, 0.35 mile to the southwest at the point of the peninsula, and 0.25 mile to the southwest within Bailey Creek near the existing pedestrian bridge. The greatest average fetch is 0.35 mile to the southwest at the point of the peninsula where the project area is experiencing the greatest erosion and is more exposed to the James River.

A documented archaeological site (DHR ID 44NN0024) is located within the TA1. The site is classified as a Native American (terrestrial, open air) site during the middle woodland time period. A Phase II Cultural Resources Survey was completed in late 2014/early 2015 to determine the boundaries and recommended eligibility status of the site. Based on the survey the limits were redefined and are shown on the attached CAP. At the time of developing this CAP, the Virginia Department of Historic Resources (DHR) review of the Phase II survey was not complete. As such, the limits of archaeological site 44NN0024 as shown on the attached CAP, have not been approved and may change based on DHR's review.

B. Topographic Survey

A topographic survey was completed on February 18, 2015, within the project area in order to develop the various design concepts. The survey did not include a boundary survey or verification of property lines and/or easements. The contours (2 ft.) based on the topographic survey are shown on the attached CAP. Since this was completed for a concept level plan, neither a tidal survey nor topographic survey within Skiffes Creek were

completed. As such, prior to completing final design plans it is recommended that a tidal survey be completed as well as additional topographic survey as needed based on the preferred design option. The cost estimates for the final design options provided in Section IV include estimates for completion of a tidal survey and any additional topographic survey that may be needed.

C. Tide Range Research

Tide data used for the development of the CAP was obtained from the Fort Eustis (Marad), James River station (ID #8638017). The mean tide range based on 2015 predictions was approximately 2.24 ft. As discussed above, a tidal survey should be completed prior to final design and cost estimates for completion of a tidal survey are included as part of the design cost estimates provided in Section IV.

II. CONCEPTUAL DESIGN OPTIONS

A. Option A: Marsh and Vegetation Management

The concept design utilizes a non-structural approach to protecting the existing and proposed planted marshes. By enhancing, planting & protecting existing marshes the natural erosion protection benefits of these systems is being protected. This method is only suitable in areas with elevations higher than mean-tide level (MTL), with minimal wave action and boat wake, and with adjacent vegetation management and bank grading and restoration.

This method utilizes a fiber log located at MTL, either placed to protect an existing marsh or placed such that a new or enhanced planted marsh can be installed landward of the fiber log. Proposed planted marshes should be graded at a slope between 8:1 and 10:1. If this is not the natural slope clean coarse grained sand fill can be brought in behind the log to achieve the desired slope. The existing offshore area surrounding Training Area 1 (TA1) falls naturally within this slope range making it a good candidate for this approach. There are pockets along the TA1 peninsula where there is healthy marsh growth that can be blended in to the planted marsh areas providing natural erosion protection and enhancing and extending natural ecosystem. The planted marsh behind the fiber log should be planted with two types of vegetation. From the back of the fiber log to the mean high water (MHW) line a low marsh will be planted with smooth cordgrass (*Spartina alterniflora*). Above MHW to approximately 3-4' above mean low water (MLW) a high marsh will be planted with saltmeadow cordgrass (*Spartina patens*) and saltgrass (*Distichlis spicata*). Behind the planted marsh a 4' wide tidal shrub zone will be planted to help stabilize the toe of the slope beyond, this area is planted with native tidal shrubs such as marsh elder (*Iva frutescens*) and groundsel tree (*Baccharis halimifolia*).

Beyond the planted marsh, bank grading will be utilized to repair the high unstable banks to prevent future erosion of those banks from inundating the new and enhanced planted marshes. In this concept the bank grading slope is noted as 2:1, this is steeper than the typical recommended range, however it minimizes the amount of earthwork necessary. In order to protect the steeper slope from erosion, erosion control matting (ECM) is recommended to help stabilize these slopes, while suitable native vegetation is becoming established, which will provide permanent bank stabilization.

Due to the minimal nature of this design, emphasis is placed on developing a vegetation management program. With proper vegetation management natural systems can be enhanced and can provide natural erosion protection. Vegetation management would include selective tree pruning and clearing, the removal of debris from the shoreline (especially after storm events), supplemental native upland plantings to stabilize adjacent banks and regular inspections and maintenance as necessary.

B. Option B: Living Shoreline

The concept design option employs Living Shoreline design methodologies to create a structural solution that maintains the natural functionality and connectivity of the delicate ecosystem that exists along tidal shores. This design methodology is suitable for areas exposed to longer fetches, greater tidal ranges, more boat wake, adjacent to bank grading, plenty of sunlight and has a shallow hard sand bottom extending offshore.

In this concept design a low profile stone structure, called a sill, is used to contain sand fill which is placed to support a new planted marsh. The sill placement is site-specific and is

dependent on the adjacent bank height, bank grade, water depth, tide ranges and bottom type near the shoreline. In the concept design option recommended for TA1 the sill is placed seaward from the existing shoreline in an attempt to balance the cut/fill required as part of the bank grading behind it. However, by pushing the sill seaward, and thus the planted marsh as well, a larger amount of sand fill will be required to achieve the desired slope range between 8:1 and 10:1 for the planted marsh. The sills are typically located at an elevation near mean low water (MLW) with the height of the sill between 0-1' above mean high water (MHW) in low energy settings (average fetch less than 0.5 miles) to allow for regular wave overtopping. Since the total sill length is greater than 100 ft., tidal gaps should be strategically placed to allow for flushing of the tidal marsh behind the sill, as well as providing connectivity between ecosystems.

The planted marsh behind the sill will be planted with two types of vegetation. From the back of the sill to the MHW line a low marsh will be planted with smooth cordgrass (*Spartina alterniflora*); above MHW to approximately 3-4' above MLW a high marsh will be planted with saltmeadow cordgrass (*Spartina patens*) and saltgrass (*Distichlis spicata*). Due to the sensitivity of this design it is important to allow the sand fill to sit for 1-2 weeks before planting. This allows for settlement, the verification of actual tide levels within the planting area and appropriate adjustments to the slope or height of the marsh area as necessary prior to planting.

Behind the planted marsh a 4' wide tidal shrub zone will be planted to help stabilize the toe of the slope beyond. This area is planted with native tidal shrubs such as marsh elder (*Iva frutescens*) and groundsel tree (*Baccharis halimifolia*). At the areas where there is extensive existing wetland vegetation, and no proposed work, the planted marsh will be blended with the existing vegetation to create a connected ecosystem.

Beyond the planted marsh, bank grading will be utilized to properly connect the marsh with the upland area. Bank grading is recommended in areas with active erosion at the top and bottom of the bank, areas with high unstable banks, undercutting or falling trees, and where sunlight will reach the graded slopes. Target slopes range between 6:1 and 3:1 and are chosen based on natural shore topography, adjacent land uses and design combinations with other shore protection methods. For the bank grading in design Option B the recommended slope is 4:1. This is a stable slope that would allow for good vegetation cover and that would not be impacted negatively by higher than normal wave action.

For the long term success of the project and for the protection of areas not within the bank grading and replanting areas a vegetation management program should be utilized to protect and enhance the natural erosion protection provided by vegetation. Vegetation management would include selective tree pruning and clearing, the removal of debris from the shoreline (especially after storm events), and supplemental native upland plantings to stabilize adjacent banks. The components and benefits of a vegetation management program are discussed further under TA1 design Option A.

C. Option C: Concrete Bulkhead

This concept design option uses a precast concrete wall, called a bulk head, to stabilize sections of eroded shoreline, specifically in bluff areas with toe erosion and high unstable banks. The precast concrete wall is placed into an excavated trench and backfill is placed on top of a rear anchor to hold the wall in place. Bulkheads are appropriate in areas where the channel is used frequently for navigation and where a more environmentally

preferred design option will impair the use of the channel for navigation. At the location of eroded shoreline adjacent to the pedestrian bridge a stone sill and planted marsh, (reference design Option B), are being recommended in order to protect the foundation of the existing pedestrian bridge without requiring modifications to the bridge.

Beyond the bulk head, bank grading will be utilized to tie the adjacent grade into the wall. Target slopes for bank grading typically range between 6:1 and 3:1 and are chosen based on natural shore topography, adjacent land uses and design combinations with other shoreline protection methods. With the use of a bulk head a steeper slope, 3:1, can be used since the upland area will not be exposed to regular wave action.

For the long term success of the project and for the protection of areas not protected by the bulk head, or within the bank grading and replanting areas a vegetation management program should be utilized to protect and enhance the natural erosion protection provided by vegetation. Vegetation management would include selective tree pruning and clearing, the removal of debris from the shoreline (especially after storm events), and supplemental native upland plantings to stabilize adjacent banks. The components and benefits of a vegetation management program are discussed further under TA1 design Option A.

D. Construction Considerations

These design options range from Option A requiring the least amount of heavy construction, to Option C requiring the most amount. Depending on the design, construction equipment will have to access the bank and in some cases the shoreline in order to execute the design. The existing access road to TA1 will provide construction access to the peninsula, however, additional temporary access roads will need to be cleared to allow for equipment access to the areas of bank grading and shoreline. Depending on the cut/fill balance of the chosen design temporary soil stockpile area(s) may be required depending on the sequence of construction. In addition, to house the equipment overnight and when not in use, a temporary material & equipment storage area will be needed. The material and equipment storage area should be located in an upland area and if possible utilize existing cleared areas to minimize additional land clearing and disturbance. Once the bank grading is completed, and the marsh, shrub zones and bank areas planted (as appropriate) additional precautions will need to be taken to protect the graded areas from erosion and the planted vegetation from waterfowl while the vegetation becomes established.

III. REGULATORY ANALYSIS

The following sections describe the regulatory requirements and applicable permits that may be required from local, state, and federal agencies based on the conceptual design options. It should be noted these are requirements that are anticipated to complete the project at the time this CAP was developed. In addition to the following, it is anticipated that due to the nature and location of the project an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) of 1969 will be required.

A. Tidal Wetlands/Waters

Impacts and encroachments (both temporary and permanent) to tidal wetlands and waters are anticipated based on the conceptual design options included in the CAP. As such, authorizations from local, state, and federal agencies including the Local Wetlands Board (LWB) and/or Virginia Marine Resource Commission (VMRC) pursuant to the Virginia Tidal Wetlands Act and the U.S. Army Corps of Engineers (Corps) pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. A Tidewater Joint Permit Application (JPA) will need to be submitted to the VMRC for coordination with the LWB and Corps. Based on the conceptual design options, it is anticipated the project may qualify for authorization under the Corps Regional Permit 19 (13-RP-19). The State Water Control Board has issued unconditional 401 Water Quality Certification for the 13-RP-19. As such, the activities that qualify for this RP also meet the requirements of the Virginia Department of Environmental Quality (DEQ) Virginia Water Protection Permit (VWP) Regulation and no additional authorization from DEQ would be required as long as the project meets the terms and conditions of 13-RP-19. In lieu of the 13-RP-19, it is our understanding the Corps has recently authorized shoreline stabilization projects under Nationwide Permit 13 (Bank Stabilization). Therefore, the regulatory strategy for this project will require further analysis and coordination depending on the chosen option presented in the CAP.

Since the project will likely require federal and state authorizations for impacts and encroachments to tidal wetlands and waters, coordination with other supporting agencies will be required to determine potential adverse effects to Cultural Resources under Section 106 of the National Historic Preservation Act (NHPA) and to threatened and/or endangered species under Section 7 of the Federal Species Act (ESA). As previously discussed, an archaeological site (DHR ID 44NN0024) is located within the TA1 project area. A Phase II survey was completed in early 2015 to define the limits of the site and determined the eligibility status. At this time DHR is in the process of reviewing the Phase II survey. Therefore, the limits of the site may change and it is uncertain, at this time, if the site will be determined eligible or potentially eligible for listing on the National Register of Historic Places (NRHP). Depending on the final limits and status of the site, additional surveys may be required. Angler completed a preliminary review of threatened and endangered species information through available resources including the U.S. Fish and Wildlife Service's (USFWS) Information, Planning, and Conservation System (IPaC), Virginia Department of Game and Inland Fisheries' (VDGIF) Fish and Wildlife Information System (VaFWIS), and the Department of Conservation and Recreation's (DCR) Virginia Natural Heritage Data Explorer (NHDE). Due to its recent listing the Northern Long-eared bat (*Myotis septentrionalis*) was included on the USFWS IPaC report. As such, further coordination with USFWS will likely be required in accordance with the recently implemented 4(d) rule for the Northern Long-eared Bat. At this time the USFWS is recommending a time of year restriction (April 15th to September 15th) for projects involving land clearing activities and require a federal authorization. However, since the 4(d) Rule

was recently implemented requirements and/or recommendations from the USFWS may vary depending on the project scope and location. Furthermore, the Atlantic sturgeon (*Acipenser oxyrinchus*, state and federal endangered) was included on the VDGIF VaFWIS and DCR's NHDE reports. Since the project will occur along Skiffes Creek, a tributary to the James River, coordination with the National Oceanic and Atmospheric Administration (NOAA) Fisheries may be required.

B. Resource Protection Area

A 100-foot Resource Protection Area (RPA) is located along Skiffes Creek and/or the tidal and non-tidal wetlands connected and contiguous to Skiffes Creek. A detailed assessment to determine the RPA limits within the project area has not been completed. Therefore, the RPA limits shown on the CAP are preliminary and based on general site evaluation and mapping. The conceptual design option included in the CAP include a combination of clearing, grading, and structural fill. Although the Chesapeake Bay Preservation Act (CBPA) is administered at the local level and may not apply on federal lands, additional review and coordination may be needed for proposed work within the RPA.

C. 100-Year Floodplain

The limits of the Federal Emergency Management Agency (FEMA) 100-year floodplain are shown on the attached CAP. Since the conceptual design options include fill and grading within the limits of the 100-year floodplain, a floodplain study/analysis will likely be required to determine potential changes to the 100-year floodplain limits based on the final design. Coordination with FEMA and/or Local review will be required for proposed work within the limits of the 100-year floodplain and to determine the need for a Conditional Letter of Map Revision (CLOMR).

D. Construction General Permit

Since the conceptual design options will require land disturbing activities, a Virginia Pollutant Discharge Elimination System (VPDES) Construction General Permit (CGP) and Stormwater Pollution Prevention Plan (SWPPP) may be required and will also depend on the acreage of land disturbance in the final design. The CGP permit fees vary depending on the acreage of land disturbance.

IV. COST ESTIMATES

The cost estimates presented below are based on the conceptual design options included in the CAP. The estimates includes and EA in accordance with NEPA requirements, final design including, local, state, and federal permitting, tidal survey, additional topographic survey that may be needed to complete the design, additional surveys and/or evaluations regarding cultural resources, and surveys and agency coordination related to threatened and endangered species. Construction estimates include site mobilization as well as material and labor for each conceptual design option. The cost estimates include development of a Vegetation Management Program and the anticipated maintenance associated with this type of program for each option. The cost estimates for the Vegetation Management Program vary between options and is based on the type of shoreline stabilization practice proposed and planting.

Ft. Eustis Training Area 1 Shoreline Erosion Corrective Action Plan Cost Estimates

Option A: Coir Logs

Item	Estimated Quantity Unit	Unit Price	Total Price
Environmental Assessment			$100,000.00
Cultural Resources Evaluation/Survey			$100,000.00
Threatened/Endangered Species Surveys/Coord.			$8,000.00
Floodplain Study/FEMA Coordination			$75,000.00
Final Design, Survey, Permitting			$19,500.00
Mobilization/Management	1.00 LS	$19,070.00	$19,070.00
Erosion and Sediment Control	1.00 LS	$21,897.00	$21,897.00
Clearing and Grubbing	0.20 Ac.	$24,579.00	$4,915.80
Earthwork Grading	1,200.00 CY	$52.00	$62,400.00
20" Coir Log Installation	875.00 LF	$31.00	$27,125.00
Marsh Planting (1.5' O.C.)	4,930.00 Each	$3.00	$14,790.00
Tidal Shrub Planting (1.5' O.C.)	2,345.00 Each	$14.00	$32,830.00
Stabilization	4,840.00 SF	$2.00	$9,680.00
Vegetative Management Program	5 Years	$14,000.00	$70,000.00
		Total Price for Option A:	**$565,207.80**

Option B: Stone Sill

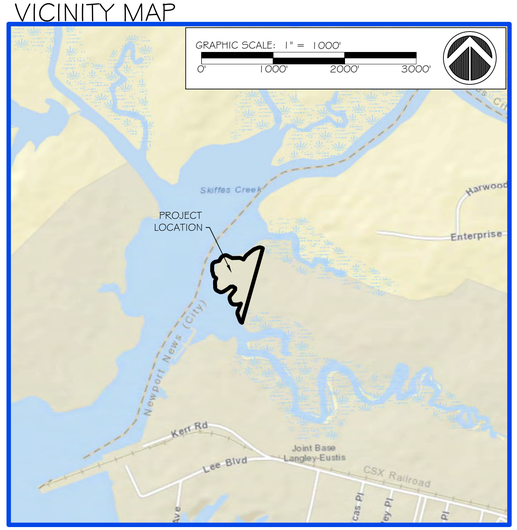
Item	Estimated Quantity Unit	Unit Price	Total Price
Environmental Assessment			$100,000.00
Cultural Resources Evaluation/Survey			$100,000.00
Threatened/Endangered Species Surveys/Coord.			$8,000.00
Floodplain Study/FEMA Coordination			$75,000.00
Final Design, Survey, Permitting			$65,000.00
Mobilization/Management	1.00 LS	$40,663.00	$40,663.00
Erosion and Sediment Control	1.00 LS	$22,535.00	$22,535.00
Clearing and Grubbing	1.00 Acre	$11,376.00	$11,376.00
Earthwork Grading	2,556.00 CY	$21.00	$53,676.00
Stone Sill	1,150.00 LF	$222.00	$255,300.00
Sand Fill	1,150.00 LF	$154.00	$177,100.00
Marsh Planting (1.5' O.C.)	12,975.00 Each	$3.00	$38,925.00
Tidal Shrub Planting (1.5' O.C.)	3,244.00 Each	$15.00	$48,660.00
Native Upland Seeding	3,227.00 SY	$1.00	$3,227.00
Vegetative Management Program	5 Years	$17,000.00	$85,000.00
		Total Price for Option B:	**$1,084,462.00**

Option C: Concrete Bulkhead

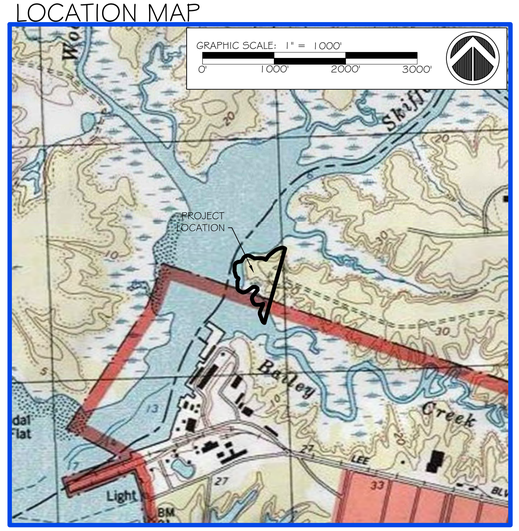
Item	Estimated Quantity Unit	Unit Price	Total Price
Environmental Assessment			$100,000.00
Cultural Resources Evaluation/Survey			$100,000.00
Threatened/Endangered Species Surveys/Coord.			$8,000.00
Floodplain Study/FEMA Coordination			$75,000.00
Final Design, Survey, Permitting			$35,000.00
Mobilization/Management	1.00 LS	$21,619.00	$21,619.00
Erosion and Sediment Control	1.00 LS	$22,535.00	$22,535.00
Clearing and Grubbing	1.00 Acre	$11,376.00	$11,376.00
Earthwork Grading	1,019.00 CY	$21.00	$21,399.00
Stone Sill	200.00 LF	$218.00	$43,600.00
Sand Fill	200.00 LF	$154.00	$30,800.00
Concrete Bulkhead	500.00 LF	$348.00	$174,000.00
Marsh Planting (1.5' O.C.)	2,256.00 Each	$3.00	$6,768.00
Tidal Shrub Planting (1.5' O.C.)	510.00 Each	$15.00	$7,650.00
Native Upland Seeding	1,854.00 SY	$1.00	$1,854.00
Vegetative Management Program	5 Years	$9,000.00	$45,000.00
		Total Price for Option C:	**$704,601.00**

FT. EUSTIS TRAINING AREA (TA) 1 SHORELINE EROSION CORRECTIVE ACTION PLAN
FORT EUSTIS, VIRGINIA

VICINITY MAP



LOCATION MAP



LATITUDE: N 37° 10' 28.9"
LONGITUDE: W 76° 36' 3.3"

OWNER/APPLICANT:
THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS
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CONTACT: TIMOTHY CHRISTENSEN
PHONE: 757-878-4231

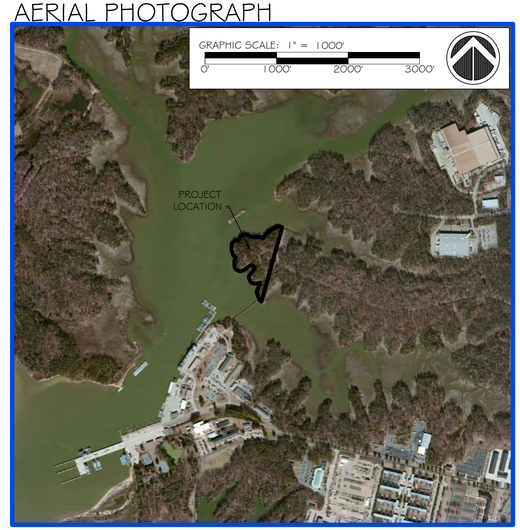
CLIENT:
DIAL CORDY & ASSOCIATES
490 OSCEOLA AVENUE
JACKSONVILLE BEACH, FL 32250

PROPERTY INFO:
LAT: 37° 10' 28.9", LONG: -76° 36' 3.3"
STUDY AREA: 8.30 AC

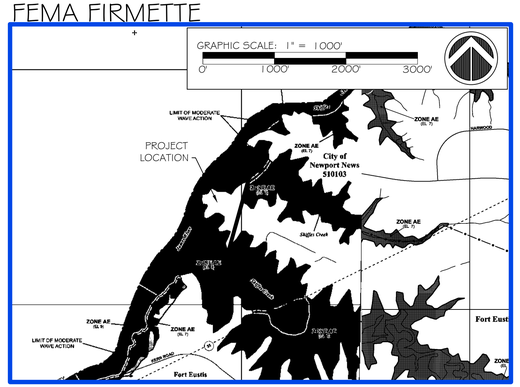
SHEET INDEX:

1 - COVERSHEET
2 - EXISTING CONDITIONS
3 - OPTION A
4 - OPTION B
5 - OPTION C

AERIAL PHOTOGRAPH



FEMA FIRMETTE



REFERENCE FEMA MAP: 5101030036D & 5101030037D

FT. EUSTIS TA 1 SHORELINE EROSION CORRECTIVE ACTION PLAN

REVISIONS:	
REVISIONS:	
REVISIONS:	
PROJECT MANAGER: RA	JOB NUMBER: 4857
DESIGNED: BW	DESIGN FILE: CONCEPTUAL CAP
DRAWN: BW	DATE: 6/26/2015

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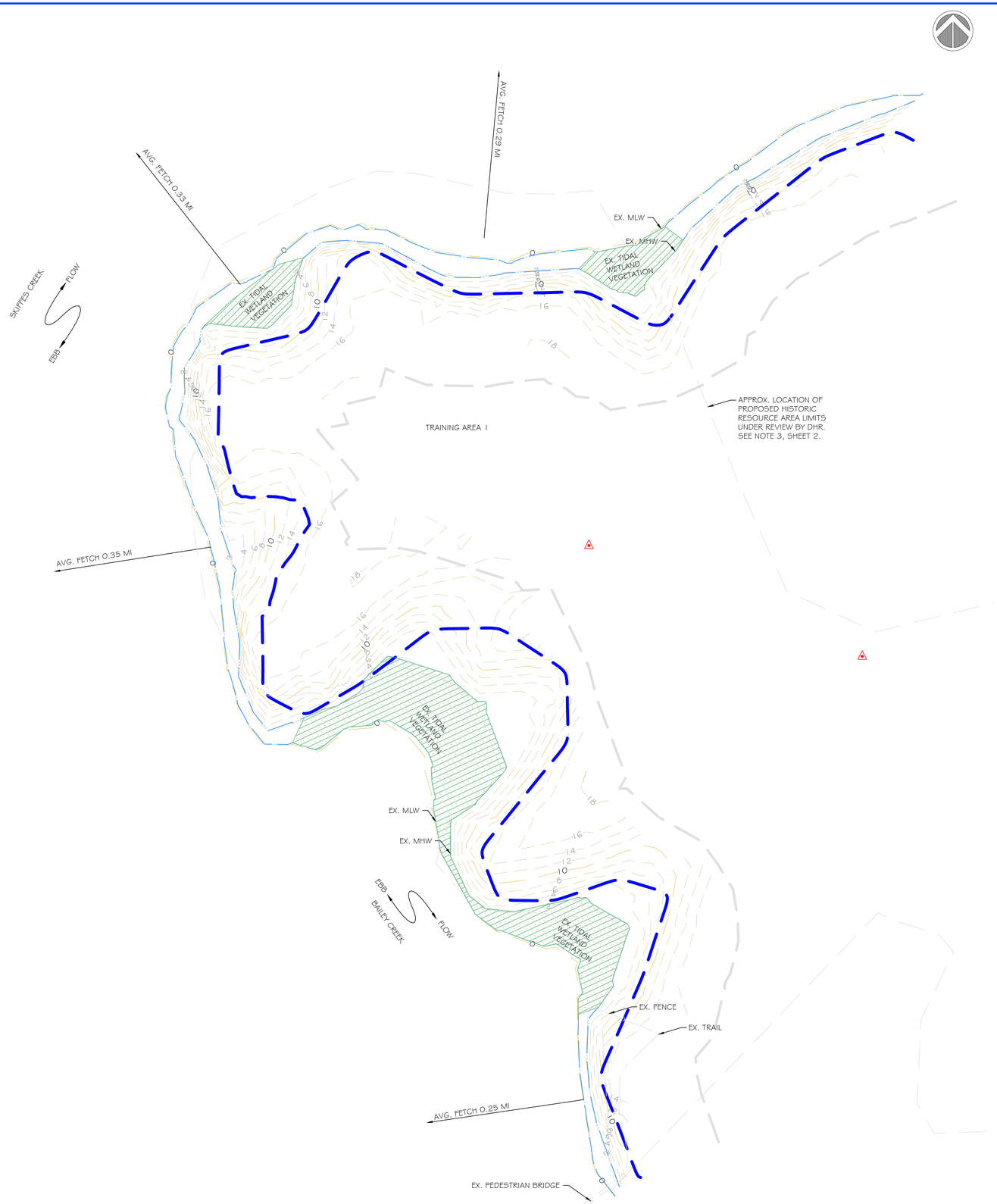

LEGEND

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. APPROX. MEAN HIGH WATER (MHW)
- EX. APPROX. MEAN LOW WATER (MLW)
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT

SURVEY NOTES:
1. THIS TOPOGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF TERRY L. HICKMAN, LAND SURVEYOR, FROM AN ACTUAL GROUND SURVEY MADE UNDER HIS SUPERVISION; THE ORIGINAL DATA WAS OBTAINED ON 2/18/15 (COMPLETED); AND THAT THIS INCLUDING METADATA MEETS MINIMUM ACCURACY STANDARDS UNLESS OTHERWISE NOTED.

2. PROPERTY LINES: THIS MAP DOES NOT REPRESENT A CURRENT LAND BOUNDARY SURVEY. THE MAP WAS COMPILED WITHOUT THE BENEFIT OF A TITLE REPORT. IT DOES NOT SHOW PROPERTY LINES OR ANY OTHER EVIDENCE OF OWNERSHIP. THIS MAP DOES NOT CREATE NEW OR REVISE ANY EXISTING PARCELS.

3. EASEMENTS: THE PARCELS MAY BE SUBJECT TO UNMAPPED EASEMENTS AND/OR RESTRICTIONS OF RECORD AND/OR THE UNMAPPED, UNWRITTEN RIGHTS.

4. THE CONTOUR INTERVAL IS 2FT.

5. MAPPING SYSTEM: VIRGINIA COORDINATE SYSTEM OF 1983. VIRGINIA SOUTH ZONE, NAD-83, US. FT.

6. THIS SPECIAL PURPOSE SURVEY DOES NOT INCLUDE ALL CHARACTERISTICS OF A COMPLETE TOPOGRAPHIC SURVEY.

NOTES:
1. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.

2. EX. TIDAL WETLAND VEGETATION LIMITS ARE APPROXIMATE AND ARE BASED UPON VISUAL SITE INSPECTION AND NOT A WATERS OF THE US DELINEATION.

3. THE PROPOSED HISTORIC RESOURCE AREA LIMITS FOR SITE 44NN0024 ARE BASED UPON UPDATED FIELD WORK AND ARE STILL TO BE APPROVED AND ACCEPTED BY THE DEPARTMENT OF HISTORIC RESOURCES (DHR.)

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PROJECT: FT. EUSTIS TA1 SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

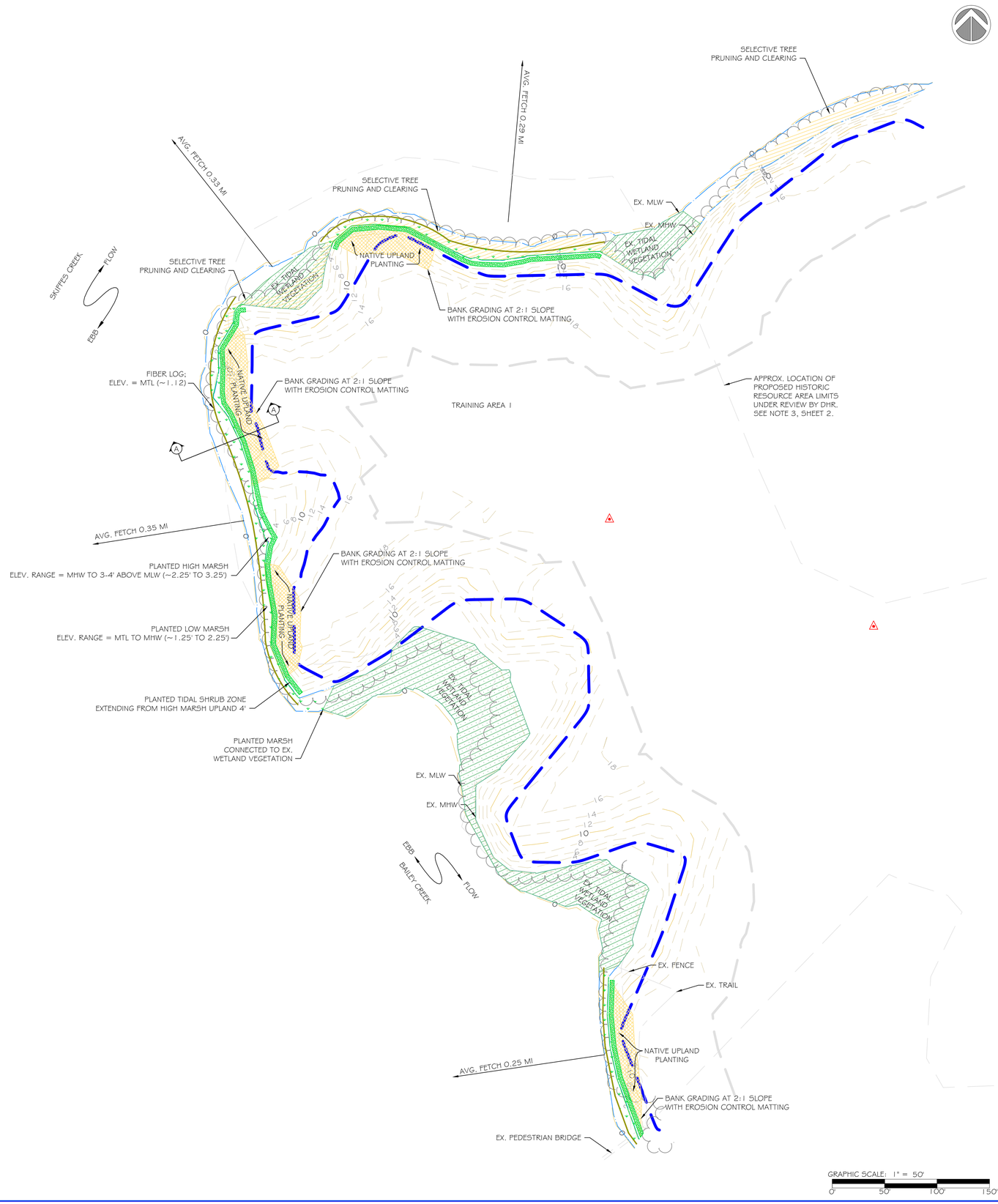
EXISTING CONDITIONS

FORT EUSTIS, VIRGINIA

REVISIONS:
X

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	2 OF 5

A-232



NARRATIVE

DESIGN METHODOLOGY:
THIS DESIGN OPTION UTILIZES A NON-STRUCTURAL APPROACH TO PROTECT EXISTING AND PLANTED MARSHES. THIS METHOD IS SUITABLE FOR AREAS HIGHER THAN MID-TIDE LEVEL (MTL), WITH MINIMAL WAVE AND BOAT WAKE, AND WITH ADJACENT TREE REMOVAL AND GRADED BANKS UNDER LANDSCAPE RESTORATION.

THE FIBER LOG IS LOCATED NEAR MTL WITH A PLANTED MARSH OR EXISTING MARSH IN THE AREA BEHIND THE LOG RUNNING TO ABOVE MID HIGH WATER (MHW). IF SAND FILL IS REQUIRED BEHIND THE FIBER LOG IT SHOULD BE GRADED AT AN 8:1-10:1 SLOPE, HOWEVER, AT THIS SITE MOST OF THE EXISTING BANK IS WITHIN THAT RANGE AND HAS MINIMAL MARSH COVERAGE THAT CAN BE SUPPLEMENTED WITH PLANTING. THE PLANTED MARSH BEHIND THE FIBER LOG WILL BE PLANTED WITH TWO TYPES OF VEGETATION. FROM THE BACK OF THE FIBER LOG TO THE MEAN HIGH WATER (MHW) LINE A LOW MARSH WILL BE PLANTED WITH SPARTINA ALTERNIFLORA (SMOOTH CORDGRASS). ABOVE MHW TO APPROXIMATELY 3-4' ABOVE MEAN LOW WATER (MLW) A HIGH MARSH WILL BE PLANTED WITH SPARTINA PATENS (SALTMEADOW CORDGRASS) & DISTICHLIS SPICATA (SALTGRASS). BEHIND THE PLANTED MARSH A 4' WIDE TIDAL SHRUB ZONE WILL BE PLANTED TO HELP STABILIZE THE TOE OF THE SLOPE BEYOND, THIS AREA IS PLANTED WITH NATIVE TIDAL SHRUBS SUCH AS IVA FRUTESCENS (MARSH ELDER) & BACCHARIS HALIMIFOLIA (GROUNDSEL TREE).

BEYOND THE PLANTED MARSH BANK GRADING WILL BE UTILIZED TO REPAIR THE HIGH UNSTABLE BANKS TO PREVENT FUTURE EROSION OF THOSE BANKS FROM IMPACTING THE PLANTED MARSHES. IN THIS CONCEPT THE GRADING SLOPE IS NOTED AS 2:1 WHICH IS STEEPER THAN THE TYPICAL RECOMMENDED RANGE. IN ORDER TO PROTECT THE STEEPER SLOPE FROM EROSION, EROSION CONTROL MATTING (ECM) IS BEING RECOMMENDED TO HELP STABILIZE THESE SLOPES, WHILE SUITABLE NATIVE VEGETATION IS BECOMING ESTABLISHED, WHICH WILL PROVIDE PERMANENT BANK STABILIZATION.

DUE TO THE MINIMAL NATURE OF THIS DESIGN, EMPHASIS IS PLACED ON VEGETATION MANAGEMENT. WITH PROPER VEGETATION MANAGEMENT NATURAL SYSTEMS CAN BE ENHANCED AND CAN PROVIDE NATURAL EROSION PROTECTION. VEGETATION MANAGEMENT WOULD INCLUDE SELECTIVE TREE PRUNING AND CLEARING, THE REMOVAL OF DEBRIS FROM THE SHORELINE (ESPECIALLY AFTER STORM EVENTS), AND SUPPLEMENTAL NATIVE UPLAND PLANTINGS TO STABILIZE ADJACENT BANKS.

CONSTRUCTION CONSIDERATIONS:

- CONSTRUCTION ACCESS MUST BE AVAILABLE TO THE BANK IN AREAS WHERE BANK GRADING IS REQUIRED. THE EXISTING ACCESS ROAD TO THE PENINSULA CAN BE UTILIZED IN CONJUNCTION WITH TEMPORARY ACCESS ROADS TO PROVIDE ACCESS FOR CONSTRUCTION EQUIPMENT TO THE BANK.
- TEMPORARY MATERIAL AND EQUIPMENT STORAGE AREAS SHOULD BE LOCATED IN THE UPLAND AREA. IF POSSIBLE, THE EXISTING STORAGE AREA OFF OF THE ACCESS ROAD WOULD BE UTILIZED FOR CONSTRUCTION TO MINIMIZE ADDITIONAL LAND DISTURBANCE AND CLEARING.
- TEMPORARY STOCKPILE AREAS MAY BE NECESSARY.
- PROPER PRECAUTIONS WILL NEED TO BE TAKEN TO ENSURE THAT THE PLANTED VEGETATION IS PROTECTED FROM WATERFOWL.

PERMITTING CONSIDERATIONS:
IN ACCORDANCE WITH THE CHESAPEAKE BAY PRESERVATION ACT A WATER QUALITY IMPACT ASSESSMENT AND ASSOCIATED REVEGETATION PLAN MAY BE REQUIRED DUE TO THE AMOUNT OF CLEARING PERFORMED AS PART OF THE BANK GRADING.

DEPENDING ON THE AMOUNT OF UPLAND DISTURBED A LAND DISTURBANCE PERMIT WILL BE REQUIRED.

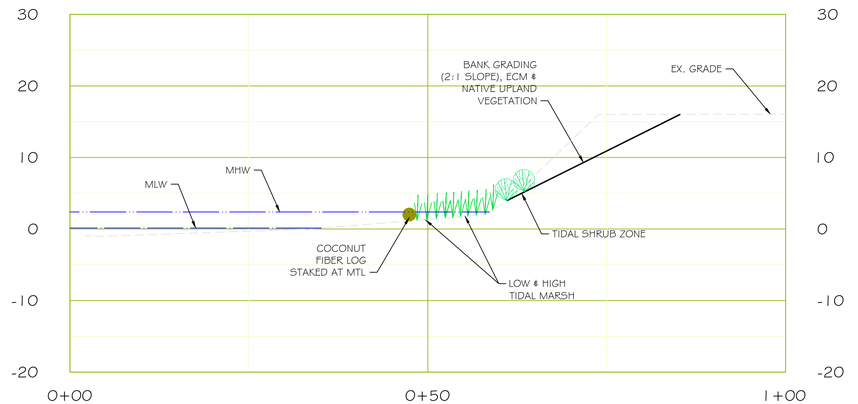
IN ORDER TO PERFORM WORK IN AREAS WITH JURISDICTIONAL WATER AND WETLAND, DUNE AND BEACH RESOURCES, A JOINT PERMIT APPLICATION WILL BE REQUIRED. THIS WILL COVER THE NECESSARY PERMITTING WITH THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE), VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VA DEQ) AND THE VIRGINIA MARINE RESOURCES COMMISSION (VMRC).

LEGEND

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. APPROX. MEAN HIGH WATER (MHW)
- EX. APPROX. MEAN LOW WATER (MLW)
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT
- APPROXIMATE LOCATION OF TREELINE
- PROPOSED GRADE
- FIBER LOG
- SELECTIVE TREE PRUNING & CLEARING
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE
- PROPOSED BANK GRADING & EROSION CONTROL MATTING (ECM)

NOTES:
1. EXISTING TOPOGRAPHY BASED ON AN ACTUAL GROUND SURVEY PERFORMED BY TERRY HICKMAN, LS, ON 2-18-15. SEE SHEET 2 FOR ADDITIONAL NOTES.

2. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.



GRAPHIC SCALE: 1" = 10'
0
10'
20'
30'

ANGLER ENVIRONMENTAL
CORPORATE | 5367 TELEPHONE ROAD, WARRENTON, VIRGINIA 20187
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P: 804.353.6018
MARYLAND | 1434 ODENTON ROAD, ODENTON, MARYLAND 21113
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PROJECT: FT. EUSTIS TA1 SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

OPTION A

FORT EUSTIS, VIRGINIA

REVISIONS:
X

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	3 OF 5

A-233

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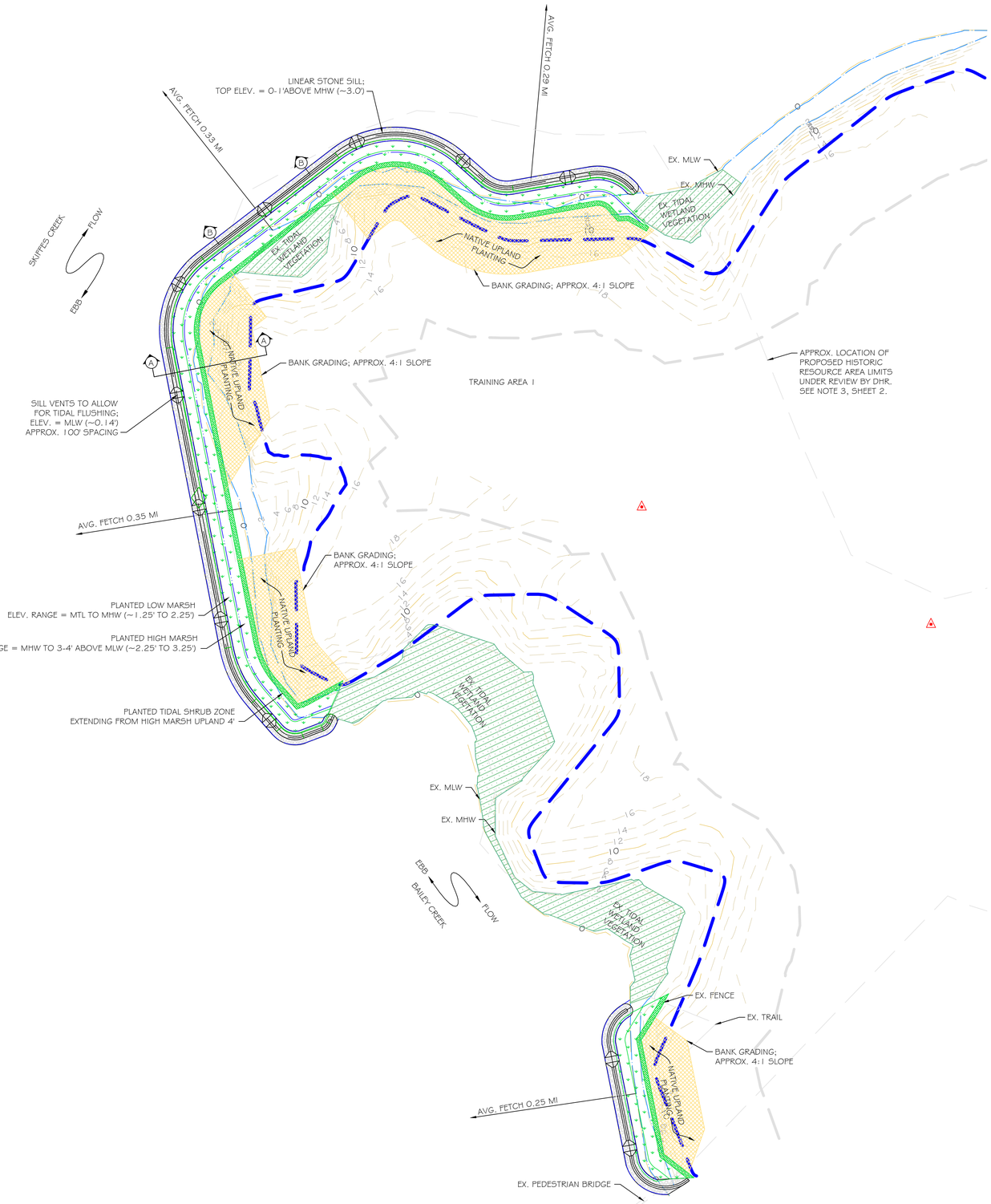

NARRATIVE

DESIGN METHODOLOGY:
THIS DESIGN OPTION UTILIZES A LOW PROFILE STONE STRUCTURE, CALLED A SILL, TO CONTAIN SAND FILL IN ORDER TO CREATE A NEW PLANTED MARSH. THE SILL PLACEMENT IS SITE-SPECIFIC AND IS DEPENDENT ON THE BANK HEIGHT, BANK GRADE, WATER DEPTH, TIDE RANGES AND BOTTOM TYPE NEAR THE SHORELINE. THIS METHOD IS SUITABLE FOR AREAS WHERE THERE IS ADJACENT BANK GRADING, PLENTY OF SUNLIGHT AND SHALLOW HARD SAND BOTTOMS EXTENDING OFF SHORE.

THE SILL IS LOCATED NEAR MEAN LOW WATER (MLW) WITH A SAND FILL GRADED BEHIND THE SILL RUNNING TO THE BANK AT AN AVERAGE 8:1 OR 10:1 SLOPE. THE HEIGHT OF THE SILL SHOULD BE BETWEEN 0-1' ABOVE MEAN HIGH WATER (MHW) IN LOW ENERGY SETTINGS (AVERAGE FETCH LESS THAN 0.5 MILES) TO ALLOW FOR REGULAR WAVE OVERTOPPING. SINCE THE TOTAL SILL LENGTH IS GREATER THAN 100 FT, TIDAL GAPS SHOULD BE STRATEGICALLY PLACED TO ALLOW FOR FLUSHING OF THE TIDAL MARSH BEHIND THE SILL, AS WELL AS PROVIDING CONNECTIVITY BETWEEN ECOSYSTEMS.

THE PLANTED MARSH BEHIND THE SILL WILL BE PLANTED WITH TWO TYPES OF VEGETATION. FROM THE BACK OF THE SILL TO THE MHW LINE A LOW MARSH WILL BE PLANTED WITH SPARTINA ALTERNIFLORA (SMOOTH CORDGRASS). ABOVE MHW TO APPROXIMATELY 3-4' ABOVE MLW A HIGH MARSH WILL BE PLANTED WITH SPARTINA PATENS (SALTMEADOW CORDGRASS) & DISTICHLIS SPICATA (SALTGRASS). BEHIND THE PLANTED MARSH A 4' WIDE TIDAL SHRUB ZONE WILL BE PLANTED TO HELP STABILIZE THE TOE OF THE SLOPE BEYOND, THIS AREA IS PLANTED WITH NATIVE TIDAL SHRUBS SUCH AS IVA FRUTESCENS (MARSH ELDER) & BACCHARIS HALIMIFOLIA (GROUNDSEL TREE).

BEYOND THE PLANTED MARSH BANK GRADING WILL BE UTILIZED TO PROPERLY CONNECT THE MARSH WITH THE UPLAND AREA. BANK GRADING IS RECOMMENDED IN AREAS WITH ACTIVE EROSION AT THE TOP AND BOTTOM OF THE BANK, AREAS WITH HIGH UNSTABLE BANKS, UNDERCUTTING OR FALLING TREES, AND WHERE SUNLIGHT WILL REACH THE GRADED SLOPES. TARGET SLOPES RANGE BETWEEN 6:1 AND 3:1 AND ARE CHOSEN BASED ON NATURAL SHORE TOPOGRAPHY, ADJACENT LAND USES AND DESIGN COMBINATIONS WITH OTHER SHORE PROTECTION METHODS. ONCE THE BANK GRADING IS COMPLETED TEMPORARY EROSION CONTROL METHODS ARE USED TO STABILIZE THE SOIL UNTIL SUITABLE NATIVE VEGETATION IS ESTABLISHED.

FOR THE LONG TERM SUCCESS OF THE PROJECT AND FOR THE PROTECTION OF AREAS NOT WITHIN THE BANK GRADING & REPLANTING AREAS A VEGETATION MANAGEMENT PROGRAM SHOULD BE UTILIZED TO PROTECT & ENHANCE THE NATURAL EROSION PROTECTION PROVIDED BY VEGETATION. VEGETATION MANAGEMENT WOULD INCLUDE SELECTIVE TREE PRUNING AND CLEARING, THE REMOVAL OF DEBRIS FROM THE SHORELINE (ESPECIALLY AFTER STORM EVENTS), AND SUPPLEMENTAL NATIVE UPLAND PLANTINGS TO STABILIZE ADJACENT BANKS.

CONSTRUCTION CONSIDERATIONS:

- CONSTRUCTION ACCESS MUST BE AVAILABLE TO THE BANK AND SHORELINE. THE EXISTING ACCESS ROAD TO THE PENINSULA CAN BE UTILIZED IN CONJUNCTION WITH TEMPORARY ACCESS ROADS TO PROVIDE ACCESS FOR CONSTRUCTION EQUIPMENT TO THE BANK AND SHORE.
- TEMPORARY MATERIAL AND EQUIPMENT STORAGE AREAS SHOULD BE LOCATED IN THE UPLAND AREA. IF POSSIBLE, THE EXISTING STORAGE AREA OFF OF THE ACCESS ROAD WOULD BE UTILIZED FOR CONSTRUCTION TO MINIMIZE ADDITIONAL LAND DISTURBANCE AND CLEARING.
- IF THE EXISTING SOIL TYPE IS SUITABLE CUT AND FILL QUANTITIES SHOULD BE BALANCED IN THE UPLAND AREAS TO MINIMIZE THE COST OF MATERIAL AND TRUCKING. TEMPORARY STOCKPILE AREAS MAY BE NECESSARY.
- TO BUILD THE TIDAL MARSH CLEAN COARSE-GRAINED SAND FILL WILL NEED TO BE BROUGHT IN. ONCE THE SAND FILL IS PLACED IT SHOULD BE ALLOWED TO SIT FOR AT LEAST 1-2 WEEKS TO ALLOW FOR SETTLEMENT, VERIFY ACTUAL TIDE LEVELS WITHIN THE PLANTING AREA, AND ADJUST SLOPE OR HEIGHT IF NECESSARY BEFORE PLANTING.
- PROPER PRECAUTIONS WILL NEED TO BE TAKEN TO ENSURE THAT THE PLANTED VEGETATION IS PROTECTED FROM WATERFOWL.

PERMITTING CONSIDERATIONS:
IN ACCORDANCE WITH THE CHESAPEAKE BAY PRESERVATION ACT A WATER QUALITY IMPACT ASSESSMENT AND ASSOCIATED REVEGETATION PLAN MAY BE REQUIRED DUE TO THE AMOUNT OF CLEARING PERFORMED AS PART OF THE BANK GRADING.

DEPENDING ON THE AMOUNT OF UPLAND DISTURBED MOST LIKELY A LAND DISTURBANCE PERMIT WILL BE REQUIRED.

IN ORDER TO PERFORM WORK IN AREAS WITH JURISDICTIONAL WATER AND WETLAND, DUNE AND BEACH RESOURCES A JOINT PERMIT APPLICATION WILL BE REQUIRED. THIS WILL COVER THE NECESSARY PERMITTING WITH THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE), VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VA DEQ) AND THE VIRGINIA MARINE RESOURCES COMMISSION (VMRC).

LEGEND

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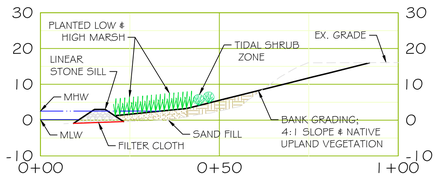
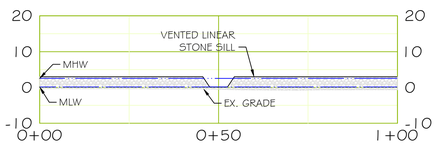
- EX. MINOR CONTOUR
- EX. APPROX. MEAN HIGH WATER (MHW)
- EX. APPROX. MEAN LOW WATER (MLW)
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT
- PROPOSED MEAN HIGH WATER (MHW)
- PROPOSED MEAN LOW WATER (MLW)
- PROPOSED GRADE
- PROPOSED ROCK SILL
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE
- PROPOSED BANK GRADING
- COMPACTED SOIL FILL
- CLEAN COARSE-GRAINED SAND FILL

NOTES:
1. EXISTING TOPOGRAPHY BASED ON AN ACTUAL GROUND SURVEY PERFORMED BY TERRY HICKMAN, LS. ON 2-18-15. SEE SHEET 2 FOR ADDITIONAL NOTES.

2. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.

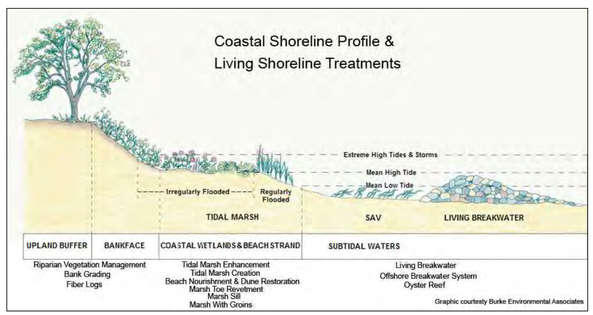


A-A TYPICAL BANK SECTION



B-B TYPICAL SILL SECTION

GRAPHIC SCALE: 1" = 20'
0' 20' 30' 40'



LIVING SHORELINE SCHEMATIC

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PROJECT: FT. EUSTIS TA1 SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

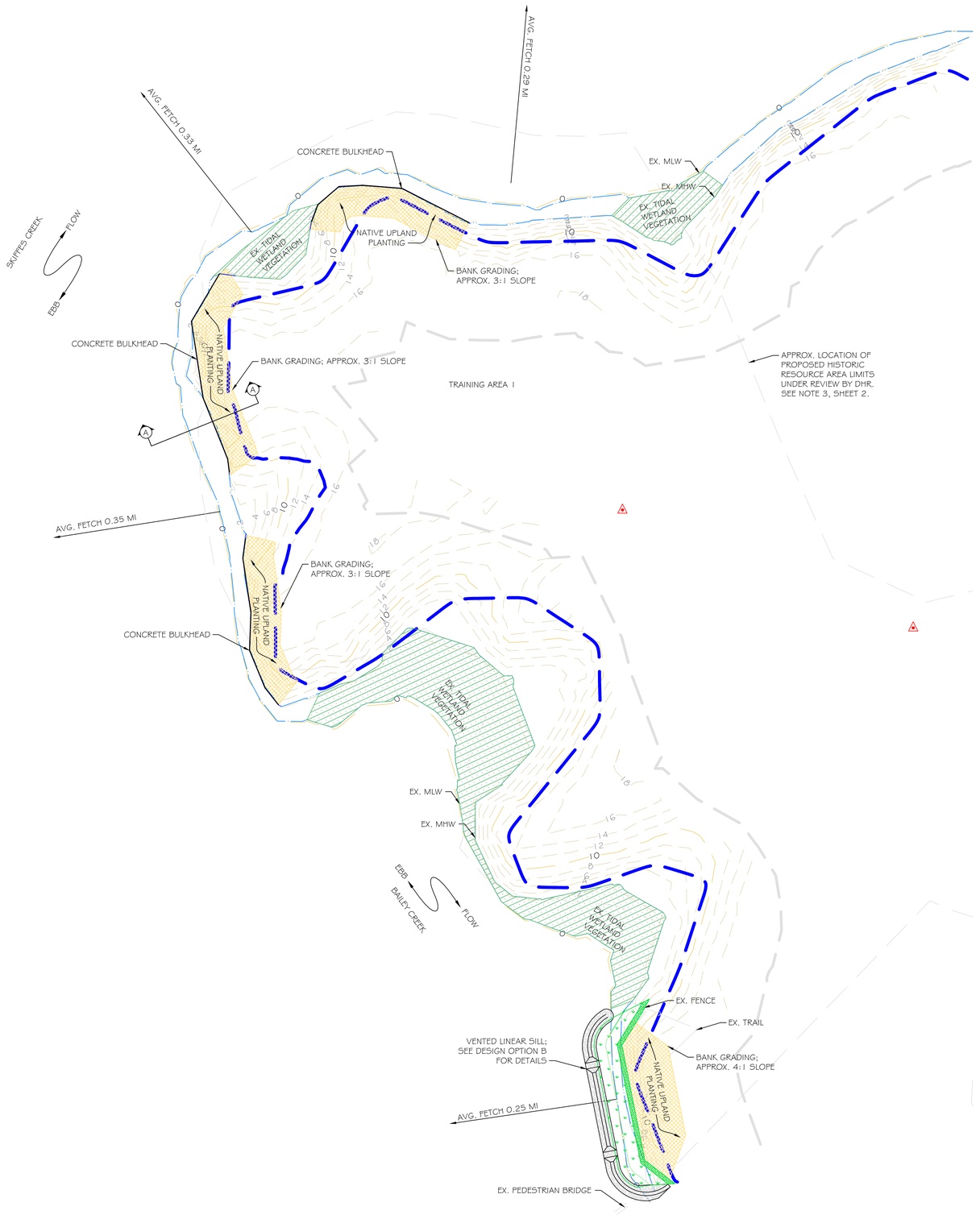
OPTION B

FORT EUSTIS, VIRGINIA

REVISIONS:
X

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	4 OF 5

A-234



NARRATIVE

DESIGN METHODOLOGY:
THIS DESIGN OPTION UTILIZES A PRECAST CONCRETE WALL TO STABILIZE SECTIONS OF ERODED SHORELINE, SPECIFICALLY IN BLUFF AREAS WITH TOE EROSION. THE PRECAST CONCRETE WALL IS PLACED INTO AN EXCAVATED TRENCH AND BACKFILL IS PLACED ON TOP OF A REAR ANCHOR TO HOLD THE WALL IN PLACE. BULKHEADS ARE APPROPRIATE IN AREAS WHERE THE CHANNEL IS USED FREQUENTLY FOR NAVIGATION AND WHERE A MORE ENVIRONMENTALLY PREFERRED DESIGN OPTION WILL IMPAIR THE USE OF THE CHANNEL FOR NAVIGATION.

AT THE LOCATION OF ERODED SHORELINE ADJACENT TO THE PEDESTRIAN BRIDGE A STONE SILL AND PLANTED MARSH, REFERENCE DESIGN OPTION B, ARE STILL BEING RECOMMENDED IN ORDER TO PROTECT THE FOUNDATION OF THE EXISTING PEDESTRIAN BRIDGE WITHOUT REQUIRING MODIFICATIONS TO THE STRUCTURE.

BEYOND THE BULK HEAD BANK GRADING WILL BE UTILIZED TO PROPERLY TIE THE BULK HEAD IN TO THE ADJACENT GRADE. TARGET SLOPES RANGE BETWEEN 6:1 AND 3:1 AND ARE CHOSEN BASED ON NATURAL SHORE TOPOGRAPHY, ADJACENT LAND USES AND DESIGN COMBINATIONS WITH OTHER SHORE PROTECTION METHODS. WITH THE USE OF A BULK HEAD A STEEPER SLOPE, 3:1, CAN BE USED SINCE THE UPLAND AREA WILL NOT BE EXPOSED TO WAVE ACTION REGULARLY. ONCE THE BANK GRADING IS COMPLETED TEMPORARY EROSION CONTROL METHODS ARE USED TO STABILIZE THE SOIL UNTIL SUITABLE NATIVE VEGETATION IS ESTABLISHED.

FOR THE LONG TERM SUCCESS OF THE PROJECT AND FOR THE PROTECTION OF AREAS NOT PROTECTED BY THE BULK HEAD A VEGETATION MANAGEMENT PROGRAM SHOULD BE UTILIZED TO PROTECT & ENHANCE THE NATURAL EROSION PROTECTION PROVIDED BY NATIVE VEGETATION. VEGETATION MANAGEMENT WOULD INCLUDE SELECTIVE TREE PRUNING AND CLEARING, THE REMOVAL OF DEBRIS FROM THE SHORELINE (ESPECIALLY AFTER STORM EVENTS), AND SUPPLEMENTAL NATIVE UPLAND PLANTINGS TO STABILIZE ADJACENT BANKS.

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- IF THE EXISTING SOIL TYPE IS SUITABLE CUT AND FILL QUANTITIES SHOULD BE BALANCED IN THE UPLAND AREAS TO MINIMIZE THE COST OF MATERIAL AND TRUCKING. TEMPORARY STOCKPILE AREAS MAY BE NECESSARY.

PERMITTING CONSIDERATIONS:
IN ACCORDANCE WITH THE CHESAPEAKE BAY PRESERVATION ACT A WATER QUALITY IMPACT ASSESSMENT AND ASSOCIATED REVEGETATION PLAN MAY BE REQUIRED DUE TO THE AMOUNT OF CLEARING PERFORMED AS PART OF THE BANK GRADING.

DEPENDING ON THE AMOUNT OF UPLAND DISTURBED A LAND DISTURBANCE PERMIT WILL LIKELY BE REQUIRED.

IN ORDER TO PERFORM WORK IN AREAS WITH JURISDICTIONAL WATER AND WETLAND, DUNE AND BEACH RESOURCES, A JOINT PERMIT APPLICATION WILL BE REQUIRED. THIS WILL COVER THE NECESSARY PERMITTING WITH THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE), VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VA DEQ) AND THE VIRGINIA MARINE RESOURCES COMMISSION (VMRC).

LEGEND

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- EX. APPROX. MEAN LOW WATER (MLW)
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- PROPOSED HISTORIC RESOURCE AREA LIMITS
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- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT
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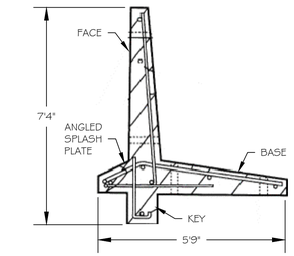
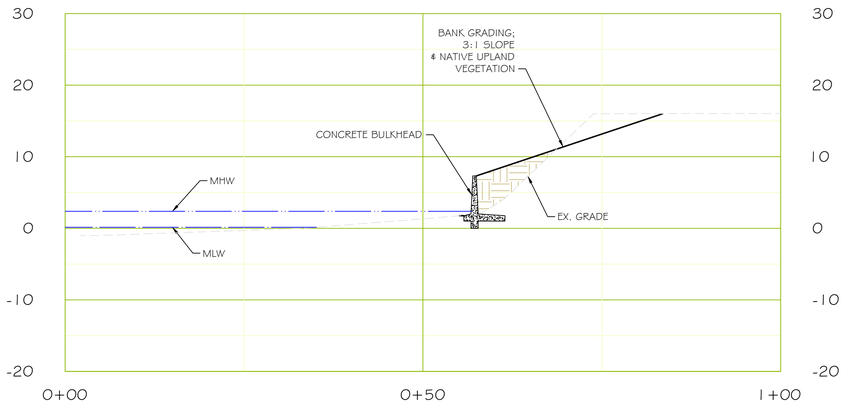
- PROPOSED GRADE
- PROPOSED BULKHEAD
- PROPOSED BANK GRADING
- COMPACTED SOIL FILL
- PROPOSED ROCK SILL
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE

NOTES:
1. EXISTING TOPOGRAPHY BASED ON AN ACTUAL GROUND SURVEY PERFORMED BY TERRY HICKMAN, LS. ON 2-18-15. SEE SHEET 2 FOR ADDITIONAL NOTES.

2. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.



TYP. PRECAST CONCRETE BULKHEAD
(BASIS OF DESIGN SEAMENT SHORELINE SYSTEMS L-WALL)



A-A TYPICAL BULKHEAD / BANK SECTION

GRAPHIC SCALE: 1" = 10'
0' 10' 20' 30'

ANGLER ENVIRONMENTAL
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PROJECT: FT. EUSTIS TAI SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

OPTION C

FORT EUSTIS, VIRGINIA

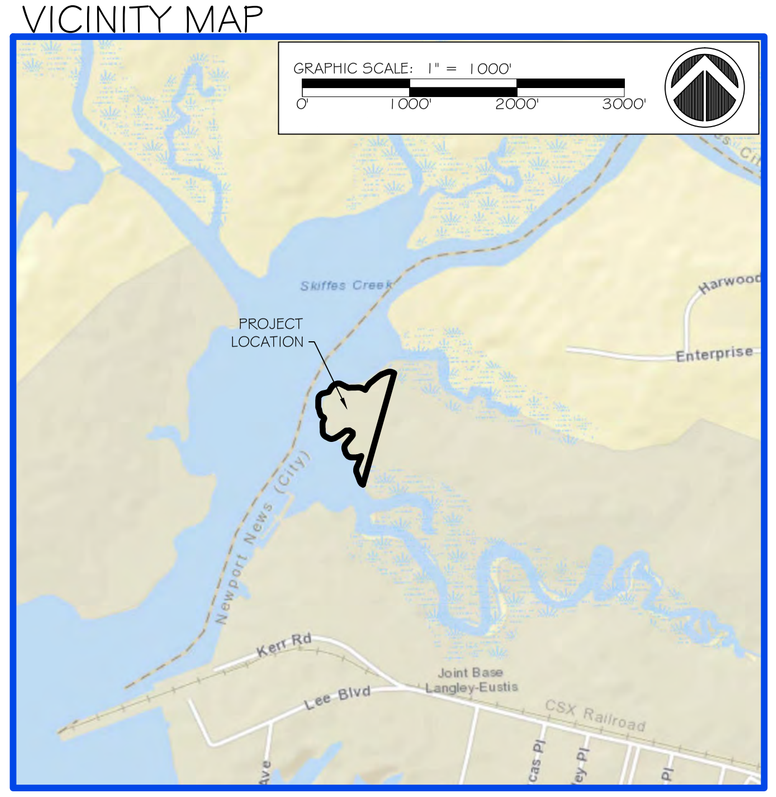
REVISIONS:
1 X

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	5 OF 5

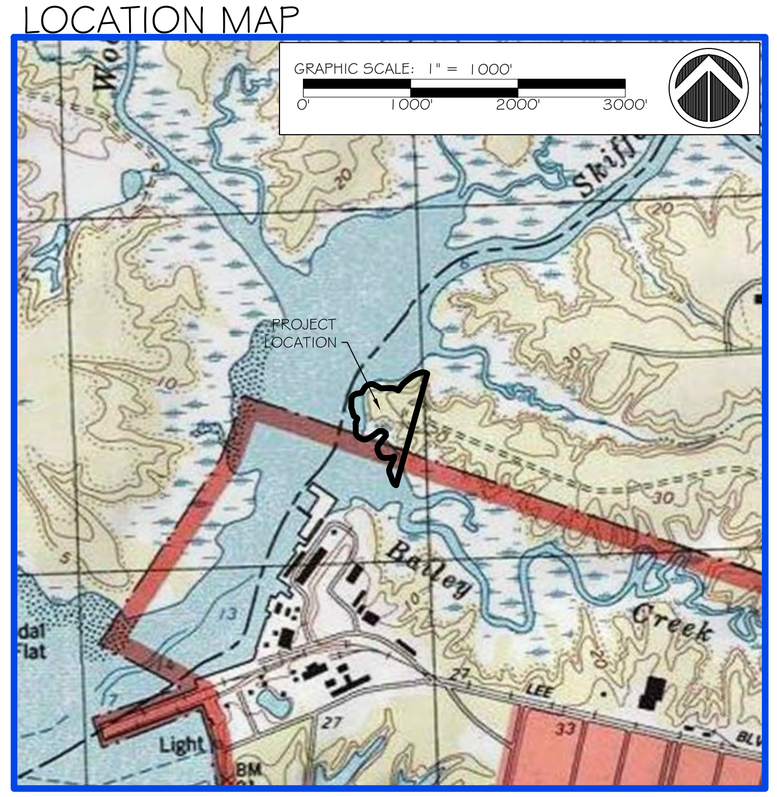
A-235

FT. EUSTIS TRAINING AREA (TA) 1 SHORELINE EROSION CORRECTIVE ACTION PLAN
FORT EUSTIS, VIRGINIA

VICINITY MAP



LOCATION MAP



LATITUDE: N 37° 10' 28.9"
LONGITUDE: W 76° 36' 3.3"

OWNER/APPLICANT:
THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS
1407 WASHINGTON BLVD
FORT EUSTIS, VIRGINIA 23604
CONTACT: TIMOTHY CHRISTENSEN
PHONE: 757-878-4231

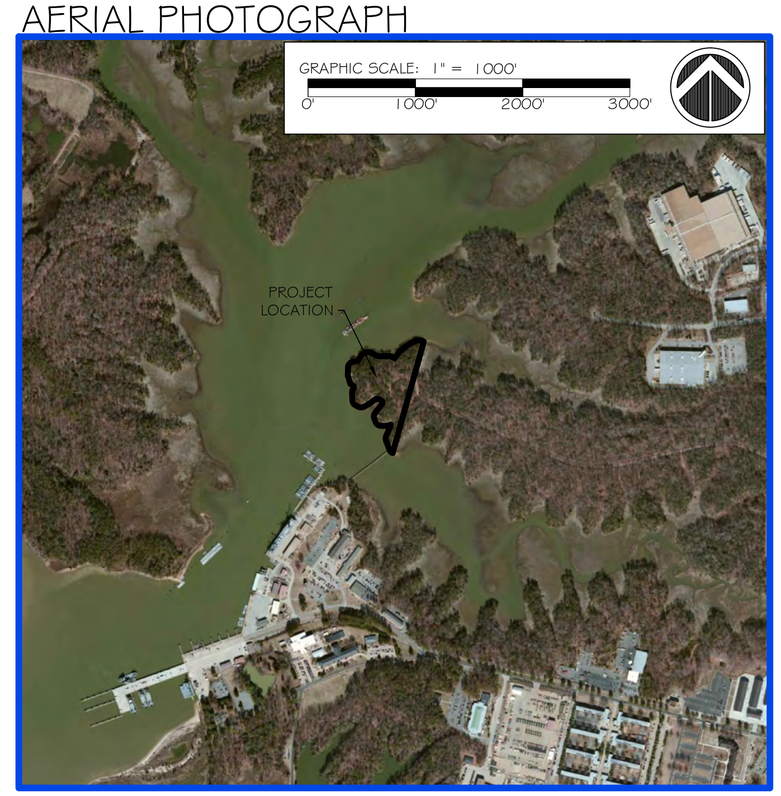
CLIENT:
DIAL CORDY & ASSOCIATES
490 OSCEOLA AVENUE
JACKSONVILLE BEACH, FL 32250

PROPERTY INFO:
LAT: 37° 10' 28.9", LONG: -76° 36' 3.3"
STUDY AREA: 8.30 AC

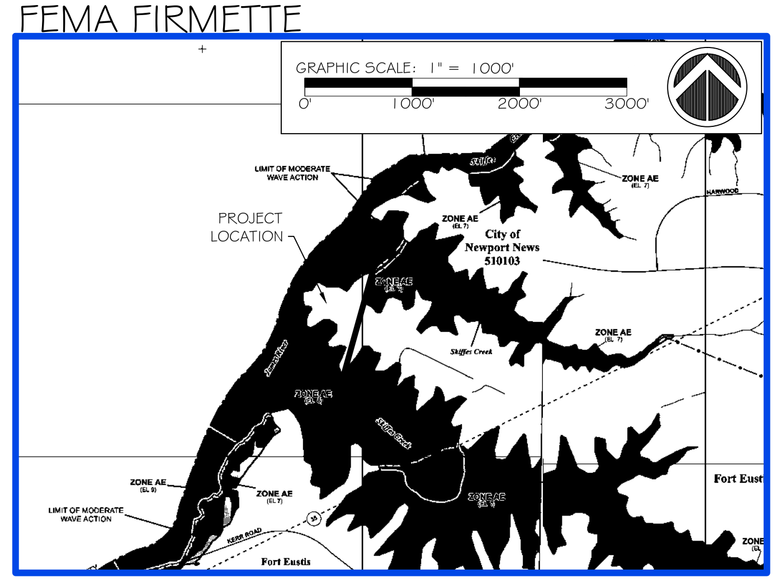
SHEET INDEX:

1 - COVERSHEET
2 - EXISTING CONDITIONS
3 - OPTION A
4 - OPTION B
5 - OPTION C

AERIAL PHOTOGRAPH



FEMA FIRMETTE



REFERENCE FEMA MAP: 5101030036D & 5101030037D

FT. EUSTIS TA 1 SHORELINE EROSION CORRECTIVE ACTION PLAN

REVISIONS:	
REVISIONS:	
REVISIONS:	
PROJECT MANAGER: RA	JOB NUMBER: 4857
DESIGNED: BW	DESIGN FILE: CONCEPTUAL CAP
DRAWN: BW	DATE: 6/26/2015

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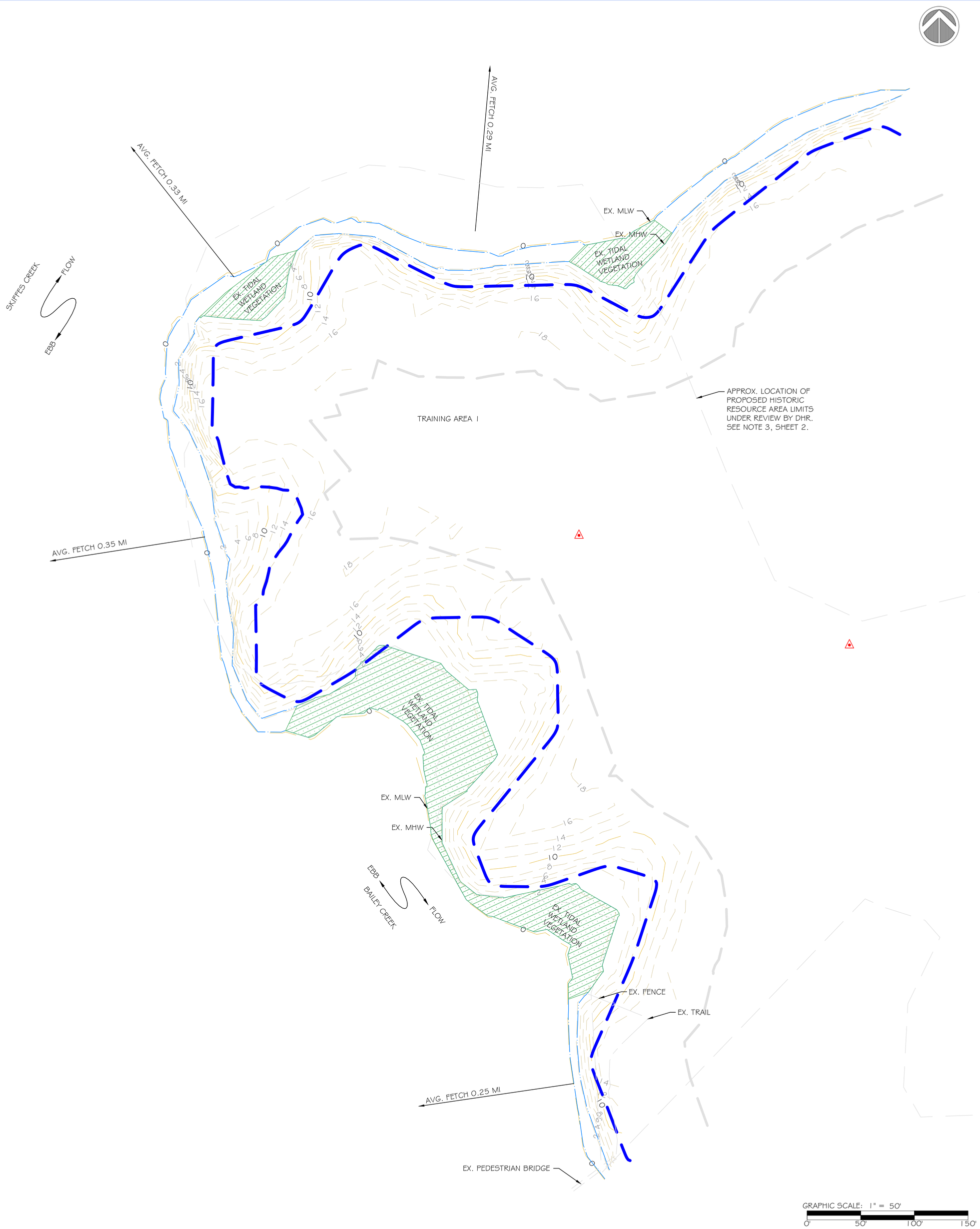

GRAPHIC SCALE: 1" = 50'

0 50 100 150

LEGEND

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. APPROX. MEAN HIGH WATER (MHW)
- EX. APPROX. MEAN LOW WATER (MLW)
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT

SURVEY NOTES:
1. THIS TOPOGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF TERRY L. HICKMAN, LAND SURVEYOR, FROM AN ACTUAL GROUND SURVEY MADE UNDER HIS SUPERVISION; THE ORIGINAL DATA WAS OBTAINED ON 2/18/15 (COMPLETED); AND THAT THIS INCLUDING METADATA MEETS MINIMUM ACCURACY STANDARDS UNLESS OTHERWISE NOTED.

2. PROPERTY LINES: THIS MAP DOES NOT REPRESENT A CURRENT LAND BOUNDARY SURVEY. THE MAP WAS COMPILED WITHOUT THE BENEFIT OF A TITLE REPORT. IT DOES NOT SHOW PROPERTY LINES OR ANY OTHER EVIDENCE OF OWNERSHIP. THIS MAP DOES NOT CREATE NEW OR REVISE ANY EXISTING PARCELS.

3. EASEMENTS: THE PARCELS MAY BE SUBJECT TO UNMAPPED EASEMENTS AND/OR RESTRICTIONS OF RECORD AND/OR THE UNMAPPED, UNWRITTEN RIGHTS.

4. THE CONTOUR INTERVAL IS 2FT.

5. MAPPING SYSTEM: VIRGINIA COORDINATE SYSTEM OF 1983. VIRGINIA SOUTH ZONE, NAD-83, US. FT.

6. THIS SPECIAL PURPOSE SURVEY DOES NOT INCLUDE ALL CHARACTERISTICS OF A COMPLETE TOPOGRAPHIC SURVEY.

NOTES:
1. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.

2. EX. TIDAL WETLAND VEGETATION LIMITS ARE APPROXIMATE AND ARE BASED UPON VISUAL SITE INSPECTION AND NOT A WATERS OF THE US DELINEATION.

3. THE PROPOSED HISTORIC RESOURCE AREA LIMITS FOR SITE 44NN0024 ARE BASED UPON UPDATED FIELD WORK AND ARE STILL TO BE APPROVED AND ACCEPTED BY THE DEPARTMENT OF HISTORIC RESOURCES (DHR.)

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PROJECT: FT. EUSTIS TA1 SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

EXISTING CONDITIONS

FORT EUSTIS, VIRGINIA

REVISIONS:
1

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	2 OF 5

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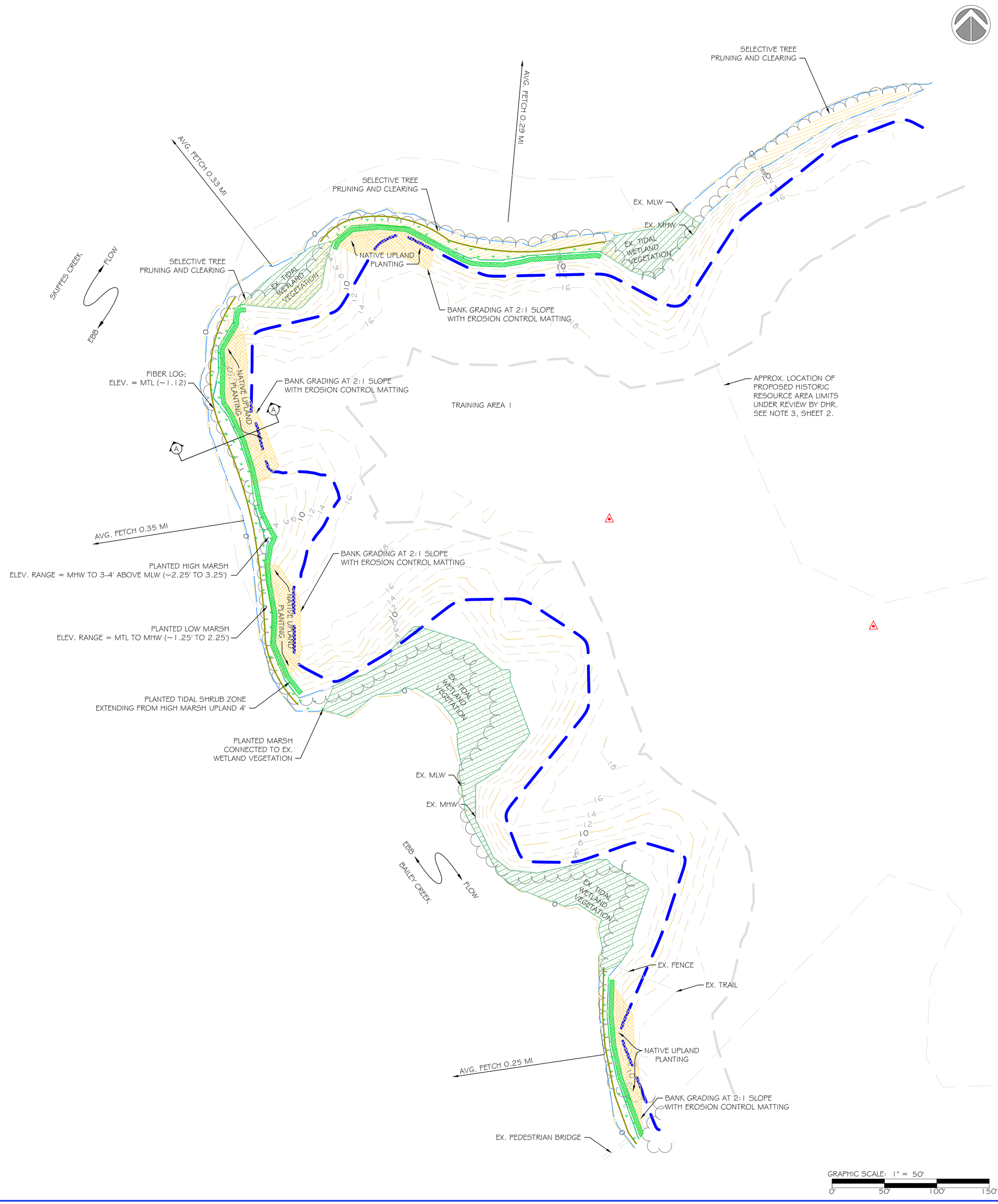


NARRATIVE

DESIGN METHODOLOGY:
THIS DESIGN OPTION UTILIZES A NON-STRUCTURAL APPROACH TO PROTECT EXISTING AND PLANTED MARSHES. THIS METHOD IS SUITABLE FOR AREAS HIGHER THAN MID-TIDE LEVEL (MTL), WITH MINIMAL WAVE AND BOAT WAKE, AND WITH ADJACENT TREE REMOVAL AND GRADED BANKS UNDER LANDSCAPE RESTORATION.

THE FIBER LOG IS LOCATED NEAR MTL WITH A PLANTED MARSH OR EXISTING MARSH IN THE AREA BEHIND THE LOG RUNNING TO ABOVE MID HIGH WATER (MHW). IF SAND FILL IS REQUIRED BEHIND THE FIBER LOG IT SHOULD BE GRADED AT AN 8:1-10:1 SLOPE, HOWEVER, AT THIS SITE MOST OF THE EXISTING BANK IS WITHIN THAT RANGE AND HAS MINIMAL MARSH COVERAGE THAT CAN BE SUPPLEMENTED WITH PLANTING. THE PLANTED MARSH BEHIND THE FIBER LOG WILL BE PLANTED WITH TWO TYPES OF VEGETATION. FROM THE BACK OF THE FIBER LOG TO THE MEAN HIGH WATER (MHW) LINE A LOW MARSH WILL BE PLANTED WITH SPARTINA ALTERNIFLORA (SMOOTH CORDGRASS) & DISTICHLIS SPICATA (SALTGRASS). ABOVE MHW TO APPROXIMATELY 3-4' ABOVE MEAN LOW WATER (MLW) A HIGH MARSH WILL BE PLANTED WITH SPARTINA PATENS (SALTMEADOW CORDGRASS) & DISTICHLIS SPICATA (SALTGRASS). BEHIND THE PLANTED MARSH A 4' WIDE TIDAL SHRUB ZONE WILL BE PLANTED TO HELP STABILIZE THE TOE OF THE SLOPE BEYOND. THIS AREA IS PLANTED WITH NATIVE TIDAL SHRUBS SUCH AS IVA FRUTESCENS (MARSH ELDER) & BACCHARIS HALIMIFOLIA (GROUNDSEL TREE).

BEYOND THE PLANTED MARSH BANK GRADING WILL BE UTILIZED TO REPAIR THE HIGH UNSTABLE BANKS TO PREVENT FUTURE EROSION OF THOSE BANKS FROM IMPACTING THE PLANTED MARSHES. IN THIS CONCEPT THE GRADING SLOPE IS NOTED AS 2:1 WHICH IS STEEPER THAN THE TYPICAL RECOMMENDED RANGE. IN ORDER TO PROTECT THE STEEPER SLOPE FROM EROSION, EROSION CONTROL MATTING (ECM) IS BEING RECOMMENDED TO HELP STABILIZE THESE SLOPES, WHILE SUITABLE NATIVE VEGETATION IS BECOMING ESTABLISHED, WHICH WILL PROVIDE PERMANENT BANK STABILIZATION.

DUE TO THE MINIMAL NATURE OF THIS DESIGN, EMPHASIS IS PLACED ON VEGETATION MANAGEMENT. WITH PROPER VEGETATION MANAGEMENT NATURAL SYSTEMS CAN BE ENHANCED AND CAN PROVIDE NATURAL EROSION PROTECTION. VEGETATION MANAGEMENT WOULD INCLUDE SELECTIVE TREE PRUNING AND CLEARING, THE REMOVAL OF DEBRIS FROM THE SHORELINE (ESPECIALLY AFTER STORM EVENTS), AND SUPPLEMENTAL NATIVE UPLAND PLANTINGS TO STABILIZE ADJACENT BANKS.

CONSTRUCTION CONSIDERATIONS:

- CONSTRUCTION ACCESS MUST BE AVAILABLE TO THE BANK IN AREAS WHERE BANK GRADING IS REQUIRED. THE EXISTING ACCESS ROAD TO THE PENINSULA CAN BE UTILIZED IN CONJUNCTION WITH TEMPORARY ACCESS ROADS TO PROVIDE ACCESS FOR CONSTRUCTION EQUIPMENT TO THE BANK.
- TEMPORARY MATERIAL AND EQUIPMENT STORAGE AREAS SHOULD BE LOCATED IN THE UPLAND AREA. IF POSSIBLE, THE EXISTING STORAGE AREA OFF OF THE ACCESS ROAD WOULD BE UTILIZED FOR CONSTRUCTION TO MINIMIZE ADDITIONAL LAND DISTURBANCE AND CLEARING.
- TEMPORARY STOCKPILE AREAS MAY BE NECESSARY.
- PROPER PRECAUTIONS WILL NEED TO BE TAKEN TO ENSURE THAT THE PLANTED VEGETATION IS PROTECTED FROM WATERFOWL.

PERMITTING CONSIDERATIONS:
IN ACCORDANCE WITH THE CHESAPEAKE BAY PRESERVATION ACT A WATER QUALITY IMPACT ASSESSMENT AND ASSOCIATED REVEGETATION PLAN MAY BE REQUIRED DUE TO THE AMOUNT OF CLEARING PERFORMED AS PART OF THE BANK GRADING.

DEPENDING ON THE AMOUNT OF UPLAND DISTURBED A LAND DISTURBANCE PERMIT WILL BE REQUIRED.

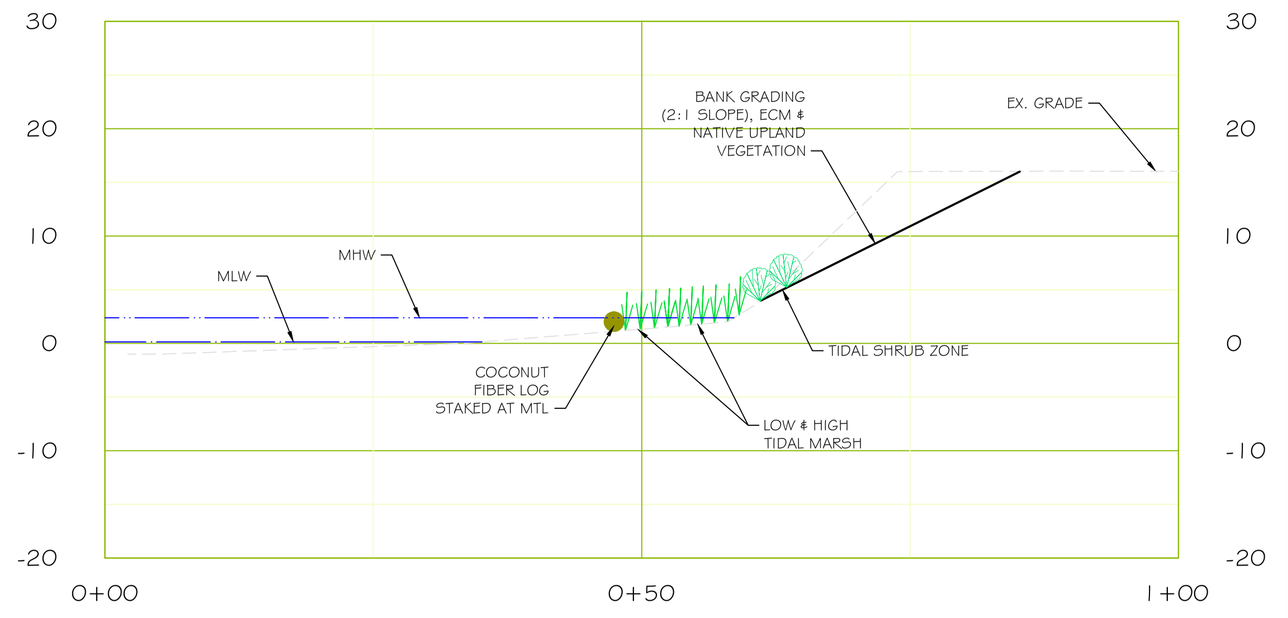
IN ORDER TO PERFORM WORK IN AREAS WITH JURISDICTIONAL WATER AND WETLAND, DUNE AND BEACH RESOURCES, A JOINT PERMIT APPLICATION WILL BE REQUIRED. THIS WILL COVER THE NECESSARY PERMITTING WITH THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE), VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VA DEQ) AND THE VIRGINIA MARINE RESOURCES COMMISSION (VMRC).

LEGEND

- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. APPROX. MEAN HIGH WATER (MHW)
- EX. APPROX. MEAN LOW WATER (MLW)
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT
- APPROXIMATE LOCATION OF TREELINE
- PROPOSED GRADE
- FIBER LOG
- SELECTIVE TREE PRUNING & CLEARING
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE
- PROPOSED BANK GRADING & EROSION CONTROL MATTING (ECM)

NOTES:
1. EXISTING TOPOGRAPHY BASED ON AN ACTUAL GROUND SURVEY PERFORMED BY TERRY HICKMAN, LS, ON 2-18-15. SEE SHEET 2 FOR ADDITIONAL NOTES.

2. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.



GRAPHIC SCALE: 1" = 10'
0 10' 20' 30'

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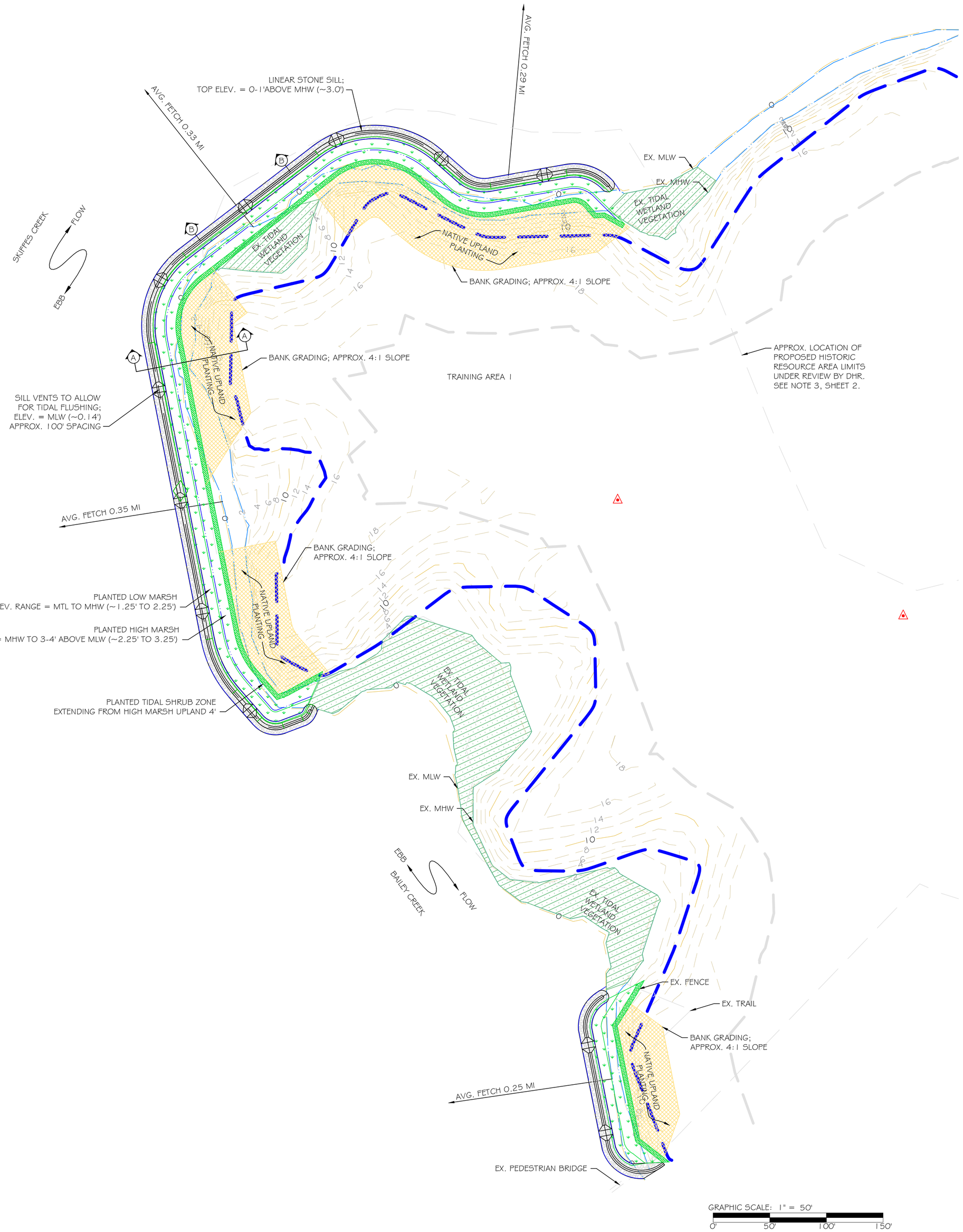
PROJECT: FT. EUSTIS TA1 SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

OPTION A

FORT EUSTIS, VIRGINIA

REVISIONS:
1

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	3 OF 5



NARRATIVE

DESIGN METHODOLOGY:
THIS DESIGN OPTION UTILIZES A LOW PROFILE STONE STRUCTURE, CALLED A SILL, TO CONTAIN SAND FILL IN ORDER TO CREATE A NEW PLANTED MARSH. THE SILL PLACEMENT IS SITE-SPECIFIC AND IS DEPENDENT ON THE BANK HEIGHT, BANK GRADE, WATER DEPTH, TIDE RANGES AND BOTTOM TYPE NEAR THE SHORELINE. THIS METHOD IS SUITABLE FOR AREAS WHERE THERE IS ADJACENT BANK GRADING, PLENTY OF SUNLIGHT AND SHALLOW HARD SAND BOTTOMS EXTENDING OFF SHORE.

THE SILL IS LOCATED NEAR MEAN LOW WATER (MLW) WITH A SAND FILL GRADED BEHIND THE SILL RUNNING TO THE BANK AT AN AVERAGE 8:1 OR 10:1 SLOPE. THE HEIGHT OF THE SILL SHOULD BE BETWEEN 0-1' ABOVE MEAN HIGH WATER (MHW) IN LOW ENERGY SETTINGS (AVERAGE FETCH LESS THAN 0.5 MILES) TO ALLOW FOR REGULAR WAVE OVERTOPPING. SINCE THE TOTAL SILL LENGTH IS GREATER THAN 100 FT, TIDAL GAPS SHOULD BE STRATEGICALLY PLACED TO ALLOW FOR FLUSHING OF THE TIDAL MARSH BEHIND THE SILL, AS WELL AS PROVIDING CONNECTIVITY BETWEEN ECOSYSTEMS.

THE PLANTED MARSH BEHIND THE SILL WILL BE PLANTED WITH TWO TYPES OF VEGETATION. FROM THE BACK OF THE SILL TO THE MHW LINE A LOW MARSH WILL BE PLANTED WITH SPARTINA ALTERNIFLORA (SMOOTH CORDGRASS). ABOVE MHW TO APPROXIMATELY 3-4' ABOVE MLW A HIGH MARSH WILL BE PLANTED WITH SPARTINA PATENS (SALTMEADOW CORDGRASS) & DISTICHLIS SPICATA (SALTGRASS). BEHIND THE PLANTED MARSH A 4' WIDE TIDAL SHRUB ZONE WILL BE PLANTED TO HELP STABILIZE THE TOE OF THE SLOPE BEYOND, THIS AREA IS PLANTED WITH NATIVE TIDAL SHRUBS SUCH AS IVA FRUTESCENS (MARSH ELDER) & BACCHARIS HALIMIFOLIA (GROUNDSEL TREE).

BEYOND THE PLANTED MARSH BANK GRADING WILL BE UTILIZED TO PROPERLY CONNECT THE MARSH WITH THE UPLAND AREA. BANK GRADING IS RECOMMENDED IN AREAS WITH ACTIVE EROSION AT THE TOP AND BOTTOM OF THE BANK, AREAS WITH HIGH UNSTABLE BANKS, UNDERCUTTING OR FALLING TREES, AND WHERE SUNLIGHT WILL REACH THE GRADED SLOPES. TARGET SLOPES RANGE BETWEEN 6:1 AND 3:1 AND ARE CHOSEN BASED ON NATURAL SHORE TOPOGRAPHY, ADJACENT LAND USES AND DESIGN COMBINATIONS WITH OTHER SHORE PROTECTION METHODS. ONCE THE BANK GRADING IS COMPLETED TEMPORARY EROSION CONTROL METHODS ARE USED TO STABILIZE THE SOIL UNTIL SUITABLE NATIVE VEGETATION IS ESTABLISHED.

FOR THE LONG TERM SUCCESS OF THE PROJECT AND FOR THE PROTECTION OF AREAS NOT WITHIN THE BANK GRADING & REPLANTING AREAS A VEGETATION MANAGEMENT PROGRAM SHOULD BE UTILIZED TO PROTECT & ENHANCE THE NATURAL EROSION PROTECTION PROVIDED BY VEGETATION. VEGETATION MANAGEMENT WOULD INCLUDE SELECTIVE TREE PRUNING AND CLEARING, THE REMOVAL OF DEBRIS FROM THE SHORELINE (ESPECIALLY AFTER STORM EVENTS), AND SUPPLEMENTAL NATIVE UPLAND PLANTINGS TO STABILIZE ADJACENT BANKS.

CONSTRUCTION CONSIDERATIONS:

- CONSTRUCTION ACCESS MUST BE AVAILABLE TO THE BANK AND SHORELINE. THE EXISTING ACCESS ROAD TO THE PENINSULA CAN BE UTILIZED IN CONJUNCTION WITH TEMPORARY ACCESS ROADS TO PROVIDE ACCESS FOR CONSTRUCTION EQUIPMENT TO THE BANK AND SHORE.
- TEMPORARY MATERIAL AND EQUIPMENT STORAGE AREAS SHOULD BE LOCATED IN THE UPLAND AREA. IF POSSIBLE, THE EXISTING STORAGE AREA OFF OF THE ACCESS ROAD WOULD BE UTILIZED FOR CONSTRUCTION TO MINIMIZE ADDITIONAL LAND DISTURBANCE AND CLEARING.
- IF THE EXISTING SOIL TYPE IS SUITABLE CUT AND FILL QUANTITIES SHOULD BE BALANCED IN THE UPLAND AREAS TO MINIMIZE THE COST OF MATERIAL AND TRUCKING. TEMPORARY STOCKPILE AREAS MAY BE NECESSARY.
- TO BUILD THE TIDAL MARSH CLEAN COARSE-GRAINED SAND FILL WILL NEED TO BE BROUGHT IN. ONCE THE SAND FILL IS PLACED IT SHOULD BE ALLOWED TO SIT FOR AT LEAST 1-2 WEEKS TO ALLOW FOR SETTLEMENT, VERIFY ACTUAL TIDE LEVELS WITHIN THE PLANTING AREA, AND ADJUST SLOPE OR HEIGHT IF NECESSARY BEFORE PLANTING.
- PROPER PRECAUTIONS WILL NEED TO BE TAKEN TO ENSURE THAT THE PLANTED VEGETATION IS PROTECTED FROM WATERFOWL.

PERMITTING CONSIDERATIONS:
IN ACCORDANCE WITH THE CHESAPEAKE BAY PRESERVATION ACT A WATER QUALITY IMPACT ASSESSMENT AND ASSOCIATED REVEGETATION PLAN MAY BE REQUIRED DUE TO THE AMOUNT OF CLEARING PERFORMED AS PART OF THE BANK GRADING.

DEPENDING ON THE AMOUNT OF UPLAND DISTURBED MOST LIKELY A LAND DISTURBANCE PERMIT WILL BE REQUIRED.

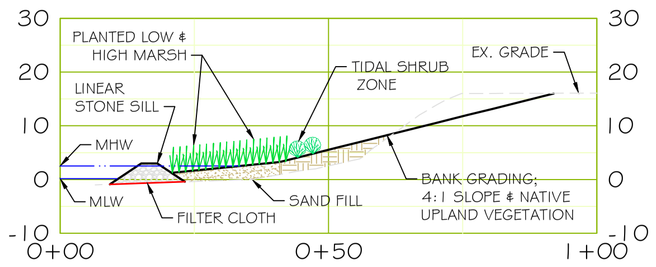
IN ORDER TO PERFORM WORK IN AREAS WITH JURISDICTIONAL WATER AND WETLAND, DUNE AND BEACH RESOURCES A JOINT PERMIT APPLICATION WILL BE REQUIRED. THIS WILL COVER THE NECESSARY PERMITTING WITH THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE), VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VA DEQ) AND THE VIRGINIA MARINE RESOURCES COMMISSION (VMRC).

LEGEND

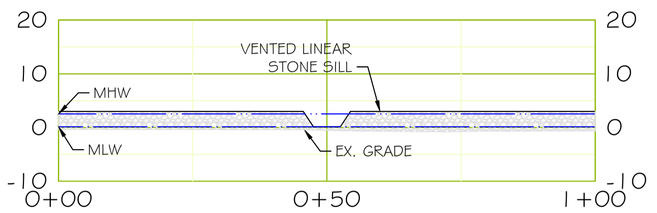
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. APPROX. MEAN HIGH WATER (MHW)
- EX. APPROX. MEAN LOW WATER (MLW)
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT
- PROPOSED MEAN HIGH WATER (MHW)
- PROPOSED MEAN LOW WATER (MLW)
- PROPOSED GRADE
- PROPOSED ROCK SILL
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE
- PROPOSED BANK GRADING
- COMPACTED SOIL FILL
- CLEAN COARSE-GRAINED SAND FILL

NOTES:
1. EXISTING TOPOGRAPHY BASED ON AN ACTUAL GROUND SURVEY PERFORMED BY TERRY HICKMAN, LS. ON 2-18-15. SEE SHEET 2 FOR ADDITIONAL NOTES.

2. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.

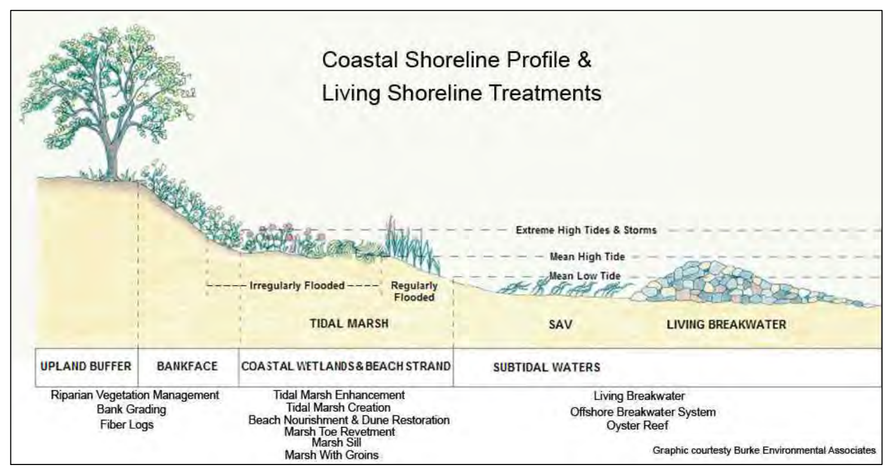


A-A TYPICAL BANK SECTION



B-B TYPICAL SILL SECTION

GRAPHIC SCALE: 1" = 20'
0
20'
30'
40'



LIVING SHORELINE SCHEMATIC

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PROJECT: FT. EUSTIS TA1 SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

OPTION B

FORT EUSTIS, VIRGINIA

REVISIONS:
X

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	4 OF 5

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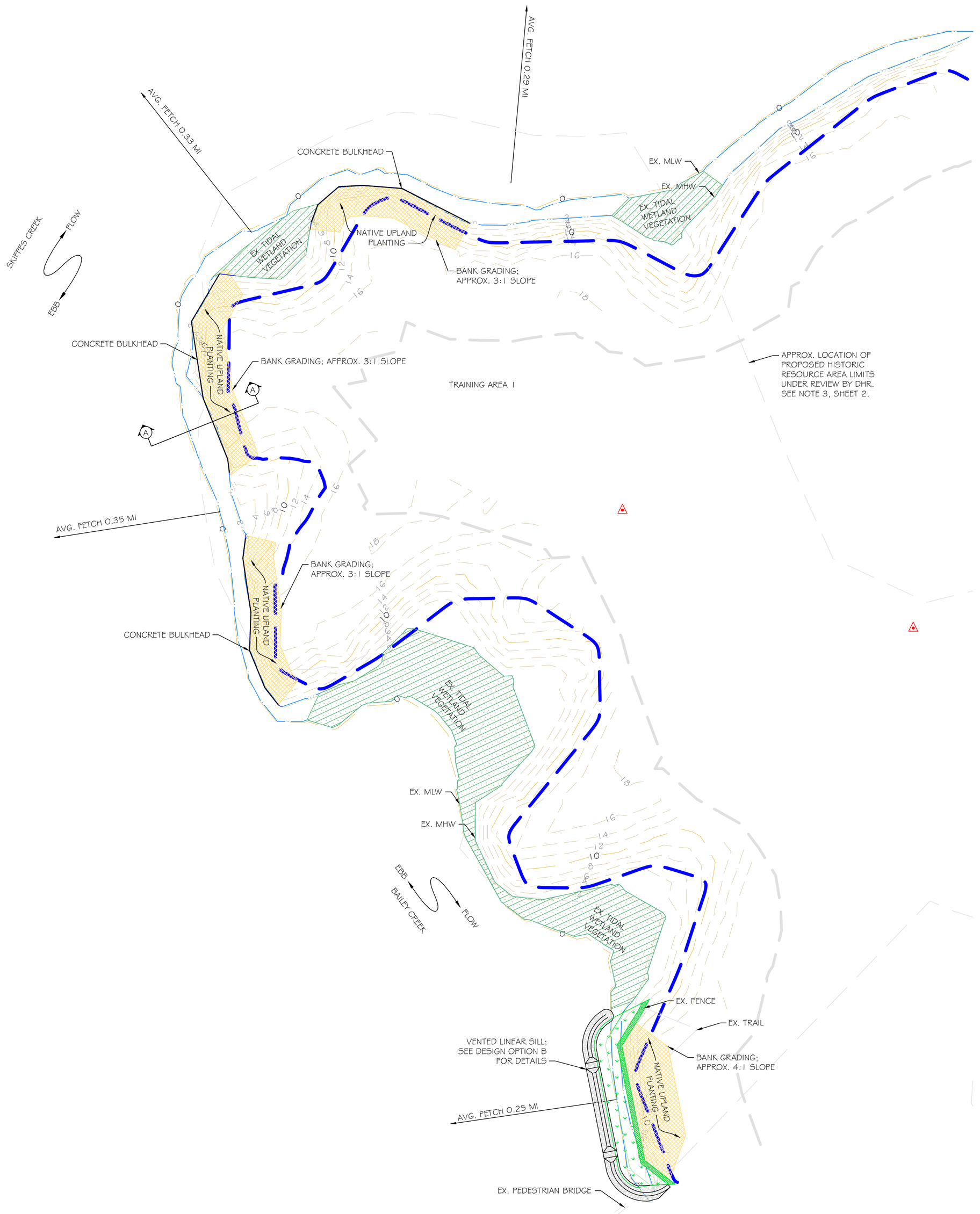


NARRATIVE

DESIGN METHODOLOGY:
THIS DESIGN OPTION UTILIZES A PRECAST CONCRETE WALL TO STABILIZE SECTIONS OF ERODED SHORELINE, SPECIFICALLY IN BLUFF AREAS WITH TOE EROSION. THE PRECAST CONCRETE WALL IS PLACED INTO AN EXCAVATED TRENCH AND BACKFILL IS PLACED ON TOP OF A REAR ANCHOR TO HOLD THE WALL IN PLACE. BULKHEADS ARE APPROPRIATE IN AREAS WHERE THE CHANNEL IS USED FREQUENTLY FOR NAVIGATION AND WHERE A MORE ENVIRONMENTALLY PREFERRED DESIGN OPTION WILL IMPAIR THE USE OF THE CHANNEL FOR NAVIGATION.

AT THE LOCATION OF ERODED SHORELINE ADJACENT TO THE PEDESTRIAN BRIDGE A STONE SILL AND PLANTED MARSH, REFERENCE DESIGN OPTION B, ARE STILL BEING RECOMMENDED IN ORDER TO PROTECT THE FOUNDATION OF THE EXISTING PEDESTRIAN BRIDGE WITHOUT REQUIRING MODIFICATIONS TO THE STRUCTURE.

BEYOND THE BULK HEAD BANK GRADING WILL BE UTILIZED TO PROPERLY TIE THE BULK HEAD IN TO THE ADJACENT GRADE. TARGET SLOPES RANGE BETWEEN 6:1 AND 3:1 AND ARE CHOSEN BASED ON NATURAL SHORE TOPOGRAPHY, ADJACENT LAND USES AND DESIGN COMBINATIONS WITH OTHER SHORE PROTECTION METHODS. WITH THE USE OF A BULK HEAD A STEEPER SLOPE, 3:1, CAN BE USED SINCE THE UPLAND AREA WILL NOT BE EXPOSED TO WAVE ACTION REGULARLY. ONCE THE BANK GRADING IS COMPLETED TEMPORARY EROSION CONTROL METHODS ARE USED TO STABILIZE THE SOIL UNTIL SUITABLE NATIVE VEGETATION IS ESTABLISHED.

FOR THE LONG TERM SUCCESS OF THE PROJECT AND FOR THE PROTECTION OF AREAS NOT PROTECTED BY THE BULK HEAD A VEGETATION MANAGEMENT PROGRAM SHOULD BE UTILIZED TO PROTECT & ENHANCE THE NATURAL EROSION PROTECTION PROVIDED BY NATIVE VEGETATION. VEGETATION MANAGEMENT WOULD INCLUDE SELECTIVE TREE PRUNING AND CLEARING, THE REMOVAL OF DEBRIS FROM THE SHORELINE (ESPECIALLY AFTER STORM EVENTS), AND SUPPLEMENTAL NATIVE UPLAND PLANTINGS TO STABILIZE ADJACENT BANKS.

CONSTRUCTION CONSIDERATIONS:

- CONSTRUCTION ACCESS MUST BE AVAILABLE TO THE BANK AND SHORELINE. THE EXISTING ACCESS ROAD TO THE PENINSULA CAN BE UTILIZED IN CONJUNCTION WITH TEMPORARY ACCESS ROADS TO PROVIDE ACCESS FOR CONSTRUCTION EQUIPMENT TO THE BANK AND SHORE.
- TEMPORARY MATERIAL AND EQUIPMENT STORAGE AREAS SHOULD BE LOCATED IN THE UPLAND AREA. IF POSSIBLE, THE EXISTING STORAGE AREA OFF OF THE ACCESS ROAD WOULD BE UTILIZED FOR CONSTRUCTION TO MINIMIZE ADDITIONAL LAND DISTURBANCE AND CLEARING.
- IF THE EXISTING SOIL TYPE IS SUITABLE CUT AND FILL QUANTITIES SHOULD BE BALANCED IN THE UPLAND AREAS TO MINIMIZE THE COST OF MATERIAL AND TRUCKING. TEMPORARY STOCKPILE AREAS MAY BE NECESSARY.

PERMITTING CONSIDERATIONS:
IN ACCORDANCE WITH THE CHESAPEAKE BAY PRESERVATION ACT A WATER QUALITY IMPACT ASSESSMENT AND ASSOCIATED REVEGETATION PLAN MAY BE REQUIRED DUE TO THE AMOUNT OF CLEARING PERFORMED AS PART OF THE BANK GRADING.

DEPENDING ON THE AMOUNT OF UPLAND DISTURBED A LAND DISTURBANCE PERMIT WILL LIKELY BE REQUIRED.

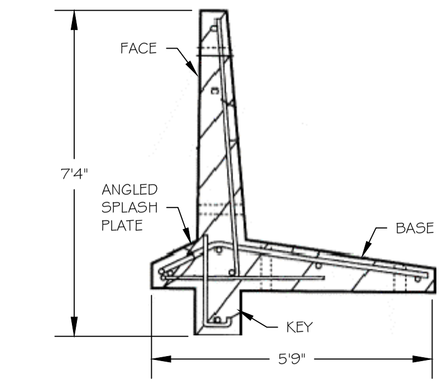
IN ORDER TO PERFORM WORK IN AREAS WITH JURISDICTIONAL WATER AND WETLAND, DUNE AND BEACH RESOURCES, A JOINT PERMIT APPLICATION WILL BE REQUIRED. THIS WILL COVER THE NECESSARY PERMITTING WITH THE UNITED STATES ARMY CORPS OF ENGINEERS (USACE), VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VA DEQ) AND THE VIRGINIA MARINE RESOURCES COMMISSION (VMRC).

LEGEND

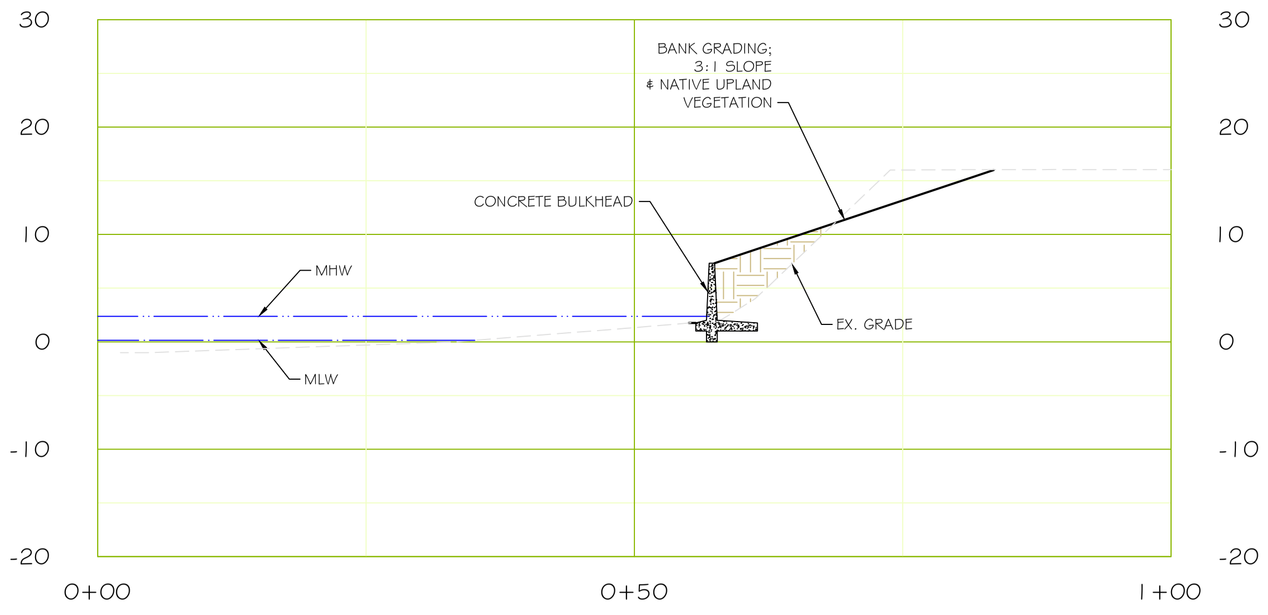
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- EX. APPROX. MEAN HIGH WATER (MHW)
- EX. APPROX. MEAN LOW WATER (MLW)
- FEMA 100 YR FLOOD ELEVATION
- PROPOSED HISTORIC RESOURCE AREA LIMITS
- EX. APPROX. RESOURCE PROTECTION AREA
- APPROX. LIMITS OF EX. TIDAL WETLAND
- SURVEY CONTROL POINT
- PROPOSED MEAN HIGH WATER (MHW)
- PROPOSED GRADE
- PROPOSED BULKHEAD
- PROPOSED BANK GRADING
- COMPACTED SOIL FILL
- PROPOSED ROCK SILL
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE

NOTES:
1. EXISTING TOPOGRAPHY BASED ON AN ACTUAL GROUND SURVEY PERFORMED BY TERRY HICKMAN, LS. ON 2-18-15. SEE SHEET 2 FOR ADDITIONAL NOTES.

2. MEAN TIDE RANGE (MTR), MEAN TIDE LEVEL (MTL), MEAN LOW WATER (MLW) AND MEAN HIGH WATER (MHW) LEVELS ARE BASED UPON AVAILABLE TIDE DATA AND SHOULD BE FIELD VERIFIED PRIOR TO FINAL DESIGN.



TYP. PRECAST CONCRETE BULKHEAD
(BASIS OF DESIGN SEAMENT SHORELINE SYSTEMS L-WALL)



A-A TYPICAL BULKHEAD / BANK SECTION

GRAPHIC SCALE: 1" = 10'
0' 10' 20' 30'

ANGLER ENVIRONMENTAL
CORPORATE | 5367 TELEPHONE ROAD, WARRENTON, VIRGINIA 20187
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PROJECT: FT. EUSTIS TAI SHORELINE EROSION CAP
APPLICANT: THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY-EUSTIS

OPTION C

FORT EUSTIS, VIRGINIA

REVISIONS:
1

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/26/2015
SHEET NO:	5 OF 5

A:\Active Jobfiles\4857 - Ft. Eustis Erosion CAP\CADD Files\Corrective Action Plan\Plan Sheets\5-BULKHEAD.dwg, 6/30/2015 8:31:23 AM, bwilfong, 1:1

ARCHAEOLOGICAL INVESTIGATIONS AT SITE 44NN0024

JOINT BASE LANGLEY-EUSTIS (JBLE-EUSTIS), NEWPORT NEWS, VIRGINIA

PREPARED FOR:
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OCTOBER 2019

AECOM

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ABSTRACT

Under contract to the United States Air Force Civil Engineer Center (AFCEC) and on behalf of Joint Base Langley-Eustis (JBLE-Eustis), AECOM conducted archaeological investigations at site 44NN0024 in conjunction with an Environmental Assessment (EA) of three proposed shoreline erosion mitigation options in Training Area 1, JBLE-Eustis, Newport News, Virginia. Shoreline mitigation may include structural and non-structural installations along with selective bank grading, tree removal, and access road/staging area construction. The Area of Potential Effects (APE) for the current study comprises approximately 2.74 hectares (ha) (6.78 acres [ac]) at the site's northwestern extent.

This study was initiated to assist AFCEC in meeting regulatory obligations under Section 106 of the *National Historic Preservation Act* of 1966, as amended (NHPA). The goals of this study were to determine if significant archaeological resources that contribute to the site's NRHP eligibility are located within the APE and, based on those results, whether the undertaking would constitute an adverse effect per 36 CFR 800.5(a).

Site 44NN0024 represents a 7.68-ha (18.98-ac) Woodland period base camp previously determined eligible for listing in the National Register of Historic Places (NRHP). While the APE was previously investigated, additional shovel test pit (STP) and test unit (TU) excavation was required to evaluate the area in accordance with JBLE-Eustis guidance and Virginia Department of Historic Resources guidelines.

Fieldwork consisted of the excavation of 63 STPs and four TUs, resulting in the recovery of 231 prehistoric artifacts and four faunal remains from largely intact soils. The prehistoric assemblage consists of nondiagnostic lithic artifacts representing early to late stage stone tool production, most of which were recovered from a discrete area near the center of the APE designated Artifact Cluster 4. This manufacturing area appears to have been intentionally isolated from the more intensively occupied site core that previous investigators identified southeast of the APE. Such patterns of site use are consistent with those visible on comparable Woodland sites elsewhere in the Mid-Atlantic coastal plain.

Given that Artifact Cluster 4 retains integrity, incorporates a variety of stone tools, and represents a discrete activity area devoted to stone tool production, it has the demonstrated ability to enhance the current understanding of how 44NN0024 was utilized. Furthermore, additional investigation could provide more detailed information on how and when this component of the site was used, which in turn can generate a more substantial case study for comparative analyses among similar regional site types. Given these considerations, AECOM recommends Artifact Cluster 4 to be a contributing site component as it has the demonstrated ability to yield important information that supports the site's existing NRHP eligibility under Criterion D.

While potential ground disturbances associated with any of the mitigation options could impact archaeological resources within the APE, the discrete nature and location of Artifact Cluster 4 will allow for the avoidance of impacts to significant deposits within the APE. It is recommended that the significant deposits of Artifact Cluster 4 be incorporated into the project design as a design constraint and that the project Limits of Disturbance avoid these deposits. With implementation of design avoidance, impacts associated with the proposed shoreline improvement options will not constitute an adverse effect to 44NN0024 under 36 CFR 800.5(a) as they would not impact elements of the site that contribute to its NRHP eligibility. No additional work is recommended within the APE.

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1.0 INTRODUCTION

On behalf of Joint Base Langley-Eustis (JBLE-Eustis) and under contract to the United States Air Force Civil Engineering Center (AFCEC), AECOM conducted archaeological investigations at 44NN0024 in support of an Environmental Assessment (EA) of proposed shoreline erosion mitigation in Training Area 1, JBLE-Eustis, Newport News, Virginia (Figure 1-1). The Area of Potential Effects (APE) for the current study corresponds to approximately 2.74 hectares (ha) (6.78 acres [ac]) of the 7.68-ha (18.98-ac) site and is bound to the north, west, and south by existing site boundaries along Skiffe's and Bailey creeks and to the east by a line denoting the extent of potential ground disturbance (Figure 1-2).

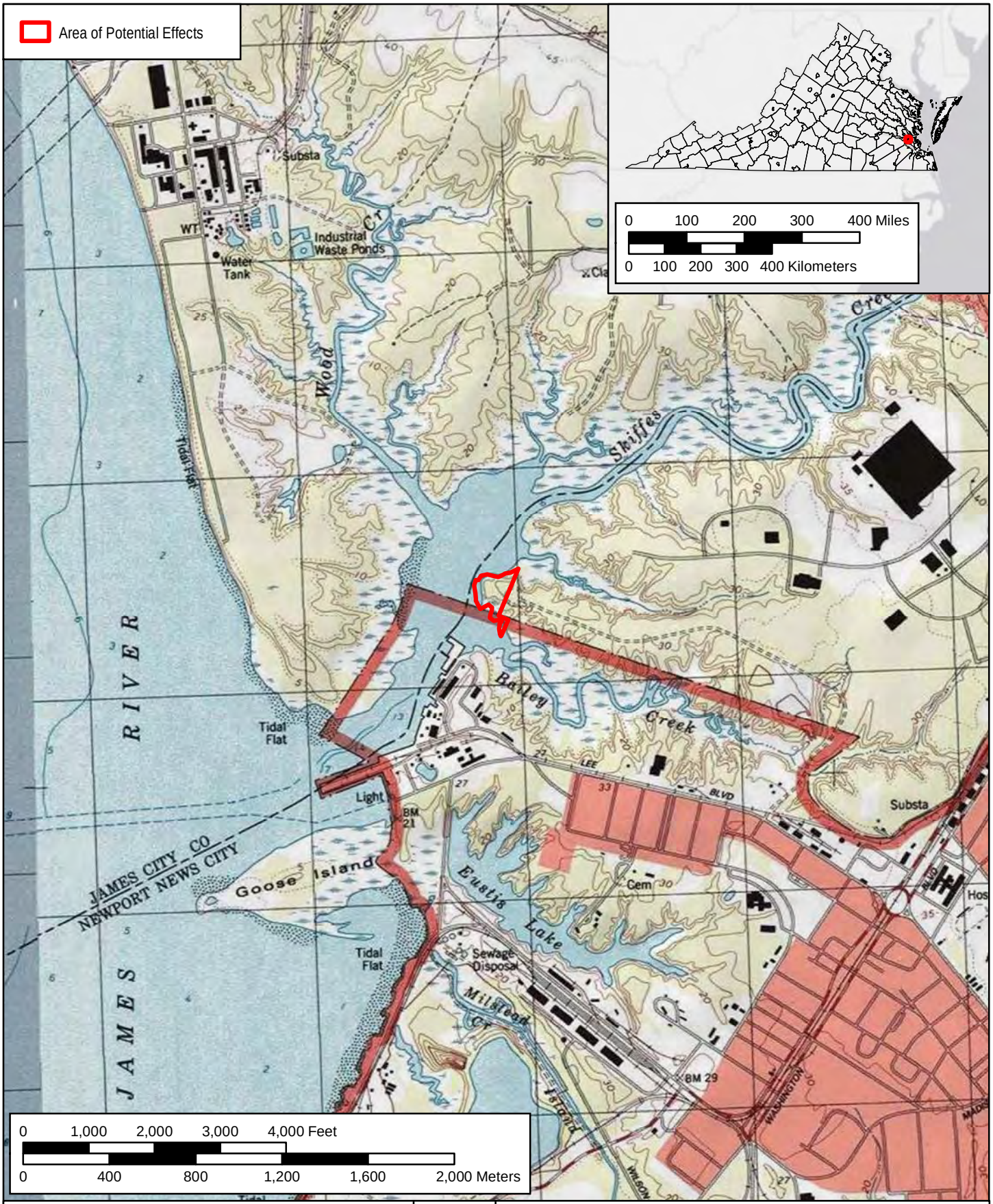
The three shoreline erosion mitigation options under consideration were presented to AECOM in a package produced by Angler Environmental and dated June 26, 2015. The measures presented in each option entail various combinations of structural and non-structural installations along with selective bank grading in vulnerable areas. Option A represents a non-structural alternative characterized by the use of a living shoreline and selective bank grading at a 2:1 slope. Option B utilizes a stone sill along the shoreline, tidal marsh plantings, and selective bank grading at 3:1 to 6:1 slopes. Lastly, Option C includes a cast concrete bulkhead along the shoreline in addition to native plantings and selective bank grading at 3:1 to 6:1 slopes. All three options potentially include the construction of temporary access roads/staging areas in level, upland portions of the APE.

Site 44NN0024 represents a 7.68-hectare (ha) (18.98-acre [ac]) Woodland period base camp previously determined eligible for listing in the National Register of Historic Places (NRHP). Louis Berger (Berger) conducted a Phase II evaluation in 2014 and presented the results and recommendations in a report entitled *National Register Evaluation of Archaeological Sites 44NN0024, 44NN0127, 44NN0213, and 44NN0214, Joint Base Langley-Eustis, City of Newport News, Virginia* (Wilkins et al. 2015); the current study is an addendum to that report. The goals of the current archaeological investigations were to determine if significant archaeological resources that contribute to the site's NRHP eligibility are located within the APE and, based on those results, whether the undertaking would constitute an adverse effect per 36 CFR 800.5(a).

All work was conducted pursuant to Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended; the Archaeological Resources Protection Act (United States Department of the Interior [USDI] 1979); the Native American Graves Protection Act (USDI 1990); and the Advisory Council on Historic Preservation's "Protection of Historic and Cultural Properties" (36 Code of Federal Regulations [CFR] 800; USDI 2004). This study was also conducted in accordance with Air Force Instruction 32-7065, Cultural Resources Management Program (USAF 2014), NRHP Criteria for Evaluation (36 CFR Part 60; USDI 2012); National Register Bulletin 15 *How to Apply the National Register Criteria for Evaluation* (National Park Service [NPS] 2002), the *Secretary of the Interior's Standards for Archeological Documentation* (USDI 1999); and the DHR *Guidelines for Conducting Cultural Resource Survey in Virginia* (DHR 2017).

Field investigations occurred between July 15 and 18, 2019. Scott Seibel was the Principal Investigator, Pete Regan was the Field Director, and Benjamin Stewart and Alison Cramer served as Field Technicians. Kayla Marciniszyn served as the Laboratory Director, while Benjamin Stewart conducted the artifact analysis. Nina Shinn served as the GIS Specialist.

Following this Introduction, the report includes four sections of text: Research Design; Results; Summary and Recommendations; and References Cited. Three appendices follow: Appendix A



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SCALE	1:24,000
SOURCE	ESRI 2019
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N

TITLE

Project Location

AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

PROJ NO 60542271

FIGURE 1-1

CLIENT	AFCEC/JBLE
PROJ	44NN0042 Supplemental Phase II
SCALE	1:1,482
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N

TITLE

Area of Potential Effects

AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

PROJ NO 60542271

FIGURE 1-2

contains the Qualifications of Investigators; Appendix B contains the Artifact Catalog; and Appendix C contains the Archaeological Site Form. Please note that since this report is considered an addendum to Wilkins et al. (2015), sections on environmental setting, cultural contexts, and previous investigations are not duplicated here. Reference is hereby made to Wilkins et al. (2015) for relevant background information.

2.0 RESEARCH DESIGN

2.1 OBJECTIVE

The objective of the current archaeological investigations was to determine if portions of 44NN0024 within the APE contain significant archaeological resources that contribute to the site's previously determined NRHP eligibility. This information was then used to determine whether the proposed undertaking constitutes an adverse effect as defined under 36 CFR 800.5(a): "an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register [of Historic Places]" (USDI 2004:n.p.).

2.2 FIELD METHODS

Field testing consisted of STP and TU excavation. STPs were excavated at 15-meter (m) (49.2-foot [ft]) intervals along a controlled grid superimposed atop the 30-m (98.4-ft) grid Berger utilized during the initial 2014 site evaluation. Grid orientation was 35 degrees east of magnetic north. AECOM primary STPs were excavated at grid coordinate points, except where collocated with Berger STPs or in areas of open water, slope in excess of 15 percent, or modern disturbance (e.g., roadways, push piles, ditches). Radial STPs were excavated at 7.5-m (24.6-ft) intervals in cardinal directions around positive STPs. Each STP measured 40 centimeters (cm) (1.3 ft) in diameter and was stratigraphically excavated 10 cm (0.33 ft) into sterile subsoil. STPs were assigned identifiers tied to AECOM's system of survey grid coordinates (e.g., N1000 E1000, N1015 E1000).

Shovel testing was followed by the excavation of 1-x-1-m (3.3-x-3.3-ft) TUs in 10-cm (0.33-ft) levels within natural stratigraphy to a depth of 10 cm (0.33 ft) into culturally sterile subsoil or to the practical and safe extent of hand excavation (approximately 1.2 m [3.9 ft] in depth).

Field data were recorded on standard field forms and in general field notes. The forms included Munsell soil color, soil texture, profiles, features present, artifacts recovered, excavator's initials, and the date of excavation. The locations of STPs and TUs were noted on field maps and recorded using a global positioning system (GPS) unit. At least one wall of each TU was photographed and drawn in profile.

All soils were screened through 6.34-millimeter (mm) (0.25-inch [in]) hardware mesh to ensure uniform artifact recovery. Collected artifacts were bagged in plastic sealing bags labeled with all relevant provenience information, including project name, STP, TU, stratum, level, the number of artifacts recovered, excavator initials, and date. Obviously modern artifacts were generally noted on forms and discarded in the field. Faunal remains were sampled from proveniences where they occurred in high frequencies, with uncollected specimens weighed in bulk and discarded. All faunal remains were limited to marine mollusk shell.

2.3 LABORATORY METHODS

Artifacts were placed in plastic bags and transported to the AECOM laboratory in Gaithersburg, Maryland, where the artifacts were cleaned, analyzed, cataloged, and accessioned for curation at Fort Lee according to the *Guidelines for Conducting Historic Resources Survey in Virginia* (DHR 2017), the Secretary of the Interior's *Standards and Guidelines for Curation* (USDI 1991; 36 CFR Part 79) and the *Regional Archaeological Curation Facility Collection Standards* (Fort Lee 2012). The objectives of laboratory analysis and cataloging were to determine, to the extent possible, the date, function, cultural affiliation, and significance of the archaeological resources.

As appropriate, artifacts were gently washed using tap water and a soft toothbrush. Once prepared, the artifacts were analyzed, cataloged, and rebagged according to provenience. Artifact data were entered into a Microsoft Access 2010 database. The analysis of the artifacts included noting provenience, group, material, form, decoration, function, vessel segment, color, and quantity. Details of the analytical methods for specific artifact groups are described below.

2.3.1 Faunal Remains

Faunal remains were identified using a comparative collection housed at the AECOM archaeological laboratory. Only small quantities of faunal remains were recovered, all of which represent bivalve shells. These were cursorily analyzed and identified to taxonomic type. Faunal remains were assigned to the Foodways, Remains functional group/subgroup.

2.3.2 Prehistoric Artifacts

All prehistoric artifacts recovered during the current investigation of 44NN0024 represent lithic material, the particular groups of which are described below alongside methods of analysis.

The following basic information was recorded for lithics: count, weight, material type, group, class, and, as applicable, subclass. Weight was recorded to the nearest 0.01 gram (g) (0.003 ounce [oz]) using a digital Sartorius scale calibrated to 800 g (28.2 oz). A four-tiered system of classification (group, material, class, and subclass) was used; the broadest level of classification is the group.

Lithic groups include core/tested material, debitage, flaked stone tool, fire-cracked rock (FCR), ground/battered stone, and unmodified cultural artifacts. Lithic artifacts were initially classified based on group and material type, followed by sorting into applicable class and subclass categories. For example, biface is a lithic class of the group flaked stone tool, and can be further described using early, middle, and late stages subclasses.

Depending on the completeness and/or condition of an artifact, additional attributes were recorded, including thermal alteration, cortex percent, and cortex type. Thermal alteration is not necessarily intentional heat treatment and instead refers to whether an artifact exhibits evidence of being heated (luster or color change) or exposed to fire (pot lidding, crazing, burning, or crumbling).

Cortex percentage has widely been used as an indicator of core and biface reduction stages, as the amount of cortex present on debitage is generally related to the manufacturing process. A greater amount of cortex is perceived as being indicative of an earlier stage of reduction, while a lack of cortex is indicative of later reduction stages. When possible, the percentage of cortex on the dorsal flake surface was estimated (none [0], less than 50 percent [<50], or greater than or equal to 50 percent [≥50]) and the type of cortex was recorded. Cortex in the form of a rounded surface rind (e.g., from fluvial transport) was classified as smoothed. Angular remnant residual, or parent, material lacking evidence of fluvial transport was classified as residual/matrix. Cortex in the form of a heavily weathered exterior surface as yet unflaked was classified as weathering rind.

2.3.2.1 Identification of Raw Material Types

The following raw materials were identified during the survey of the project area: quartz, quartzite, orthoquartzite, sandstone, and metarhyolite. Stone material identification was based primarily on macroscopic observation; when necessary, a hand lens (10x magnification) or stereomicroscope (10 to 40x magnification) was used to aid determination.

2.3.2.2 Cores/Tested Material

Tested material and cores are produced via freehand or bipolar reduction in which lithic material is detached from a larger object for the purpose of producing a usable flake. Negative flake scars and remnant striking platforms are identifying attributes of a core. A core has at least four flake scars removed in an identifiable pattern. A piece of material with fewer flakes and no discernable flaking pattern is considered tested material.

Cores were sorted into classes based on flake removal direction(s). Classes include unidirectional, bidirectional, and multidirectional cores. Unidirectional cores have flakes scars in a single direction from a single striking platform. Bidirectional cores exhibit flake scars in at least two directions while multidirectional cores have three or more directions of removal (Andrefsky 2005).

2.3.2.3 Debitage

Debitage were sorted into classes based on percent body cortex on the dorsal surface. Classes include: primary cortex (retain ≥50 percent dorsal cortex), secondary cortex (retain <50 percent dorsal cortex), and non-cortex (0 percent cortex). Debitage subclasses were based on general morphology and/or completeness. Subclasses include complete/mostly complete flake, flake fragment, debris/shatter, blade/microblade, bipolar flake, and too small/indeterminate. Complete/mostly complete flakes possess striking platforms and have no more than lateral or distal portions absent. Flake fragments are the distal or lateral portions of flakes with either a missing or partially missing striking platform. Debris/shatters are those fragments that cannot be positively identified as a flake fragment.

The size of each debitage was determined by fitting it into one of a series of circles with graduated diameters. Size grades for debitage were determined by the diameter of the smallest circle into which it fit. Size grades begin at less than 0.95 cm (0.375 in; size grade G1) and end at 10.48 to 11.11 cm (4.125 to 4.375 in; size grade G17); size grades increase in 0.635-cm (0.25-in) increments. The intervals are roughly equivalent to the diagonals of squares that progressively increase in 0.635-cm (0.25-in) increments. This provides a general and relative characterization of debitage sizes rather than an exact measurement of length and width.

2.3.2.4 Fire-Cracked Rock

Fire-Cracked Rock (FCR) is a stone that has been reddened, cracked, crazed, and/or vitrified during exposure to heat and fire. These stones are byproducts from boiling receptacles, hearths, and earth-ovens. The FCR were primarily identified by distinct reddening and sharp angularity and were sorted by material type and weighed.

2.3.2.5 Flaked Stone Tools

Artifacts classified as flaked stone tools are the result of reductive bipolar, knapping, or pressure flaking processes; flaked stone tools exhibit edge modification and/or use-wear. Flaked stone tools were organized into classes and subclasses based on overall design and shape; tool types identified in the lithic assemblage are defined below.

Bifaces are tools that have been flaked across two opposing faces (Crabtree 1972); these faces meet to form an edge that circumscribes the entire artifact. Bifaces can also be opposing bifacially retouched margins, depending on the nature of the reduction complexity (e.g., the manufacture of

a biface from a very thin flake blank would not necessarily require invasive thinning). The general shape and edge characteristics of a biface become more regular as the form is reduced and shaped.

Bifaces were divided into early, middle, and late stage subclasses based on the extent of flaking and other modifications. The subclass categories refer to the bifacial reduction phase. Those classified as early stage bifaces were minimally/weakly bifacial. Early stage bifaces exhibit bulbar flake scars produced by percussion flaking, square to sinuous margin edges, and irregular topography. Middle stage bifaces exhibit bulbar flake scars that typically extend to at least the center of the biface, less sinuous margins, and a relatively continuous flake pattern on both faces. Middle stage bifaces may or may not have undergone initial shaping. Late stage bifaces have undergone shaping and exhibit a regularized topography, straighter margins, and a thinner cross-section relative to earlier stages. Faces may exhibit evidence of secondary thinning, which partially obliterates previous flake scars. The primary distinguishing factor between a late stage biface and a finished biface, or projective point/knife (PPK), is the presence of a diagnostic haft element. An unfinished biface exhibiting macroscopically visible use-wear is classified as an "unfinished biface used as a tool."

A PPK is a finished biface. It exhibits distally converging lateral margins that meet at an acute angle (i.e., the point) and a haft element at the opposing end (e.g., stem or notches). PPKs were analyzed based on morphology and attributes of manufacture. Cultural and temporal stylistic differences serve as diagnostic chronological markers, providing a means of relative site dating. Interpretations of morphology and temporal affiliation follow nomenclature by Hranicky (1994).

Scrapers are tools with wide working edges and a moderate to steep edge angle. Scrapers can be unifacially or bifacially worked complete tools. Scrapers are classed as a separate lithic class. Subclasses are based on the location of the working surface and/or overall size (e.g., end scraper, thumbnail scraper).

Debitage exhibiting use or retouch were classified as retouched/utilized debitage in the flaked stone tool group. Use causes the edge of a flake to have a regular pattern of edge damage manifested as either microflaking or grinding that can be attributed to tool use. Retouch is a deliberate modification (not microflaking) to the edge of a flake along one or more margins. Retouch can be unifacial or bifacial but does not extend too far from the margin (Odell 2003). A spokeshave is a tool with a single concave notch likely used for working wood or bone. Debitage were only classified as utilized/retouched if the modification was unmistakable.

2.3.2.6 Ground/Battered Stone

Ground or battered stones are manufactured via abrasion, polish, or impaction mechanisms that may be intentional or the result of general usage (Adams 2002). Grinding use creates a polished surface which is planar or rounded; impaction use creates a pitted, pecked, or even fractured surface. Ground/battered stone were sorted into classes based on overall morphology and general shape of the ground or battered surfaces. Examples of ground/battered stone tools include handstones, hammerstones, and abraders.

Handstones are a tool used in planar grinding against a larger milling slab, usually for food processing. They often have multiple grinding surfaces located on several facets. Hammerstones are tools used to strike or crush another object. They are often used for tool production, though it possible that they could also be used for food processing.

Abraders are used to grind or polish the surface of another object. They are primarily utilized in tool production and maintenance such as platform preparation for stone tool production or polishing and shaping wooden surfaces.

Where possible, a subclass was also assigned to the tool; these include descriptions of ground stone cross-section, grooves, or other secondary usage. The classes and subclasses are based on Wright's (1992) classification system.

2.3.2.7 Unmodified Cultural

Unmodified cultural lithics are natural stone or crystalline objects recovered from archaeological contexts that have not been intentionally modified. Context is the primary basis for the classification of artifacts in this group. The manuport class is the only one represented in this assemblage. Manuports are stone objects transported via human agency from a natural context and are otherwise unmodified.

2.4 EXPECTED RESULTS

Based on Wilkins et al.'s 2015 results, a light scatter of prehistoric artifacts was anticipated within the APE. Wilkins et al. (2015) recovered seven prehistoric artifacts from three STPs within the current APE. Recovered material included one core from an isolated STP as well as four FCR, one biface reduction flake, and one piece of shatter from two adjacent STPs. While the presence of FCR in adjacent STPs suggested that prehistoric hearth features may be present, the low-density distribution of cultural material across this portion of the site did not suggest intensive occupation. Wilkins et al. (2015) did not recover any prehistoric ceramics from this portion of 44NN0024, suggesting it was not utilized for the food preparation/consumption activities evident within the site core southeast of the APE. Therefore, it was expected that the current investigation would yield predominantly lithic artifacts, likely associated with stone tool production, with a low to moderate potential for archaeological features.

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3.0 RESULTS

The supplemental archaeological evaluation of 44NN0024 consisted of the excavation of 63 STPs and four TUs, resulting in the recovery of 231 prehistoric artifacts and four faunal remains (Figure 3-1). At the time of this study, the APE largely consisted of a forested upland environment near the tip of a peninsula above Skiffe's and Bailey creeks (Figure 3-2). Erosion is evident in several places along the peninsula's margins, where slopes in excess of 15 percent are common (Figures 3-3 3-4). Obvious ground disturbances include actively used gravel access roads, disused two-track dirt roads, spoil piles/fox holes attributed to military training activities, and drainage ditches (Figure 3-5).

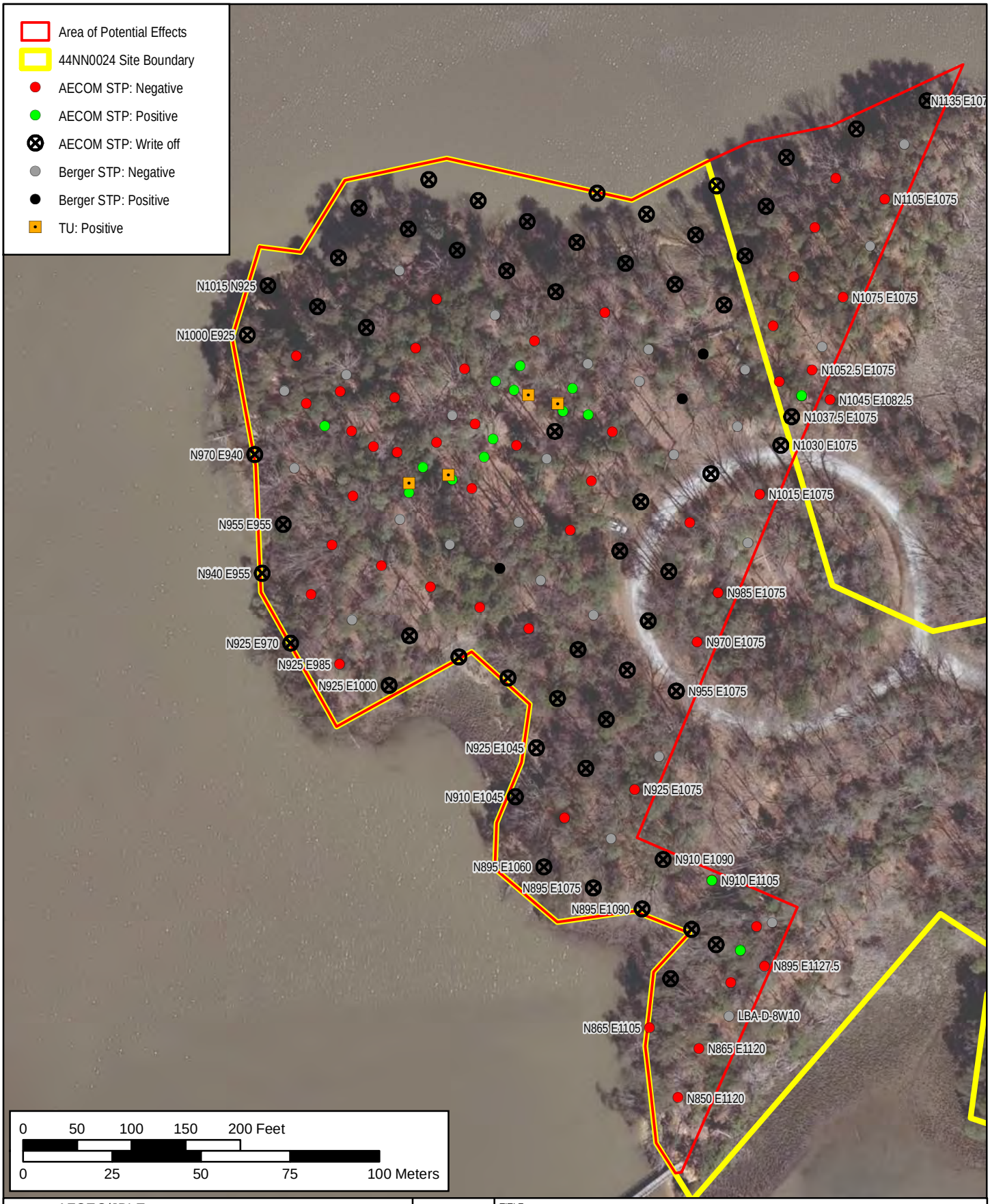
3.1 SHOVEL TESTING

A 15-m (49.2-ft) survey grid superimposed atop Berger's previous 30-m (98.4-ft) grid yielded a total of 127 primary STP locations within the APE. Of these, 84 were written off due to their collocation with a previous Berger STP (n=30) or their location in open water (n=34), on slopes greater than 15 percent (n=12), or within areas of modern ground disturbance (n=8). The remaining 43 primary STP locations were excavated, of which seven were positive for cultural material. An additional 20 radial STPs were excavated at 7.5-m (24.6-ft) intervals to delineate positive STPs.

Soil profiles were fairly consistent throughout the APE and generally revealed three strata. Stratum I typically consisted of dark grayish brown (10YR 4/2) to gray (10YR 5/1) silt loam representing the surface mineral layer (A horizon). In most instances, the first 2 to 5 cm (0.06 to 0.16 ft) of Stratum I was a distinct surficial organic layer (O horizon) consisting of the native root mat. While technically representing two distinct strata, they were screened as a single provenience during shovel testing given the difficulty of separating the thin O and A horizons; the combined thickness of these layers was generally less than 10 cm (0.33 ft). No evidence for a distinct plowzone (Ap horizon) was observed in any of the STPs.

Stratum II typically consisted of light brownish gray (10YR 6/2) to pale yellow (2.5Y 7/3) compact silt loam representing the eluvial zone (E horizon). The thickness of the E horizon generally ranged between 10 and 20 cm (0.33 and 0.66 ft). Lastly, Stratum III typically consisted of dark yellowish brown (10YR 4/6) to brownish yellow (10YR 6/8) compact silt loam or silty clay loam representing subsoil (B horizon). The density of the E and B horizons was pervasive but does not appear to be the result of mechanical compaction given its occurrence in every STP. Rather, native soils appear to have undergone some form of diagenetic consolidation likely related to water displacement, natural soil loading, and/or other processes. Figure 3-6 provides a representative STP profile.

In total, 54 nondiagnostic prehistoric lithic artifacts and three faunal remains were recovered from 15 STPs (Table 3-1). These artifacts are described in greater detail in section 3.3. Additionally, eight modern objects (e.g., bullet casings, plastic) and approximately 1.4 kilograms (kg) (3 pounds [lbs]) of marine shell were noted and discarded in the field. All modern debris is attributed to military training activities regularly conducted within 44NN0024. The discarded shell was identified within STP N910 E1105 but did not appear to represent a primary cultural deposit. The STP was located in a small, highly constricted area at the base of a swale adjacent to the tidal marsh, and the shell remains had clearly eroded from an unknown upslope location. Additionally, no prehistoric or historic artifacts were found in association with the shell remains.



CLIENT	AFCEC/JBLE
PROJ	44NN0042 Supplemental Phase II
SCALE	1:1,450
SOURCE	ESRI 2019
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N

TITLE

Plan of Excavations

AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

PROJ NO	60542271
FIGURE	3-1

Figure 3-2. Overview of Forested Uplands in Center of APE, Facing South

Figure 3-3. Overview of Erosion at Northwestern End of APE, Facing South

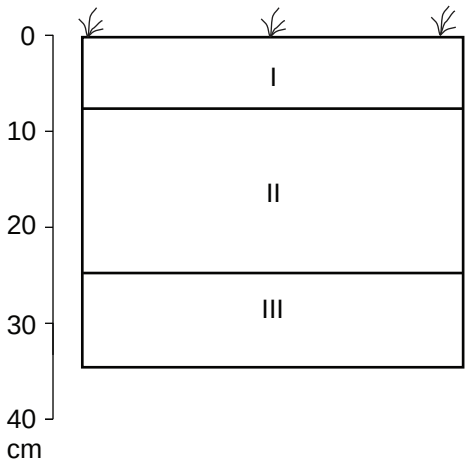
CLIENT AFCEC/JBLE		TITLE Project Photographs	
PROJ 44NN0024 Supplemental Phase II			
SCALE N/A			
SOURCE N/A			
S:\900-GIS and Graphics\930 Graphics\931 Illustrator		AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271 FIGURES 3-2 and 3-3

Figure 3-4. Overview of Slopes along North Side of APE, Facing Northeast

Figure 3-5. Overview of Road and Drainage Ditch Disturbances on West Side of APE, Facing South

CLIENT AFCEC/JBLE		TITLE Project Photographs
PROJ 44NN0024 Supplemental Phase II		
SCALE N/A		
SOURCE N/A		AECOM 12420 Milestone Center Dr. Germantown, MD 20876
S:\900-GIS and Graphics\930 Graphics\931 Illustrator		PROJ NO 60542271 FIGURES 3-4 and 3-5

STP N1015 E1000



I = Dark grayish brown (10YR 4/2) silty clay loam combined A/O horizon
II = Pale brown (10YR 6/3) compact silt loam E horizon
III = Dark yellowish brown (10YR 4/6) compact silty clay loam B horizon

CLIENT AFCEC/JBLE		TITLE Representative STP Profile	
PROJ 44NN0024 Supplemental Phase II			
SCALE As Shown			
SOURCE N/A		AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
S:\900-GIS and Graphics\930 Graphics\931 Illustrator			FIGURE 3-6

Table 3-1. STP Artifact Summary

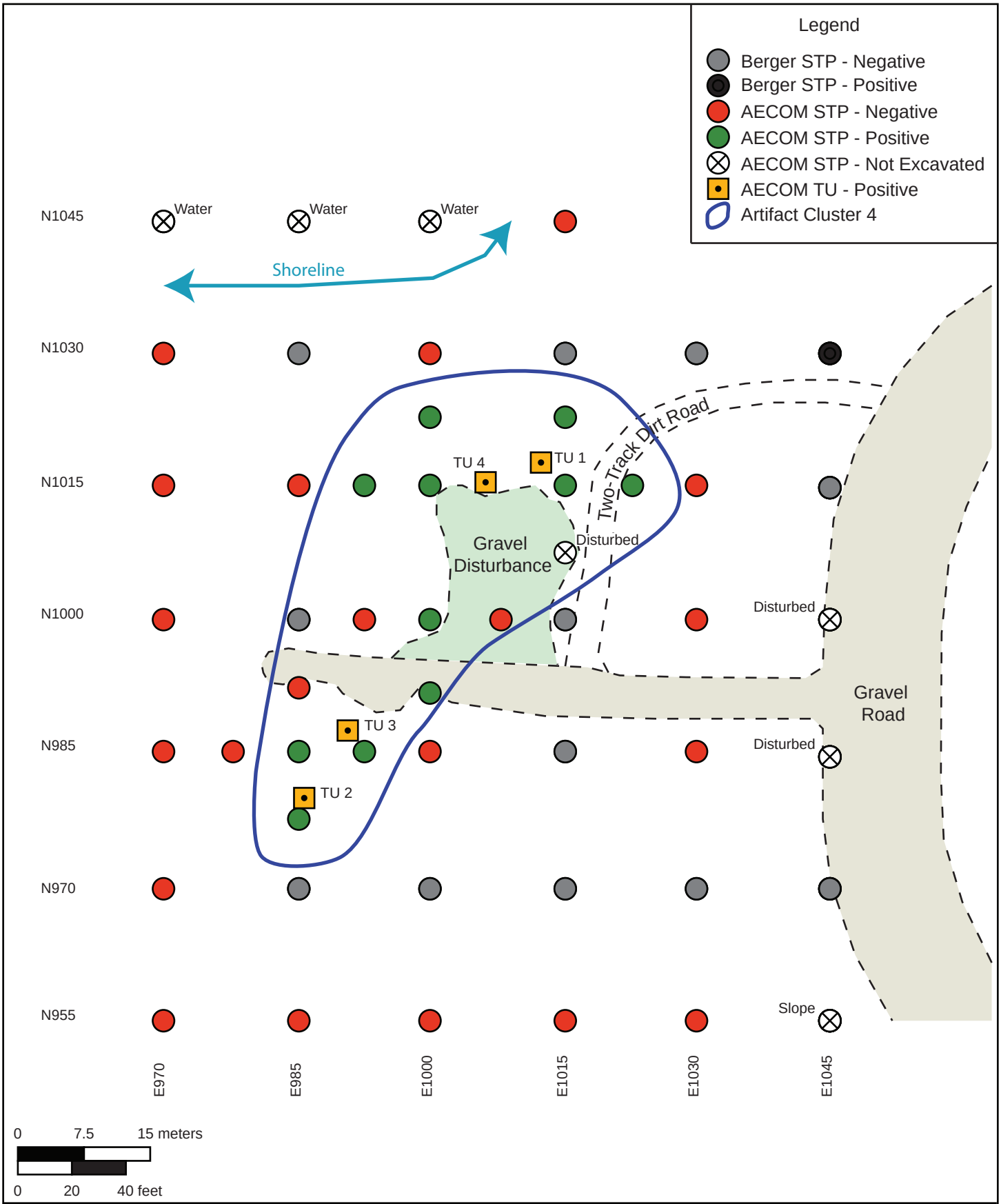
STP	Group					Count
	Core/Tested Material	Debitage	FCR	Flaked Stone Tool	Foodways	
N895 E1120	1				1	**2**
N910 E1105					2	**2**
N977.5 E985		17				**17**
N985 E955		2		1		**3**
N985 E985		2				**2**
N985 E992.5		4				**4**
N992.5 E1000		3				**3**
N1000 E1000		3				**3**
N1015 E992.5		2	1			**3**
N1015 E1000		1				**1**
N1015 E1015		5		1		**6**
N1015 E1022.5		2				**2**
N1022.5 E1000	1					**1**
N1022.5 E1015		5		1		**6**
N1045 E1075		1		1		**2**
Total	**2**	**47**	**1**	**4**	**3**	**57**

Nearly 89 percent (n=48) of the artifacts were recovered from an area broadly bound by the N977.5, N1022.5, E985, and E1022.5 transects. STPs excavated in this area revealed a light scatter of prehistoric lithic artifacts, whereas positive STPs elsewhere within the APE represent isolated find spots. This small prehistoric scatter was defined by 10 positive STPs along a southwest-northeast axis between radial STPs N977.5 E985 and N1022.5 E1015. Wilkins et al. (2015) previously identified three site loci, labeling each as an "Artifact Cluster". Following that nomenclature, the prehistoric scatter identified during the current shovel testing is designated Artifact Cluster 4 (Figure 3-7).

Central to Artifact Cluster 4, however, are areas of prior ground disturbance. An actively used gravel access road is present between the N985 and N1000 transects, while the area between transects N1000, N1015, E1000, and E1015 exhibits compacted construction gravel immediately below the surface. This area may have been used as a former parking/staging zone. Older growth oak and beech trees are evident along the exterior of this area, with substantially younger tree growth in the interior (Figures 3-8 and 3-9). The density of the gravel precluded excavation here.

3.2 TEST UNITS

Based on the results of STP excavation, four TUs were excavated to investigate artifact distributions within Artifact Cluster 4 (Figure 3-1). As noted, extensive ground disturbances characterize the center of the cluster, restricting TU placement to the cluster's periphery and in the vicinity of STPs yielding the greatest quantities/varieties of prehistoric material. The results of each TU are presented below with descriptions of stratigraphy and artifact content. TU coordinates correspond to each unit's southwest corner.



CLIENT	AFCEC/JBLE
PROJ	44NN0024 Supplemental Phase II
SCALE	As Shown
SOURCE	N/A
	S:\900-GIS and Graphics\930 Graphics\931 Illustrator

TITLE
Site Plan Detail Showing Artifact Cluster 4 and Local Disturbances

AECOM
12420 Milestone Center Dr.
Germantown, MD 20876

PROJ NO 60542271
FIGURE 3-7

Figure 3-8. Overview of Disturbed Parking/Staging Area at Center of Artifact Cluster 4, Facing North

Figure 3-9. Overview of Disturbed Parking/Staging Area at Center of Artifact Cluster 4, Facing South

CLIENT AFCEC/JBLE		TITLE Project Photographs	
PROJ 44NN0024 Supplemental Phase II			
SCALE N/A			
SOURCE N/A		AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
S:\900-GIS and Graphics\930 Graphics\931 Illustrator			FIGURES 3-8 and 3-9

3.2.1 TU 1

TU 1 was placed at N1017 E1012 to investigate distributions at the northeastern end of Artifact Cluster 4. STP N1015 E1015 and radial STP N1022.5 E1015 each yielded five debitage and one flaked stone tool, while radial STP N1015 E1022.5 yielded two debitage. Given the relatively high quantity of material recovered from STPs N1015 E1015 and N1022.5 E1015, TU 1 was placed between the two where modern disturbances and tree growth would allow.

Excavation revealed four strata (Figure 3-10). Stratum I consisted of a 4-cm (1.6-in) thick brown (10YR 4/3) loam O horizon. Stratum II consisted of a 6-cm (0.2-ft) thick very dark grayish brown (10YR 3/2) loam A horizon. Stratum III consisted of a 24-cm (0.79-ft) thick pale yellow (2.5Y 7/3) compact silt loam E horizon. Lastly, Stratum IV consisted of the yellowish brown (10YR 5/4) compact silty clay loam B horizon extending to the base of excavation up to 43 cm (1.4 ft) below ground surface (bgs). A modern disturbance, potentially representing an auger hole associated with recent military site uses, was identified in the southwest corner of the unit as a straight-edge shaft of culturally sterile dark gray (10YR 4/1) loam extending from the ground surface to an unknown depth below the base of unit excavation.

In total, 30 prehistoric artifacts and one marine shell were recovered from TU 1, including three from the A horizon (Stratum II), 27 from the E horizon (Stratum III), and one from the B horizon interface (Stratum IV; Table 3-2). These artifacts are described in greater detail in section 3.3 below. Additionally, one modern brass bullet casing and one AA battery from Stratum I (O horizon), as well as a second bullet casing from Stratum II (A horizon), were discarded in the field.

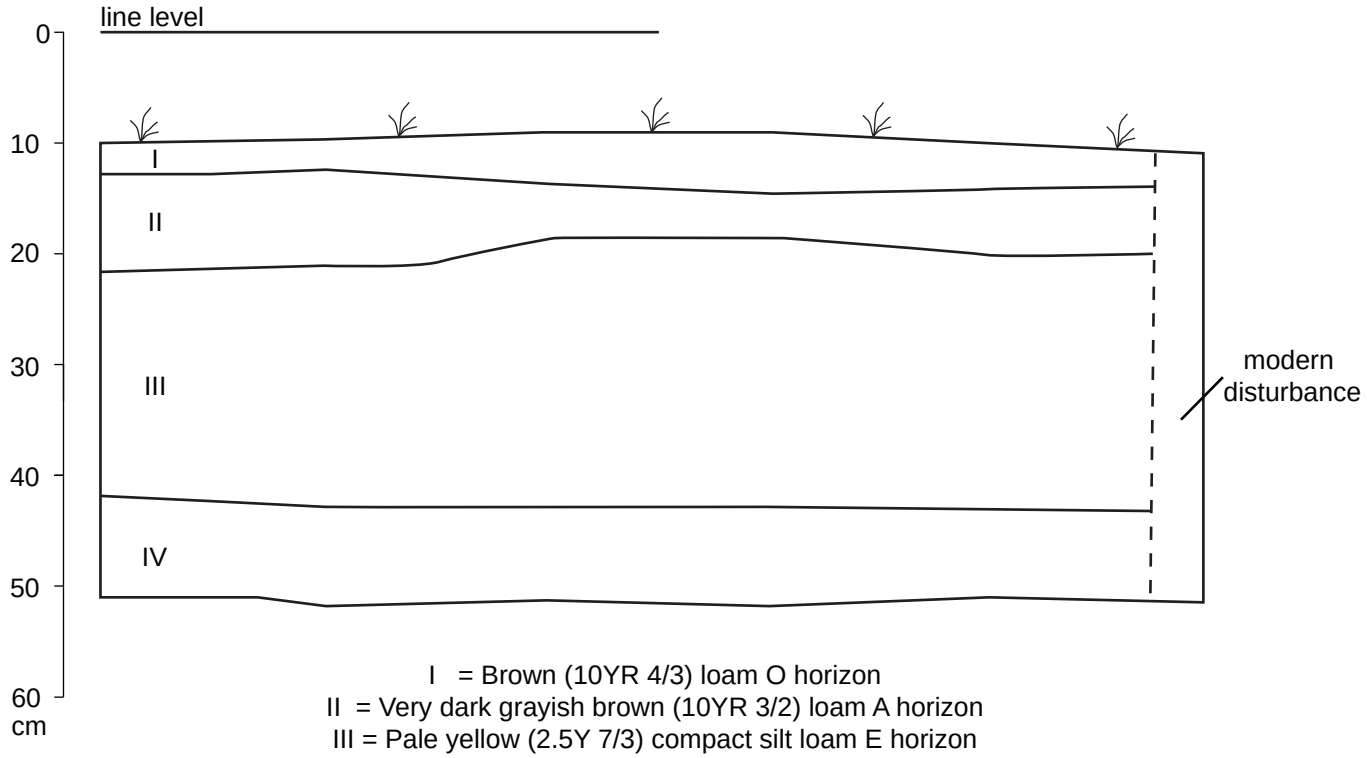
Table 3-2. TU 1 Artifact Summary

Group	Stratum II	Stratum III		Stratum IV	Count
	Level 1	Level 1	Level 2	Level 1	
Debitage	1	15	11	1	**28**
Flaked Stone Tool	1				**1**
Foodways	1				**1**
Ground/Battered Stone			1		**1**
Total	**3**	**15**	**12**	**1**	**31**

3.2.2 TU 2

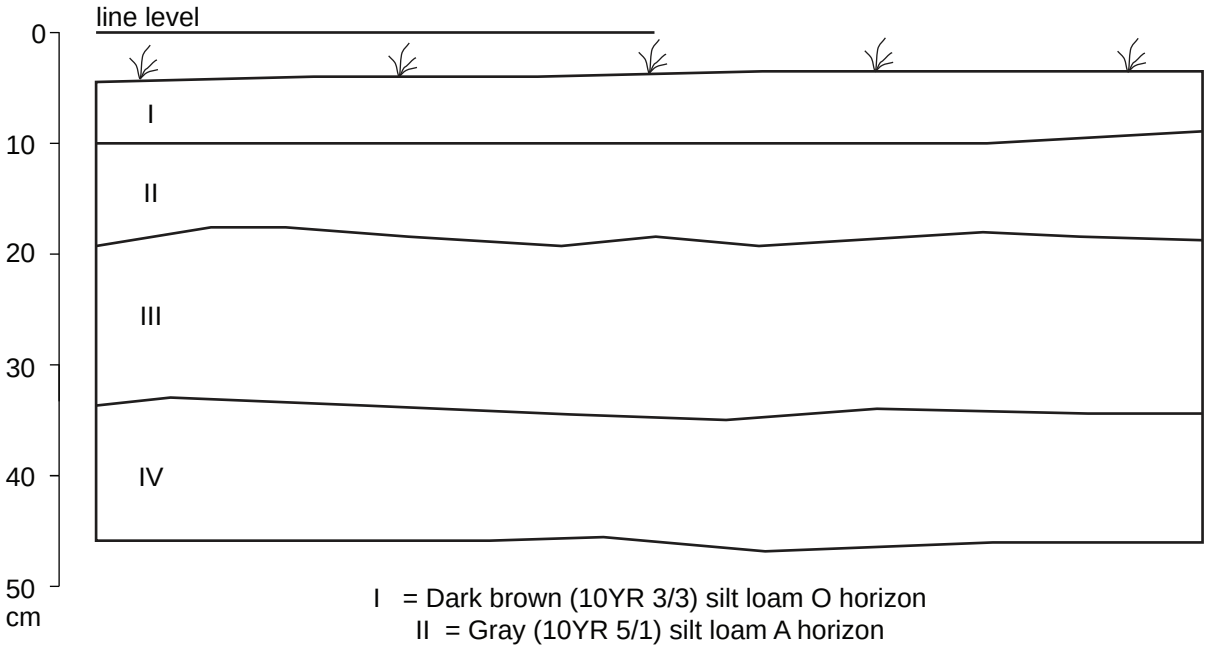
TU 2 was placed at N978 E985 to investigate the high quantity of lithic artifacts (n=17) recovered from radial STP N977.5 E985. The unit was placed slightly north-northeast of this STP given that it represents the southwesternmost positive STP in Artifact Cluster 4. Primary STP N985 E985 yielded two debitage while radial STP N985 E992.5 yielded four debitage; AECOM and Berger STPs to the south produced no cultural material. Therefore, while unit placement was largely determined by proximity to radial STP N977.5 E985, its position slightly north of that STP was based on local distributions.

Excavation revealed four strata (Figure 3-11). Stratum I consisted of a 9-cm (0.3-ft) thick dark brown (10YR 3/3) silt loam O horizon. Stratum II consisted of a 6-cm (0.2-ft) thick gray (10YR 5/1) silt loam A horizon. Stratum III consisted of a 17-cm (0.56-ft) thick pale yellow (2.5Y 7/3)



I = Brown (10YR 4/3) loam O horizon
II = Very dark grayish brown (10YR 3/2) loam A horizon
III = Pale yellow (2.5Y 7/3) compact silt loam E horizon
IV = Yellowish brown (10YR 5/4) compact silt loam B horizon
Modern Disturbance = Dark gray (10YR 4/1) loam

CLIENT	AFCEC/JBLE	TITLE	TU 1 South Profile
PROJ	44NN0024 Supplemental Phase II		
SCALE	As Shown		
SOURCE	N/A	AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
S:\900-GIS and Graphics\930 Graphics\931 Illustrator			FIGURE 3-10



I = Dark brown (10YR 3/3) silt loam O horizon
II = Gray (10YR 5/1) silt loam A horizon
III = Pale yellow (2.5Y 7/3) compact silt loam E horizon
IV = Brownish yellow (10YR 6/8) compact silt loam B horizon

CLIENT	AFCEC/JBLE	TITLE	TU 2 East Profile
PROJ	44NN0024 Supplemental Phase II		
SCALE	As Shown		
SOURCE	N/A	AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
S:\900-GIS and Graphics\930 Graphics\931 Illustrator			FIGURE 3-11

compact silt loam E horizon. Lastly, Stratum IV consisted of the brownish yellow (10YR 6/8) compact silt loam B horizon extending to the base of excavation up to 44 cm (1.4 ft) bgs.

In total, 93 prehistoric artifacts were recovered from TU 2, all of which were identified within the Stratum III (E horizon; Table 3-3). These artifacts are described in greater detail in section 3.3 below. Additionally, one modern bullet casing was found within Stratum I (O horizon) and discarded in the field.

Table 3-3. TU 2 Artifact Summary

Group	Stratum III		Count
	Level 1	Level 2	
Core/Tested Material	4	1	**5**
Debitage	71	16	**87**
Unmodified Cultural	1		**1**
Total	**76**	**17**	**93**

3.2.3 TU 3

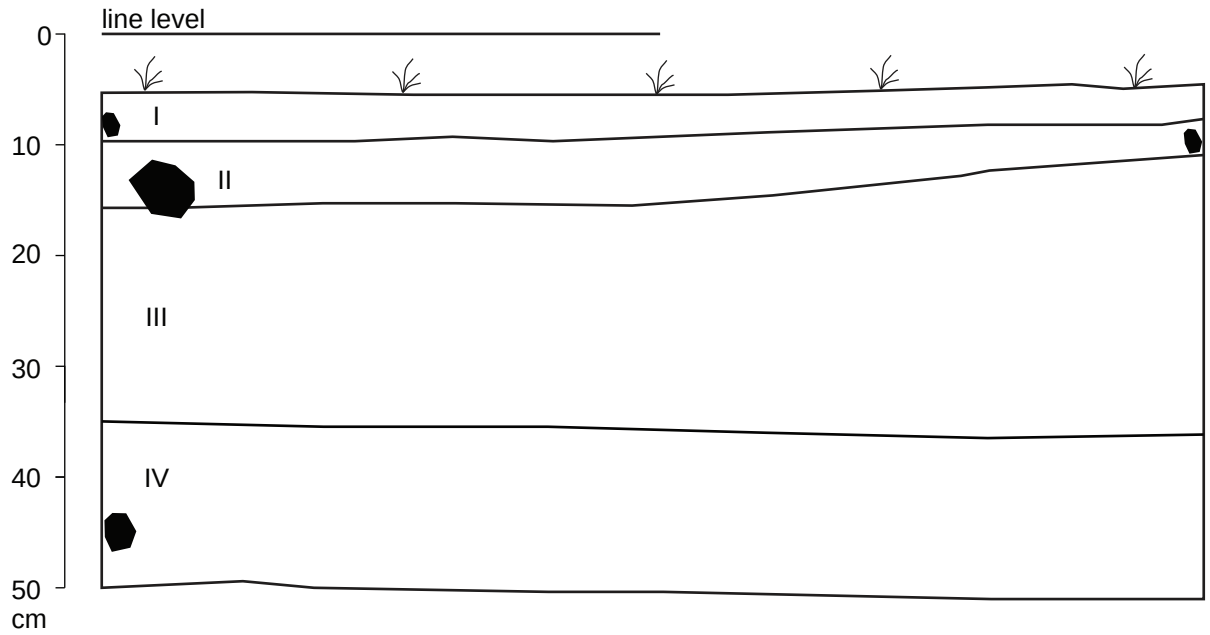
TU 3 was placed at N986 E991 to investigate artifact distributions immediately south of the disturbed area central to Artifact Cluster 4. The unit's specific location was based on four debitage recovered from radial STP N985 E992.5 and two debitage recovered from primary STP N985 E985. While these STPs did not yield high artifact counts, they represent the two positive STPs closest to the southern edge of the ground disturbance central to Artifact Cluster 4. Since TU 2 investigated the area around radial STP N977.5 E985, TU 3 was utilized to provide additional testing in the undisturbed portions of Artifact Cluster 4's southwestern half.

Excavation revealed four strata (Figure 3-12). Stratum I consisted of a 3-cm (0.1-ft) thick dark brown (10YR 3/3) silt loam O horizon. Stratum II consisted of a 5-cm (0.16-ft) thick gray (10YR 5/1) silt loam A horizon. Stratum III consisted of a 23-cm (0.75-ft) thick pale yellow (2.5Y 7/3) compact silt loam E horizon. Lastly, Stratum IV consisted of the brownish yellow (10YR 6/8) very compact silt loam B horizon extending to the base of excavation up to 45 cm (1.5 ft) bgs.

In total, 47 prehistoric artifacts were recovered from TU 3, all of which were identified within the Stratum III (E horizon; Table 3-4). These artifacts are described in greater detail in section 3.3 below.

Table 3-4. TU 3 Artifact Summary

Group	Stratum III		Count
	Level 1	Level 2	
Core/Tested Material	1		**1**
Debitage	28	15	**43**
FCR	1	1	**2**
Ground/Battered Stone		1	**1**
Total	**30**	**17**	**47**



I = Dark brown (10YR 3/3) silt loam O horizon
II = Gray (10YR 5/1) silt loam A horizon
III = Pale yellow (2.5Y 7/3) compact silt loam E horizon
IV = Brownish yellow (10YR 6/8) compact silt loam B horizon
● = Root

CLIENT	AFCEC/JBLE	TITLE	TU 3 East Profile
PROJ	44NN0024 Supplemental Phase II		
SCALE	As Shown		
SOURCE	N/A	AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
S:\900-GIS and Graphics\930 Graphics\931 Illustrator			FIGURE 3-12

3.2.4 TU 4

TU 4 was placed at N1015 E1005 to investigate artifact distributions immediately north of the disturbed area central to Artifact Cluster 4. Six positive STPs in this vicinity indicate that intact prehistoric deposits extend north of the disturbed area. Because artifact quantities in the north half of Artifact Cluster 4 generally increase toward the center, TU 4 was placed as close to the center as modern disturbances and tree growth would allow. Since the dense, subsurface construction gravel is generally present south of the N1015 transect, TU 4 could not be placed any farther south than this line.

Excavation revealed four strata (Figure 3-13). Stratum I consisted of a 3-cm (0.1-ft) thick brown (10YR 4/3) loam O horizon. Stratum II consisted of a 3-cm (0.1-ft) thick very dark grayish brown (10YR 3/2) silt loam A horizon. Stratum III consisted of a 23-cm (0.75-ft) thick very pale brown (10YR 7/3) compact silt loam E horizon. Lastly, Stratum IV consisted of the dark yellowish brown (10YR 4/4) very compact silty clay loam B horizon extending to the base of excavation up to 42 cm (1.4 ft) bgs.

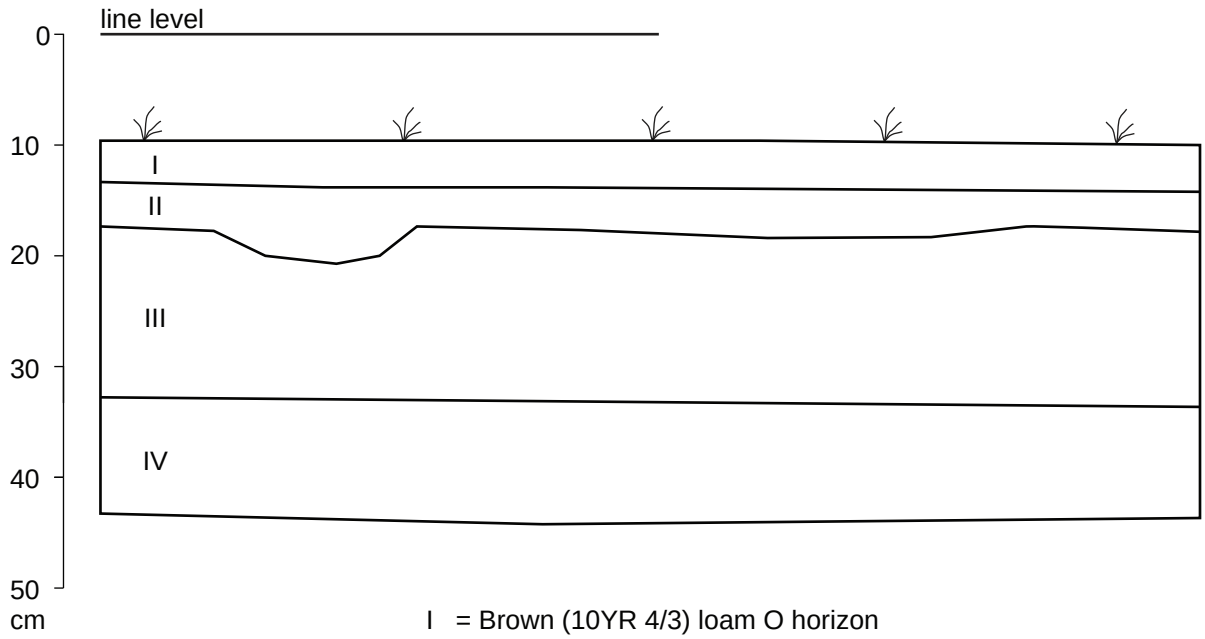
In total, seven prehistoric artifacts were recovered from TU 4, all of which were identified within the Stratum III (E horizon). These include six pieces of debitage and one ground/battered stone, which are described in greater detail in section 3.3 below. Additionally, 12 modern bullet casings, two plastic stakes, and three plastic tarp fragments were identified within Stratum I (O horizon) and discarded in the field, while two additional bullet casings were identified within Stratum II (A horizon) and discarded in the field.

3.3 ARTIFACTS

In total, 235 artifacts were recovered from 44NN0024, including 231 prehistoric artifacts and four faunal remains (Table 3-5). Seventeen modern bullet casings, eight pieces of plastic, one rope, and one AA battery were noted and discarded in the field. Additionally, approximately 1.4 (kg) (3 lbs) of shell were weighed and discarded in the field. Over 96 percent of the artifacts were recovered from the E horizon (n=226), with substantially smaller quantities recovered from the A (n=5) and B (n=1) horizons. Only three artifacts were recovered from a potentially disturbed surface layer in STP N1000 E1000.

Table 3-5. Artifact Summary

Group	Count	Percent
Core/Tested Material	8	3.40
Debitage	211	89.79
FCR	3	1.28
Flaked Stone Tool	5	2.13
Foodways	4	1.70
Ground/Battered Stone	3	1.28
Unmodified Cultural	1	0.43
Total	**235**	**100.00**



I = Brown (10YR 4/3) loam O horizon
II = Very dark grayish brown (10YR 3/2) silt loam A horizon
III = Very pale brown (10YR 7/3) compact silt loam E horizon
IV = Dark yellowish brown (10YR 4/4) compact silt loam B horizon

CLIENT	AFCEC/JBLE	TITLE	TU 4 North Profile
PROJ	44NN0024 Supplemental Phase II		
SCALE	As Shown		
SOURCE	N/A	AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
S:\900-GIS and Graphics\930 Graphics\931 Illustrator			FIGURE 3-13

3.3.1 Faunal Remains

Faunal remains account for less than 2 percent of the recovered artifacts (n=4) and are entirely represented by four oyster (*Crassostrea virginica*) shells assigned to the foodways group. Two of these were collected as samples from STP N895 E1105, while the other two represent the only faunal remains identified within their respective proveniences.

3.3.2 Prehistoric Artifacts

Prehistoric artifacts account for 98.3 percent (n=231) of the assemblage and include only lithic material (Table 3-6; Figure 3-14). Raw materials include quartzite, quartz, orthoquartzite, sandstone, and metarhyolite (Table 3-7). By weight, quartzite represents 56.25 percent (2,707.46 g [95.5 oz]) of the lithics, followed by sandstone at 24.33 percent (1,170.85 g [41.3 oz]), orthoquartzite at 16.28 percent (783.48 g [27.6 oz]), and smaller proportions of quartz and metarhyolite. By count, quartzite accounts for 82.25 percent (n=190) followed by quartz at 7.79 percent (n=18) and smaller quantities of orthoquartzite (n=10), sandstone (n=9), and metarhyolite (n=4). Each material type could have been sourced along the local shoreline, and the differing proportions of each material likely reflect selection preferences and resource availability.

Table 3-6. Prehistoric Artifact Summary

Group	Count	Percent
Core/Tested Material	8	3.46
Debitage	211	91.34
FCR	3	1.30
Flaked Stone Tool	5	2.16
Ground/Battered Stone	3	1.30
Unmodified Cultural	1	0.43
Total	**231**	**100.00**

Table 3-7. Summary of Lithic Groups by Material Type

Material		Group						Total	Percent
		CTM	DEB	FCR	FST	GBS	UC		
Metarhyolite	Count		3		1			**4**	**1.73**
	Wt (g)		*1.95*		*17.28*			***19.23***	***0.40***
Orthoquartzite	Count	1	8		1			**10**	**4.33**
	Wt (g)	*384.34*	*343.69*		*55.45*			***783.48***	***16.28***
Quartz	Count	1	16		1			**18**	**7.79**
	Wt (g)	*100.81*	*25.49*		*5.7*			***132***	***2.74***
Quartzite	Count	4	183		2	1		**190**	**82.25**
	Wt (g)	*1,866.18*	*715.63*		*24.65*	*101*		***2,707.46***	***56.25***
Sandstone	Count	2	1	3		2	1	**9**	**3.90**
	Wt (g)	*213.49*	*24.26*	*222.32*		*626.42*	*84.36*	***1,170.85***	***24.33***
Total Count		**8**	**211**	**3**	**5**	**3**	**1**	**231**	**100.00**
Total Weight (g)		***2,564.82***	***1,111.02***	***222.32***	***103.08***	***727.42***	***84.36***	***4,813.02***	***100.00***

CTM=Core/Tested Material; DEB=Debitage; FCR=Fire-Cracked Rock; FST=Flaked Stone Tool; GBS=Ground/Battered Stone; UC=Unmodified Cultural

Top Row: Metarhyolite Middle Phase Biface (9.01); Quartz Middle Phase Biface (18.01)
Middle Row: Quartzite Flakes (22.05)
Bottom Row: Quartzite Bipolar Flakes (28.02 and 12.01)

Sandstone Hammerstones (30.01 and 31.01)

CLIENT AFCEC/JBLE		TITLE Representative Prehistoric Artifacts
PROJ 44NN0024 Supplemental Phase II		
SCALE As Shown		
SOURCE N/A	AECOM 12420 Milestone Center Dr. Germantown, MD 20876	PROJ NO 60542271
S:\900-GIS and Graphics\930 Graphics\931 Illustrator		FIGURE 3-14

3.3.2.1 Core/Tested Material

Core/tested material artifacts account for 3.46 percent of the prehistoric artifact assemblage (n=8). The group includes two tested sandstone cobbles, two tested quartzite cobbles, one tested orthoquartzite cobble, one bipolar quartz core with multidirectional flaking, one bifacial quartzite core with multidirectional flaking, and one formalized quartzite core with unidirectional flaking. These artifacts represent various stages of core reduction and the initial phases of lithic tool manufacture.

3.3.2.2 Debitage

Debitage dominates the prehistoric artifact assemblage, accounting for 91.34 percent (n=211). Raw material types include quartzite (n=183), quartz (n=16), orthoquartzite (n=8), metarhyolite (n=3), and sandstone (n=1). The group includes complete/mostly complete flakes (n=110), flake fragments (n=85), bipolar flakes (n=12), and debris/shatter (n=4). Of these 75.83 percent (n=160) have no cortex, 15.17 percent (n=32) have less than 50 percent cortex, and the remaining 9 percent (n=19) have more than 50 percent cortex. The large percentage of non-cortex flakes is indicative of biface reduction, retouch, sharpening, and finishing activities. It is assumed that larger flakes, with more cortical surface represent initial stages of tool production, while smaller flakes, with less external cortex, represent the later stages of tool making and retouch.

A review of complete and mostly complete flake size grades supports this assertion, as non-cortex flakes cluster within the smallest size grades (Table 3-8). Over 90 percent of non-cortex flakes (n=75) fall within a size grade between 15.88 and 28.58 mm (0.625 and 1.125 in). Flakes with less than 50 percent cortex tend to be somewhat larger, with over 83 percent (n=15) between 28.58 and 47.63 mm (1.125 and 1.875 in). These flakes may be more indicative of bifacial reduction. Large flakes more typical of the primary reduction stage are the least common, with 75 percent (n=6) measuring greater than 41.28 mm (1.625 in). These distributions suggest that while initial reduction was occurring, the production activities were more commonly dedicated to bifacial reduction and tool finishing/maintenance.

Table 3-8. Complete/Mostly Complete Flake Size Grades

Cortex %	Size Grade (in/mm)						Total
	0.625	0.875	1.125	1.375	1.625	1.875	
	15.88	22.23	28.58	34.93	41.28	47.63	
0	35	30	10	6	2		**83**
< 50	1	2	7	2	1	5	**18**
≥ 50		1	1	1	4	2	**8**
Total	**36**	**33**	**18**	**9**	**7**	**7**	**110**

3.3.2.3 FCR

FCR accounts for 1.3 percent (n=3) of the prehistoric assemblage, all of which represent broken sandstone cobbles. Individual pieces ranged from as little as 16.54 g (0.58 oz) to as much as 128.66 g (4.54 oz).

3.3.2.4 Flaked Stone Tool

Flaked stone tools account for 2.16 percent of the prehistoric assemblage (n=5). Artifact classes include retouched/reutilized debitage (n=2), bifaces (n=2), and scrapers (n=1). The retouched/reutilized debitage includes one quartzite spokeshave and one orthoquartzite utilized flake. The bifaces include two in the middle stage of production, one made of quartz and the other metarhyolite. Lastly, the scraper is a quartzite thumbnail scraper.

3.3.2.5 Ground/Battered Stone

Ground/battered stone artifacts account for 1.3 percent of the prehistoric assemblage (n=3). These include one quartzite hammerstone with more than 50 percent cortex, one sandstone hammerstone with less than 50 percent cortex, and a second sandstone hammerstone with 90 percent cortex.

3.3.2.6 Unmodified Cultural

Unmodified cultural artifacts account for 0.43 percent of the prehistoric artifacts and include a single sandstone manuport. This artifact is believed to have been transported to its location of discovery, an interpretation based on the lack of similar, naturally occurring materials in related site contexts. This 84.36-g (3-oz) cobble was recovered from the E horizon in TU 2 (Stratum III, Level 1), which contained no other unmodified cobbles. Additionally, its occurrence within a provenience containing 75 other prehistoric artifacts associated with lithic reduction activities suggests it was intentionally deposited via human agency.

3.4 INTERPRETATIONS

Site 44NN0024 represents a long-term base camp repeatedly occupied during the Early through Late Woodland periods. Initially recorded in 1975 and surveyed a decade later, 44NN0024 was most recently investigated in 2014 during Berger's assessment of the site's NRHP eligibility (Wilkins et al. 2015). Systematic shovel testing and TU excavation resulted in the recovery of 2,423 artifacts and the identification of two shell midden features. Artifacts included faunal remains (n=2,331) as well as prehistoric (n=87) and historic (n=5) material identified within three Artifact Clusters as well as in isolated locations. Faunal remains entirely consisted of marine shell, dominated by oyster (n=2,327). Prehistoric artifacts included lithics (n=68) and ceramics (n=19). Prehistoric lithics included debitage (n=43), FCR (n=20), bifaces (n=3), a cracked rock, a core, and a piece of hematite. The lithic assemblage is indicative of early to late stage tool production and includes quartzite (n=33), quartz (n=31), chert (n=2), and single examples of hematite and granite. The ceramic assemblage, which included a variety of tempers and surface treatments, was defined by specimens too eroded to assign to a particular ware type. Lastly, the minor historic assemblage included bricks (n=4) and a cut nail. Site investigations prior to Berger's evaluation have also identified similarly small quantities of historic artifacts at 44NN0024, but no evidence for significant historic occupation has been revealed to date.

Two shell midden features were also recorded during Berger's assessment. Both middens largely consisted of oyster shell and relatively small prehistoric artifact quantities. Prehistoric ceramics were recovered from both features, however, indicating that they were created at some point during the Woodland period. These features, as well as the majority of the artifacts Berger recovered, are located southeast of the current APE. Within the current APE, Berger identified seven prehistoric artifacts from three STPs. Artifacts included one core from an isolated STP as well as four FCR, one biface reduction flake, and one piece of shatter from two adjacent STPs.

The current study included the excavation of 63 STPs and four TUs, resulting in the recovery of 231 prehistoric artifacts and four faunal remains. The prehistoric assemblage is dominated by debitage (n=212), followed by cores/tested material (n=8), flaked stone tools (n=5), FCR (n=3), ground/battered stone (n=3), and unmodified cultural material (n=1). These artifacts indicate that stone tool production was the primary prehistoric activity still archaeologically visible within the APE. Correlations between debitage size grade and cortex percentage indicate that while all stages of stone tool production are evident, most of the debitage was produced during late stage manufacturing/tool maintenance. Nevertheless, cores and tested material, along with some of the debitage, attest to the initial phase of lithic reduction. Only a few finished tools were identified, including a spokeshave, utilized flake, and a thumbnail scraper.

Raw lithic materials include quartzite (n=190), quartz (n=18), orthoquartzite (n=10), sandstone (n=9), and metarhyolite (n=4). These all likely originated as fluvial deposits sourced from the local shoreline. The trend in lithic materials selection is generally consistent with distributions reported by Wilkins et al. (2015), where quartzite is dominant, distantly followed by quartz and other less commonly utilized materials.

Artifacts were recovered from the A (n=8), E (n=226), and B (n=1) horizons. While the A horizon showed minor disturbances in some cases, most of the artifacts were recovered from intact natural soil strata. This is consistent with Berger's findings elsewhere onsite (Wilkins et al. 2015), indicating that despite several obvious modern ground disturbances, the site's archaeological integrity has not been severely compromised.

Most of the recovered artifacts (n=226) were identified within a distinct cluster located toward the center of the APE. This large swath of level terrain may have been selected as a lithic production area for a variety of reasons. Slopes along the peninsula margins immediately north and south of Artifact Cluster 4 are comparatively gentle and may have provided relatively easy access to raw cobbles. Furthermore, wave action and erosional forces appear to be strongest at the tip of the peninsula and in the vicinity of Artifact Cluster 4, meaning raw materials may have become available in higher quantities more frequently in this area than elsewhere.

In addition to the ease of raw materials sourcing, this area may have been selected for lithic production to provide spatial segregation between manufacturing activities and the more intensively occupied site core to the southeast. Since lithic production inherently results in a scatter of sharp stone debris, removing these activities from more heavily trafficked portions of the site would have reduced the potential for injury. The tip of the peninsula offers a more isolated location where foot traffic would have been naturally limited by land's end, as opposed to areas farther up the peninsula where through-traffic may have been more regular.

The lack of diagnostic artifacts precludes being able to definitively assign the activities evident within Artifact Cluster 4 to a particular cultural period. However, given the intensive Woodland occupations that Wilkins et al. (2015) reported within the site core southeast of the APE, it is likely that Artifact Cluster 4 represents a Woodland period production site. That it is spatially isolated from the food preparation/consumption activities that characterize the subsistence-focused site core suggests a level of intentionality conscious of the site's broader functional layout. While it is true that Wilkins et al. (2015) reported lithic manufacturing artifacts within and around the site core, indicating that these activities may not have always been isolated from other site uses, it is important to emphasize that lithic production is the only prehistoric activity archaeologically visible in Artifact Cluster 4; there is no conclusive evidence for dwellings, middens, storage pits,

cooking hearths, or any other indication that it was ever used for anything other than lithic production. This suggests that while other site areas may have experienced functional overlap, the center of the APE remained deliberately devoted to lithic production and, seemingly, to the exclusion of other activities. Thus, it is likely that those who selected the APE for lithic production did so, at least in part, to keep it separate from other coeval activity areas. For these reasons, and despite the lack of diagnostic artifacts, the prehistoric activities evident within the APE are attributed to the Woodland period.

As the foregoing discussion indicates, the APE retains archaeological integrity and includes a discrete lithic production area within a larger, repeatedly-occupied Woodland period base camp. The current study has provided additional information on raw materials sourcing, tool production, and the spatial arrangement of site activities. Additional investigation could reveal higher resolution spatial patterning and diagnostic material, furthering the understanding of how this site was utilized and providing a comparative case study to examine similarities and differences between 44NN0024 and comparable Woodland period sites throughout Tidewater Virginia and the broader Mid-Atlantic region.

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4.0 SUMMARY AND RECOMMENDATIONS

Under contract to AFCEC and in support of JBLE-Eustis, AECOM conducted archaeological investigations at 44NN0024 in support of an EA designed to assess the impacts of erosion mitigation proposed for the shoreline at the far northwestern end of the peninsula on which the site is located. The primary objectives of this assessment were to determine whether significant archaeological deposits are present within the APE and, based upon that determination, to determine whether the proposed mitigation options would constitute an adverse effect as defined under 36 CFR 800.5(a). Under this regulation, "an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register [of Historic Places]" (USDI 2004:n.p.).

DHR determined 44NN0024 eligible for listing in the NRHP following the recommendations of Wilkins et al. (2015). The site's eligibility, however, is largely based on archaeological features and artifact distributions within the site core, located southeast of the APE. In order to assess the significance of archaeological deposits within the APE, and thus the potential for an adverse effect, AECOM conducted additional STP and TU excavation in accordance with JBLE-Eustis guidance and DHR guidelines.

The current archaeological investigations included the excavation of 63 STPs and four TUs, resulting in the recovery of 231 prehistoric artifacts and four faunal remains. While some artifacts were identified in isolated locations near the periphery of the APE, most were recovered from Artifact Cluster 4, an oblong concentration of lithic tools and debris roughly bound by the N977.5, N1022.5, E985, and E1022.5 transects. Here, relatively large quantities of debitage were found alongside smaller quantities of cores/tested cobbles, flaked stone tools, and hammerstones. All stages of stone tool production are represented within Artifact Cluster 4, which constitutes a discrete activity area spatially segregated from food production/consumption activities centered on the site core.

Central to Artifact Cluster 4, however, is an area that contains densely compacted construction gravel immediately below the surface and which may have served as a prior parking/staging area. It is unclear to what extent this disturbance has impacted any preexisting archaeological deposits, as it was not possible to manually excavate through the gravel layer.

While ground disturbances are evident throughout the APE in the form of roads, ditches, push piles, and possible parking/staging areas, most of the artifacts recovered during the current investigation originated in undisturbed, natural strata. Over 96 percent (n=226) were recovered from the E horizon and just over 2.5 percent collectively were recovered from the A (n=5) and B (n=1) horizons. The three remaining artifacts were recovered from potentially disturbed surficial soils. This indicates that, in general, the APE retains good archaeological integrity, a finding consistent with previous investigators' observations (Wilkins et al. 2015).

Based on the results of this study, archaeologically visible prehistoric activities within the APE are largely limited to stone tool production. While no diagnostic artifacts were recovered, if the deposits in the APE are contemporaneous with Woodland period occupations evident elsewhere onsite, then the APE may represent a discrete activity area within the sphere of a larger habitation. As noted, the site core is located southeast of the APE and is defined by two shell middens and associated artifacts. With the core area predominantly utilized for subsistence activities, the APE may have been specifically selected as a less heavily trafficked area where the sharp debris from stone processing would be kept at a distance from more intensively occupied site loci. Placing this

processing area at the tip of the site peninsula may have been based on raw material access as well, as more intense wave action on this headland may have more frequently eroded quartz/quartzite cobbles from the banks.

Given that the archaeological deposits identified within Artifact Cluster 4 retain integrity, incorporate a variety of stone tools, and represent a discrete activity area devoted to stone tool production, it has the potential to contribute significant information to the understanding of 44NN0024. These intact deposits augment the current knowledge of how 44NN0024 was utilized, revealing spatial planning strategies and some of the potential landform and resource access considerations underlying the decisions that resulted in Artifact Cluster 4. Additional investigations of Artifact Cluster 4 could provide more detailed information on how and when this component of the site was used, which in turn can generate a more substantial case study for comparative analyses among similar regional site types. Given these considerations, AECOM recommends Artifact Cluster 4 to be a contributing site component as it has the demonstrated ability to yield important information that supports the site's preexisting NRHP eligibility under Criterion D.

Erosion mitigation Options A, B, and C each include varying levels of ground disturbance, but those activities most likely to impact upland portions of the APE where archaeological resources are located include bank grading and access road/staging area construction. While bank grading will require the loss of upland ground surfaces in select locations, these are restricted to isolated areas along the peninsula's perimeter. Potential access road/staging area construction may occur anywhere with4-2in the APE and, while not defined in Angler Environmental's schematics, reasonably can be expected to include, at a minimum, some amount of grading, tree removal, and heavy equipment traffic. It is likely that these activities will exceed the minimum depth to intact archaeological deposits within the APE (less than 10 cm [0.33 ft] in many places).

While potential ground disturbances arising from any of the three mitigation options may impact archaeological resources within the APE, the location of Artifact Cluster 4 and its discrete nature will allow for the avoidance of impacts to significant archaeological deposits at 44NN0024 from the proposed project. It is recommended that the significant deposits of Artifact Cluster 4 be incorporated into the project design as a design constraint and that the project Limits of Disturbance avoid these deposits. The boundaries of these deposits are depicted on Figure 4-1 and exclude areas of modern disturbance, such as an existing access road and the gravel disturbance central to Artifact Cluster 4. Protection of the significant deposits of Artifact Cluster 4 can be implemented during construction by the installation of protective fencing and notations on design plans. With implementation of design avoidance, impacts associated with the proposed shoreline improvement options will not constitute an adverse effect to 44NN0024 under 36 CFR 800.5(a) as they would not impact elements of the site that contribute to its NRHP eligibility. No additional work is recommended within the APE.

CLIENT	AFCEC/JBLE
PROJ	44NN0042 Supplemental Phase II
SCALE	1:1,482
SOURCE	ESRI 2019
	U:\Projects\VA\FortEustis\920 GIS\ArtifactCluster20190910.mxd

N

TITLE

Artifact Cluster 4 Significant Deposits

AECOM

12420 Milestone Center Dr.
Germantown, MD 20876

PROJ NO 60542271

FIGURE 4-1

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Appendix A:
Qualifications of the Investigators

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Scott Seibel, MSc, has over 21 years of professional experience in archeological excavations, research and compliance studies and exceeds the *Secretary of the Interior's Professional Qualification Standards* (36CFR Part 61) for archeology and history. A Registered Professional Archeologist, Mr. Seibel has extensive cultural resource management experience for a wide range of private and governmental clients, having served as Principal Investigator or Field Director for tens of thousands of acres of Phase I archeological survey, dozens of Phase II evaluations and a dozen Phase III data recovery excavations across the United States. He received his Bachelor's Degree in Archeological Studies at the University of Texas at Austin in 1996 and his Master's Degree in Archeomaterials at the University of Sheffield in England in 1997.

Peter Regan, MA, is a Registered Professional Archaeologist (RPA) with over 11 years of experience in cultural resources management and exceeds the Secretary of the Interior's professional qualifications for archaeology and history. He specializes in historic site analyses, biological archaeology, historic research, and developing public outreach platforms for archaeological sites and other places of cultural interest. Mr. Regan has worked throughout the United States for numerous federal, state, municipal, and private clients on a wide variety of sites under all phases of excavation. In addition to extensive compliance-driven experience, Mr. Regan has served as a research consultant for archaeology and cultural outreach projects and is Vice Chairman of Frederick, Maryland's Historic Preservation Commission. As a Senior Archaeologist and Senior Historian with AECOM, he directs field projects, generates high quality technical documents, and contributes to numerous aspects of project execution, data analysis, and interagency coordination.

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Appendix B:
Artifact Catalog

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44NN0024 Ph II Artifact Catalog

Site #: 44NN0024 **Northing: 1045** **Easting: 1075** **TU #:** **Stratum: I**

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
1.1	1	Flaked Stone Tool		Orthoquartzite	Retouched/Utilized Debitage Utilized Flake		
1.2	1	Debitage		Quartzite	Primary Cortex Debris/Shatter		

Site #: 44NN0024 **Northing: 895** **Easting: 1120** **TU #:** **Stratum: II**

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
2.1	1	Core/Tested Material		Quartzite	Mulltidirectional Bifacial		Possibly utilized as a scraper
2.2	1	Foodways	Remains	Shell	Crassostrea virginica Mollusk		

Site #: 44NN0024 **Northing: 910** **Easting: 1105** **TU #:** **Stratum: II** ***~3 Lbs of Discarded oyster shell***

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
3.1	2	Foodways	Remains	Shell	Crassostrea virginica Mollusk		
3.2							~1.5 kg discarded oyster shell

Note: Additional attribute data is recorded in the electronic database.

Site #: 44NN0024 Northing: 910 Easting: 1105 TU #: Stratum: I 20 Oyster Shell discarded

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
4.1	20						~20 oyster shell

Site #: 44NN0024 Northing: 970 Easting: 1075 TU #: Stratum: I 1 Discarded Blank Bullet casing

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
5.1	1						1 modern blank cartridge

Site #: 44NN0024 Northing: 1022.5 Easting: 1000 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
6.1	1	Core/Tested Material		Quartzite	Unidirectional Formalized		Material is of poor quality with many fracture planes not conducive to knapping

Site #: 44NN0024 Northing: 985 Easting: 985 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
7.1	1	Debitage		Quartzite	Non-Cortex Complete/Mostly Complete F		
7.2	1	Debitage		Quartzite	Non-Cortex Complete/Mostly Complete F		

Site #: 44NN0024 Northing: 1022.5 Easting: 1015 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
8.1	1	Flaked Stone Tool		Quartzite	Retouched/Utilized Debitage Spokeshave		Size Grade G-6
8.2	1	Debitage		Quartzite	Non-Cortex Complete/Mostly Complete F		
8.3	1	Debitage		Quartzite	Non-Cortex Flake Fragment		
8.4	2	Debitage		Quartzite	Non-Cortex Flake Fragment		
8.5	1	Debitage		Quartzite	Non-Cortex Complete/Mostly Complete F		

Site #: 44NN0024 Northing: 985 Easting: 955 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
9.1	1	Flaked Stone Tool		Metarhyolite	Biface Middle		Broke during thinning of biface.
9.2	1	Debitage		Quartz	Non-Cortex Complete/Mostly Complete F		
9.3	1	Debitage		Quartzite	Non-Cortex Flake Fragment		

Site #: 44NN0024 Northing: 1015 Easting: 1000 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
10.1	1	Debitage		Orthoquartzite	Secondary Cortex Complete/Mostly Complete F		

Site #: 44NN0024 Northing: 1015 Easting: 1015 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
11.1	1	Flaked Stone Tool		Quartzite	Scraper Thumbnail Scraper		Manufactured from a G-8 sized flake
11.2	1	Debitage		Orthoquartzite	Secondary Cortex Bipolar Flake		
11.3	1	Debitage		Quartzite	Secondary Cortex Complete/Mostly Complete F		Striking platform is cortical in its entirety
11.4	1	Debitage		Quartz	Non-Cortex Complete/Mostly Complete F		
11.5	1	Debitage		Quartz	Non-Cortex Complete/Mostly Complete F		
11.6	1	Debitage		Quartzite	Non-Cortex Flake Fragment		

Site #: 44NN0024 Northing: 1000 Easting: 1000 TU #: Stratum: I 1 Blank Bullet Casing discarded

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments

12.1	1	Debitage		Quartzite			
					Non-Cortex Bipolar Flake		
12.2	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
12.3	1	Debitage		Quartz			
					Non-Cortex Complete/Mostly Complete F		
12.4	1						1 modern blank cartridge

Site #: 44NN0024 Northing: 992.5 Easting: 1000 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
13.1	1	Debitage		Orthoquartzite			
					Primary Cortex Flake Fragment		
13.2	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
13.3	1	Debitage		Quartzite			
					Secondary Cortex Complete/Mostly Complete F		Entire striking platform is cortical

Site #: 44NN0024 Northing: 985 Easting: 992.5 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
14.1	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		

14.2	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
14.3	2	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		

Site #: 44NN0024 Northing: 977.5 Easting: 985 TU #: Stratum: II

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
15.1	1	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
15.2	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
15.3	1	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
15.4	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
15.5	4	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
15.6	2	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
15.7	2	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
15.8	2	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		

15.9	3	Debitage		Quartzite	Non-Cortex Complete/Mostly Complete F		

Site #: 44NN0024 Northing: 1015 Easting: 1022.5 TU #: Stratum: III

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
16.1	1	Debitage		Quartzite	Non-Cortex Flake Fragment		
16.2	1	Debitage		Metarhyolite	Non-Cortex Flake Fragment		

Site #: 44NN0024 Northing: 1015 Easting: 992.5 TU #: Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
17.1	1	Debitage		Quartzite	Secondary Cortex Bipolar Flake		
17.2	1	Debitage		Quartzite	Secondary Cortex Complete/Mostly Complete F		Cortex is present over entire striking platform
17.3	1	Fire-Cracked Rock		Sandstone	Fire-Cracked Rock		<50 Smooth Cortex

Site #: 44NN0024 Northing: Easting: TU #: 1 Stratum: II

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
18.1	1	Flaked Stone Tool		Quartz	Biface Middle		Base or Point fragment of an unfinished biface, likely broke while thinning

18.2	1	Debitage		Quartz			
					Non-Cortex Flake Fragment		
18.3	1	Foodways	Remains	Shell	Crassostrea virginica Mollusk		
18.4	1						1 modern blank cartridge

Site #: 44NN0024 Northing: Easting: TU #: 1 Stratum: IV

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
19.1	1	Debitage		Quartz			
					Primary Cortex Complete/Mostly Complete F		

Site #: 44NN0024 Northing: Easting: TU #: 1 Stratum: III

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
20.1	1	Debitage		Quartzite			
					Secondary Cortex Bipolar Flake		The Cortex is entirely present on the Striking platform
20.2	1	Debitage		Orthoquartzite			
					Primary Cortex Complete/Mostly Complete F		
20.3	1	Debitage		Quartzite			
					Secondary Cortex Complete/Mostly Complete F		
20.4	1	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		

20.5	1	Debitage		Orthoquartzite			
					Primary Cortex Complete/Mostly Complete F		
20.6	1	Debitage		Quartzite			
					Secondary Cortex Complete/Mostly Complete F		
20.7	2	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
20.8	1	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
20.9	1	Debitage		Quartzite			
					Secondary Cortex Flake Fragment		
20.10	1	Debitage		Metarhyolite			
					Non-Cortex Flake Fragment		
20.11	3	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
20.12	1	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		

Site #: 44NN0024 Northing: Easting: TU #: 1 Stratum: III Additional prehistoric artifact was point plotted within this provenience, see Bag 31

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
21.1	1	Debitage		Orthoquartzite			
					Primary Cortex Debris/Shatter		
21.2	1	Debitage		Quartzite			
					Secondary Cortex Bipolar Flake		

21.3	1	Debitage	Orthoquartzite	Secondary Cortex Flake Fragment		
21.4	1	Debitage	Quartzite	Secondary Cortex Bipolar Flake		All of cortex is present on the striking platform
21.5	1	Debitage	Quartzite	Secondary Cortex Bipolar Flake		
21.6	2	Debitage	Quartzite	Secondary Cortex Complete/Mostly Complete F		Cortex is present on striking platform
21.7	1	Debitage	Quartzite	Primary Cortex Complete/Mostly Complete F		
21.8	1	Debitage	Quartzite	Secondary Cortex Complete/Mostly Complete F		Cortex is present exclusively on Striking platform
21.9	1	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F		
21.10	1	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F		
21.11	2	Other	Sandstone			Non-Cultural

Site #: 44NN0024 Northing: Easting: TU #: 2 Stratum: III

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*

22.1	1	Core/Tested Material	Quartz	Mulltidirectional Bipolar
22.2	1	Core/Tested Material	Quartzite	Tested Material Rounded/Subrounded-Cobbl
22.3	1	Core/Tested Material	Quartzite	Tested Material Rounded/Subrounded-Cobbl
22.4	1	Core/Tested Material	Sandstone	Tested Material Rounded/Subrounded-Cobbl
22.5	2	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F
22.6	3	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F
22.7	9	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F
22.8	7	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F
22.9	1	Debitage	Quartzite	Non-Cortex Flake Fragment
22.10	3	Debitage	Quartzite	Non-Cortex Flake Fragment
22.11	7	Debitage	Quartzite	Non-Cortex Flake Fragment

22.12	13	Debitage	Quartzite	Non-Cortex Flake Fragment	
22.13	1	Debitage	Quartzite	Primary Cortex Complete/Mostly Complete F	
22.14	1	Debitage	Sandstone	Primary Cortex Complete/Mostly Complete F	
22.15	2	Debitage	Quartzite	Primary Cortex Flake Fragment	
22.16	1	Debitage	Quartzite	Secondary Cortex Bipolar Flake	
22.17	1	Debitage	Quartzite	Secondary Cortex Bipolar Flake	Cortex is present on striking platform
22.18	1	Debitage	Quartzite	Secondary Cortex Complete/Mostly Complete F	
22.19	1	Debitage	Quartzite	Non-Cortex Bipolar Flake	
22.20	1	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F	
22.21	2	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F	
22.22	5	Debitage	Quartzite	Non-Cortex Complete/Mostly Complete F	

22.23	3	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
22.24	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
22.25	1	Debitage		Quartz			
					Non-Cortex Complete/Mostly Complete F		
22.26	2	Debitage		Quartz			
					Non-Cortex Complete/Mostly Complete F		
22.27	1	Debitage		Quartz			
					Secondary Cortex Debris/Shatter		
22.28	1	Debitage		Quartz			
					Non-Cortex Flake Fragment		
22.29	1	Debitage		Quartz			
					Non-Cortex Debris/Shatter		
22.30	1	Unmodified Cultural		Sandstone			
					Manuport		

Site #: 44NN0024 Northing: Easting: TU #: 2 Stratum: III

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
23.1	1	Debitage		Quartzite			
					Secondary Cortex Complete/Mostly Complete F		
23.2	1	Debitage		Quartzite			
					Secondary Cortex Complete/Mostly Complete F		All of cortex is present on the striking platform

Note: Additional attribute data is recorded in the electronic database.

23.3	1	Debitage	Quartzite			
				Non-Cortex Complete/Mostly Complete F		
23.4	1	Debitage	Quartzite			
				Secondary Cortex Complete/Mostly Complete F		
23.5	1	Debitage	Quartzite			
				Primary Cortex Complete/Mostly Complete F		
23.6	2	Debitage	Quartzite			
				Non-Cortex Flake Fragment		
23.7	1	Debitage	Quartzite			
				Secondary Cortex Complete/Mostly Complete F		
23.8	3	Debitage	Quartzite			
				Non-Cortex Complete/Mostly Complete F		
23.9	1	Debitage	Quartzite			
				Non-Cortex Complete/Mostly Complete F		
23.10	2	Debitage	Quartzite			
				Non-Cortex Flake Fragment		
23.11	2	Debitage	Quartzite			
				Non-Cortex Flake Fragment		
23.12	1	Core/Tested Material	Sandstone			
				Tested Material Rounded/Subrounded-Cobbl		

Site #: ***44NN0024*** ***Northing:*** ***1045*** ***Easting:*** ***1082.5*** ***TU #:*** ***Stratum:*** ***I*** ***3 Plastic and 1 Bkank bullet casing discarded***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*

Note: Additional attribute data is recorded in the electronic database.

24.1	4						

3 plastic, 1 modern blank cartridge

Site #: 44NN0024 Northing: 1015 Easting: 1030 TU #: Stratum: II 1 Oyster shell fragment discarded

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
25.1	1						

oyster shell fragment

Site #: 44NN0024 Northing: 1015 Easting: 1015 TU #: Stratum: I 1 rope fragment discarded

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
26.1	1						

Length of modern rope

Site #: 44NN0024 Northing: Easting: TU #: 2 Stratum: I 1 Blank bullet casing discarded

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
27.1	1						

1 modern blank cartridge

Site #: 44NN0024 Northing: Easting: TU #: 4 Stratum: III

Catalog #	Count	Group	Subgroup	Material	Form	Color	Comments
28.1	1	Ground/Battered Stone		Quartzite	Hammerstone		
28.2	1	Debitage		Quartzite	Primary Cortex Bipolar Flake		

28.3	1	Debitage		Quartzite			
					Primary Cortex Complete/Mostly Complete F		
28.4	1	Debitage		Quartzite			
					Primary Cortex Flake Fragment		
28.5	1	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		
28.6	1	Debitage		Quartz			
					Non-Cortex Complete/Mostly Complete F		
28.7	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		

Site #: 44NN0024 Northing: Easting: TU #: 3 Stratum: III

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
29.1	1	Debitage		Quartzite			
					Secondary Cortex Bipolar Flake		
29.2	1	Debitage		Quartzite			
					Non-Cortex Flake Fragment		
29.3	1	Debitage		Quartzite			
					Secondary Cortex Complete/Mostly Complete F		
29.4	1	Debitage		Quartzite			
					Primary Cortex Complete/Mostly Complete F		
29.5	1	Debitage		Quartzite			
					Non-Cortex Complete/Mostly Complete F		

29.6	1	Debitage	Quartzite	
				Non-Cortex
				Complete/Mostly Complete F
29.7	1	Debitage	Quartzite	
				Primary Cortex
				Flake Fragment
29.8	1	Debitage	Quartzite	
				Non-Cortex
				Complete/Mostly Complete F
29.9	1	Debitage	Quartzite	
				Secondary Cortex
				Complete/Mostly Complete F
29.10	1	Debitage	Quartzite	
				Secondary Cortex
				Flake Fragment
29.11	1	Debitage	Quartzite	
				Non-Cortex
				Complete/Mostly Complete F
29.12	4	Debitage	Quartzite	
				Non-Cortex
				Flake Fragment
29.13	2	Debitage	Quartzite	
				Non-Cortex
				Complete/Mostly Complete F
29.14	2	Debitage	Quartzite	
				Non-Cortex
				Flake Fragment
29.15	1	Debitage	Quartzite	
				Secondary Cortex
				Complete/Mostly Complete F
29.16	1	Debitage	Quartz	
				Non-Cortex
				Flake Fragment

29.17	1	Debitage	Quartzite		Non-Cortex Complete/Mostly Complete F		
29.18	3	Debitage	Quartzite		Non-Cortex Flake Fragment		
29.19	2	Debitage	Quartzite		Non-Cortex Complete/Mostly Complete F		
29.20	1	Debitage	Quartzite		Non-Cortex Flake Fragment		
29.21	1	Core/Tested Material	Orthoquartzite		Tested Material Rounded/Subrounded-Cobbl		
29.22	1	Fire-Cracked Rock	Sandstone		Fire-Cracked Rock		
29.23	1	Other	Sandstone				Non-cultural

Site #: 44NN0024 ***Northing:*** ***Easting:*** ***TU #: 3*** ***Stratum: III***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
30.1	1	Ground/Battered Stone		Sandstone	Hammerstone		Worked flat cobble with facets on both ends and one margin. No evidence of use on cobble faces.
30.2	1	Debitage		Quartzite	Secondary Cortex Complete/Mostly Complete F		

30.3	1	Debitage	Quartzite		
				Non-Cortex	
				Flake Fragment	
30.4	1	Debitage	Quartzite		
				Non-Cortex	
				Complete/Mostly Complete F	
30.5	1	Debitage	Orthoquartzite		
				Primary Cortex	
				Flake Fragment	
30.6	1	Debitage	Quartzite		
				Secondary Cortex	
				Flake Fragment	
30.7	1	Debitage	Quartz		
				Primary Cortex	
				Flake Fragment	
30.8	2	Debitage	Quartzite		
				Non-Cortex	
				Complete/Mostly Complete F	
30.9	4	Debitage	Quartzite		
				Non-Cortex	
				Flake Fragment	
30.10	2	Debitage	Quartzite		
				Non-Cortex	
				Flake Fragment	
30.11	1	Debitage	Metarhyolite		
				Non-Cortex	
				Complete/Mostly Complete F	
30.12	1	Fire-Cracked Rock	Sandstone		
				Fire-Cracked Rock	
					Broke from single piece into six fragments

Site #: ***44NN0024*** ***Northing:*** ***Easting:*** ***TU #: 1*** ***Stratum: III*** ***Point Provenience of Artifact***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
31.1	1	Ground/Battered Stone		Sandstone	Hammerstone		Battering along two margins, with some pecking and grinding on the third margin.

Site #: ***44NN0024*** ***Northing:*** ***Easting:*** ***TU #: 1*** ***Stratum: I*** ***Discarded AA Battery and Bullet casing***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
32.1	2						1 AA Battery, 1 modern blank cartridge

Site #: ***44NN0024*** ***Northing:*** ***Easting:*** ***TU #: 4*** ***Stratum: I*** ***12 Bullet casings, 2 plastic stakes , and 3 Plastic tarp fragments discarded***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
33.1	17						12 modern blank cartridges, 2 plastic stakes, 3 plastic tarp fragments

Site #: ***44NN0024*** ***Northing:*** ***Easting:*** ***TU #: 4*** ***Stratum: II*** ***2 Bullet Casings discarded***

Catalog #	*Count*	*Group*	*Subgroup*	*Material*	*Form*	*Color*	*Comments*
34.1	2						2 modern blank cartridges

Grand Total 289

Appendix C:
Archaeological Site Form

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Snapshot

Date Generated: September 16, 2019

Site Name: No Data
Site Classification: Terrestrial, open air
Year(s): No Data
Site Type(s): Camp, base, Other, Shell midden
Other DHR ID: No Data
Temporary Designation: No Data

Site Evaluation Status

DHR Evaluation Committee:
Eligible

Locational Information

USGS Quad: YORKTOWN
County/Independent City: Newport News (Ind. City)
Physiographic Province: Coastal Plain
Elevation: 20
Aspect: Flat
Drainage: James
Slope: 0 - 2
Acreage: 18.980
Landform: Other, Terrace, Marine
Ownership Status: Federal Govt
Government Entity Name: U.S. Department of the Army

Site Components

Component 1

Category: Domestic
Site Type: Camp, base
Cultural Affiliation: Native American
DHR Time Period: Early Woodland, Late Woodland, Middle Woodland
Start Year: No Data
End Year: No Data
Comments: long-term occupation site

November 2014

July 2019 (AECOM): AECOM investigated the far western extent of 44NN0024 in advance of proposed shoreline mitigation alternatives. This site previously was recommended eligible for listing in the NRHP under criterion D. To summarize the work to date as well as the results of the current study, the following discussion is presented:

Site 44NN0024 represents a long-term base camp repeatedly occupied during the Early through Late Woodland periods. Initially recorded in 1975 and surveyed a decade later, 44NN0024 was most recently investigated in 2014 during Berger's assessment of the site's NRHP eligibility (Wilkins et al. 2015). Systematic shovel testing and TU excavation resulted in the recovery of 2,423 artifacts and the identification of two shell midden features. Artifacts included faunal remains (n=2,331) as well as prehistoric (n=87) and historic (n=5) material identified within three Artifact Clusters as well as in isolated locations. Faunal remains entirely consisted of marine shell, dominated by oyster (n=2,327). Prehistoric artifacts included lithics (n=68) and ceramics (n=19). Prehistoric lithics included debitage (n=43), FCR (n=20), bifaces (n=3), a cracked rock, a core, and a piece of hematite. The lithic assemblage is indicative of early to late stage tool production and includes quartzite (n=33), quartz (n=31), chert (n=2), and single examples of hematite and granite. The ceramic assemblage, which included a variety of tempers and surface treatments, was defined by specimens too eroded to assign to a particular ware type. Lastly, the minor historic assemblage included bricks (n=4) and a cut nail. Site investigations prior to Berger's evaluation have also identified similarly small quantities of historic artifacts at 44NN0024, but no evidence for significant historic occupation has been revealed to date.
Two shell midden features were also recorded during Berger's assessment. Both middens largely consisted of oyster shell and relatively small prehistoric artifact quantities. Prehistoric ceramics were recovered from both features, however, indicating that they were created at some point during the Woodland period. These features, as well as the majority of the artifacts Berger recovered, are located southeast of the current APE. Within the current APE, Berger identified seven prehistoric artifacts from three STPs. Artifacts included

one core from an isolated STP as well as four FCR, one biface reduction flake, and one piece of shatter from two adjacent STPs.

The current study included the excavation of 63 STPs and four TUs, resulting in the recovery of 231 prehistoric artifacts and four faunal remains. The prehistoric assemblage is dominated by debitage (n=212), followed by cores/tested material (n=8), flaked stone tools (n=5), FCR (n=3), ground/battered stone (n=3), and unmodified cultural material (n=1). These artifacts indicate that stone tool production was the primary prehistoric activity still archaeologically visible within the APE. Correlations between debitage size grade and cortex percentage indicate that while all stages of stone tool production are evident, most of the debitage was produced during late stage manufacturing/tool maintenance. Nevertheless, cores and tested material, along with some of the debitage, attest to the initial phase of lithic reduction. Only a few finished tools were identified, including a spokeshave, utilized flake, and a thumbnail scraper.

Raw lithic materials include quartzite (n=190), quartz (n=18), orthoquartzite (n=10), sandstone (n=9), and metarhyolite (n=4). These all likely originated as fluvial deposits sourced from the local shoreline. The trend in lithic materials selection is generally consistent with distributions reported by Wilkins et al. (2015), where quartzite is dominant, distantly followed by quartz and other less commonly utilized materials.

Artifacts were recovered from the A (n=8), E (n=226), and B (n=1) horizons. While the A horizon showed minor disturbances in some cases, most of the artifacts were recovered from intact natural soil strata. This is consistent with Berger's findings elsewhere onsite (Wilkins et al. 2015), indicating that despite several obvious modern ground disturbances, the site's archaeological integrity has not been severely compromised.

Most of the recovered artifacts (n=226) were identified within a distinct cluster located toward the center of the APE. This large swath of level terrain may have been selected as a lithic production area for a variety of reasons. Slopes along the peninsula margins immediately north and south of Artifact Cluster 4 are comparatively gentle and may have provided relatively easy access to raw cobbles. Furthermore, wave action and erosional forces appear to be strongest at the tip of the peninsula and in the vicinity of Artifact Cluster 4, meaning raw materials may have become available in higher quantities more frequently in this area than elsewhere.

In addition to the ease of raw materials sourcing, this area may have been selected for lithic production to provide spatial segregation between manufacturing activities and the more intensively occupied site core to the southeast. Since lithic production inherently results in a scatter of sharp stone debris, removing these activities from more heavily trafficked portions of the site would have reduced the potential for injury. The tip of the peninsula offers a more isolated location where foot traffic would have been naturally limited by land's end, as opposed to areas farther up the peninsula where through-traffic may have been more regular.

The lack of diagnostic artifacts precludes being able to definitively assign the activities evident within Artifact Cluster 4 to a particular cultural period. However, given the intensive Woodland occupations that Wilkins et al. (2015) reported within the site core southeast of the APE, it is likely that Artifact Cluster 4 represents a Woodland period production site. That it is spatially isolated from the food preparation/consumption activities that characterize the subsistence-focused site core suggests a level of intentionality conscious of the site's broader functional layout. While it is true that Wilkins et al. (2015) reported lithic manufacturing artifacts within and around the site core, indicating that these activities may not have always been isolated from other site uses, it is important to emphasize that lithic production is the only prehistoric activity archaeologically visible in Artifact Cluster 4; there is no conclusive evidence for dwellings, middens, storage pits, cooking hearths, or any other indication that it was ever used for anything other than lithic production. This suggests that while other site areas may have experienced functional overlap, the center of the APE remained deliberately devoted to lithic production and, seemingly, to the exclusion of other activities. Thus, it is likely that those who selected the APE for lithic production did so, at least in part, to keep it separate from other coeval activity areas. For these reasons, and despite the lack of diagnostic artifacts, the prehistoric activities evident within the APE are attributed to the Woodland period.

As the foregoing discussion indicates, the APE retains archaeological integrity and includes a discrete lithic production area within a larger, repeatedly-occupied Woodland period base camp. The current study has provided additional information on raw materials sourcing, tool production, and the spatial arrangement of site activities. Additional investigation could reveal higher resolution spatial patterning and diagnostic material, furthering the understanding of how this site was utilized and providing a comparative case study to examine similarities and differences between 44NN0024 and comparable Woodland period sites throughout Tidewater Virginia and the broader Mid-Atlantic region.

Component 2

Category: Indeterminate
Site Type: Other
Cultural Affiliation: Indeterminate
DHR Time Period: Antebellum Period, Civil War, Reconstruction and Growth
Start Year: No Data
End Year: No Data
Comments: minor historic component of indeterminate function dating to the nineteenth century
---
November 2014

Component 3

Category: Domestic

Site Type:	Shell midden
Cultural Affiliation:	Native American
DHR Time Period:	Middle Woodland
Start Year:	No Data
End Year:	No Data
Comments:	August 1986 --- November 2014

Bibliographic Information

Bibliography:

Talbott, A.R.
1957Camp Abraham Eustis, Virginia, Index to Property Maps. Original drawing in 1919 by J. B. Ferguson and Co. Reissued by Office of the Post Engineer, Fort Eustis, Virginia.

Informant Data:

No Data

CRM Events

Event Type: Survey:Phase II

Project Staff/Notes:

Principal Investigator: Scott Seibel
Field Director: Pete Regan
Field Techs: Benjamin Stewart and Alison Cramer
Lab Director: Kayla Marciniszyn

Project Review File Number: No Data
Sponsoring Organization: No Data
Organization/Company: AECOM Germantown
Investigator: Peter Regan
Survey Date: 7/15/2019

Survey Description:

This project represents a supplemental Phase II, the results of which serve as an addendum to National Register Evaluation of Archaeological Sites 44NN0024, 44NN0127, 44NN0213, and 44NN0214, Joint Base Langley-Eustis, City of Newport News, Virginia (Wilkins et al. 2015). The project was undertaken to assess a previously surveyed portion of 44NN0024 in advance of potential ground disturbances associated with proposed erosion mitigation options. Fieldwork consisted of the excavation of 63 STPs and four TUs, resulting in the recovery of 231 prehistoric artifacts and four faunal remains from largely intact soils. The prehistoric assemblage consists of nondiagnostic lithic artifacts representing early to late stage stone tool production, most of which were recovered from a discrete area near the center of the APE. This manufacturing area appears to have been intentionally isolated from the more intensively occupied site core that previous investigators identified southeast of the APE. Such patterns of site use are consistent with those visible on comparable Woodland sites elsewhere in the Mid-Atlantic coastal plain.

Current Land Use	Date of Use	Comments
Military base/facility	9/9/2019 12:00:00 AM	*No Data*

Threats to Resource: Erosion
Site Conditions: Subsurface Integrity
Survey Strategies: Subsurface Testing, Surface Testing
Specimens Collected: Yes
Specimens Observed, Not Collected: Yes

Artifacts Summary and Diagnostics:

AECOM (2019):

No diagnostics were recovered.

In total, 235 artifacts were recovered from 44NN0024, including 231 prehistoric artifacts and four faunal remains. Seventeen modern bullet casings, eight pieces of plastic, one rope, and one AA battery were noted and discarded in the field. Additionally, approximately 1.4 (kg) (3 lbs) of shell were weighed and discarded in the field. Over 96 percent of the artifacts were recovered from the E horizon (n=226), with substantially smaller quantities recovered from the A (n=5) and B (n=1) horizons. Only three artifacts were recovered from a potentially disturbed surface layer in STP N1000 E1000.

Faunal remains account for less than 2 percent of the recovered artifacts (n=4) and are entirely represented by four oyster (Crassostrea virginica) shells assigned to the foodways group. Two of these were collected as samples from STP N895 E1105, while the other two represent the only faunal remains identified within their respective proveniences.

Prehistoric artifacts account for 98.3 percent (n=231) of the assemblage and include only lithic material. Raw materials include quartzite, quartz, orthoquartzite, sandstone, and metarhyolite. By weight, quartzite represents 56.25 percent (2,707.46 g [95.5 oz]) of the lithics, followed by sandstone at 24.33 percent (1,170.85 g [41.3 oz]), orthoquartzite at 16.28 percent (783.48 g [27.6 oz]), and smaller proportions of quartz and metarhyolite. By count, quartzite accounts for 82.25 percent (n=190) followed by quartz at 7.79 percent (n=18) and smaller quantities of orthoquartzite (n=10), sandstone (n=9), and metarhyolite (n=4). Each material type could have been sourced along the local shoreline, and the differing proportions of each material likely reflect selection preferences and resource availability.

Core/tested material artifacts account for 3.46 percent of the prehistoric artifact assemblage (n=8). The group includes two tested sandstone cobbles, two tested quartzite cobbles, one tested orthoquartzite cobble, one bipolar quartz core with multidirectional flaking, one bifacial quartzite core with multidirectional flaking, and one formalized quartzite core with unidirectional flaking. These artifacts represent various stages of core reduction and the initial phases of lithic tool manufacture.

Debitage dominates the prehistoric artifact assemblage, accounting for 91.34 percent (n=211). Raw material types include quartzite (n=183), quartz (n=16), orthoquartzite (n=8), metarhyolite (n=3), and sandstone (n=1). The group includes complete/mostly complete flakes (n=110), flake fragments (n=85), bipolar flakes (n=12), and debris/shatter (n=4). Of these 75.83 percent (n=160) have no cortex, 15.17 percent (n=32) have less than 50 percent cortex, and the remaining 9 percent (n=19) have more than 50 percent cortex. The large percentage of non-cortex flakes is indicative of biface reduction, retouch, sharpening, and finishing activities. It is assumed that larger flakes, with more cortical surface represent initial stages of tool production, while smaller flakes, with less external cortex, represent the later stages of tool making and retouch.
A review of complete and mostly complete flake size grades supports this assertion, as non-cortex flakes cluster within the smallest size grades. Over 90 percent of non-cortex flakes (n=75) fall within a size grade between 15.88 and 28.58 mm (0.625 and 1.125 in). Flakes with less than 50 percent cortex tend to be somewhat larger, with over 83 percent (n=15) between 28.58 and 47.63 mm (1.125 and 1.875 in). These flakes may be more indicative of bifacial reduction. Large flakes more typical of the primary reduction stage are the least common, with 75 percent (n=6) measuring greater than 41.28 mm (1.625 in). These distributions suggest that while initial reduction was occurring, the production activities were more

commonly dedicated to bifacial reduction and tool finishing/maintenance.

FCR accounts for 1.3 percent (n=3) of the prehistoric assemblage, all of which represent broken sandstone cobbles. Individual pieces ranged from as little as 16.54 g (0.58 oz) to as much as 128.66 g (4.54 oz).

Flaked stone tools account for 2.16 percent of the prehistoric assemblage (n=5). Artifact classes include retouched/reutilized debitage (n=2), bifaces (n=2), and scrapers (n=1). The retouched/reutilized debitage includes one quartzite spokeshave and one orthoquartzite utilized flake. The bifaces include two in the middle stage of production, one made of quartz and the other metarhyolite. Lastly, the scraper is a quartzite thumbnail scraper.

Ground/battered stone artifacts account for 1.3 percent of the prehistoric assemblage (n=3). These include one quartzite hammerstone with more than 50 percent cortex, one sandstone hammerstone with less than 50 percent cortex, and a second sandstone hammerstone with 90 percent cortex.

Unmodified cultural artifacts account for 0.43 percent of the prehistoric artifacts and include a single sandstone manuport. This artifact is believed to have been transported to its location of discovery, an interpretation based on the lack of similar, naturally occurring materials in related site contexts. This 84.36-g (3-oz) cobble was recovered from the E horizon in TU 2 (Stratum III, Level 1), which contained no other unmodified cobbles. Additionally, its occurrence within a provenience containing 75 other prehistoric artifacts associated with lithic reduction activities suggests it was intentionally deposited via human agency.

Summary of Specimens Observed, Not Collected:

Seventeen modern bullet casings, eight pieces of plastic, one rope, and one AA battery were noted and discarded in the field.

Current Curation Repository: AECOM Laboratory, Gaithersburg, MD

Permanent Curation Repository: Fort Lee, Virginia

Field Notes: Yes

Field Notes Repository: Currently AECOM Laboratory, Gaithersburg, MD

Photographic Media: Digital

Survey Reports: Yes

Survey Report Information:

Regan, Pete.
2019
Supplemental Phase II Archaeological Evaluation of Site 44NN0024, Joint Base Langley-Eustis (Ft. Eustis), Newport News, Virginia. Prepared by AECOM for the United States Air Force Civil Engineer Center

Survey Report Repository: AECOM, will go to DHR

DHR Library Reference Number: No Data

Significance Statement: Though the archaeological assemblage is relatively small, the presence of intact subsurface cultural features and feature clusters associated with temporally diagnostic artifacts indicates that Site 44NN0024 has the potential to yield information that would further understanding of Woodland-period occupation sites in the coastal plain of Virginia. Though only shell middens were encountered during the archaeological evaluations, the intact nature of these deposits in relatively shallow stratigraphy suggests that other subsurface cultural features related to long-term occupation sites, such as postholes, pits, or hearths, may also be present. Research themes pertinent to sites with intact Woodland period components include the settlement patterns of indigenous groups prior to the contact period, subsistence practices, diet, and the spatial organization of Woodland occupation sites.

As Site 44NN0024 has the potential to yield information important to subsistence practices, settlement patterns, and domestic activities at Woodland-period long-term occupation sites, Louis Berger recommends the site as eligible for inclusion in the National Register under Criterion D. Louis Berger further concludes that the minor historic component present at the site does not contribute to the eligibility of the site. Louis Berger further recommends that the original site boundaries be revised to exclude locations devoid of cultural materials or features. Louis Berger does not recommend the site as eligible for the National Register under Criterion A or Criterion B, as the site is not associated with events important to the broad pattern of local, state, or national history, or with individuals of local, state, or national significance. Criterion C was applied and found to be not applicable to the site.

AECOM (2019): The far western portion of 44NN0024 that could be impacted by proposed erosion mitigation measures was evaluated to determine if it represents a contributing component of the site. Given that the archaeological deposits identified within Artifact Cluster 4 retain integrity, incorporate a variety of stone tools, and represent a discrete activity area devoted to stone tool production, it has the potential to contribute significant information to the understanding of 44NN0024. These intact deposits augment the current knowledge of how 44NN0024 was utilized, revealing spatial planning strategies and some of the potential landform and resource access considerations underlying the decisions that resulted in Artifact Cluster 4. Additional investigations of Artifact Cluster 4 could provide more detailed information on how and when this component of the site was used, which in turn can generate a more substantial case study for comparative analyses among similar regional site types. Given these considerations, AECOM recommends Artifact Cluster 4 to be a contributing site component as it has the demonstrated ability to yield important information that supports the site's preexisting NRHP eligibility under Criterion D.

Surveyor's Eligibility Recommendations: Recommended Eligible

Surveyor's NR Criteria Recommendations, : D

Surveyor's NR Criteria Considerations: No Data

Event Type: DHR Evaluation Committee: Eligible

DHR ID: 44NN0024
Staff Name: Archaeology E-Team
Event Date: 4/14/2016
Staff Comment 2016-0338. This multicomponent site, evaluated for significance under Criterion D, was found to be eligible for listing in the National Register with a total of 37 points for the prehistoric component. It was the committee's opinion that the minor 19th century historic component did not contribute to the site's eligibility. The committee concurred with the consultant's recommendation.

Event Type: Survey:Phase II

Project Staff/Notes:

Project Manager: Eric Voigt

Principal Investigator: Andrew Wilkins

Field Directors: Andrew Wilkins, Tracey Jones

Project Review File Number: 2016-0338
Sponsoring Organization: No Data
Organization/Company: The Louis Berger Group
Investigator: Tracey Jones
Survey Date: 11/4/2014
Survey Description:

Archaeological evaluation of four sites (44NN0024, 44NN0127, 44NN0213, and 44NN0214) located on the Fort Eustis military base.

Subsurface testing included shovel testing on grid alignments excavated at all sites, with 30-meter interval with 15-meter close interval tests at 44NN0024 and a 10-meter interval at Site 44NN0127, 44NN0213, and 44NN0214. 1x1-meter test units were hand-excavated at three of the four sites, but not at 44NN0214, as the close interval shovel testing indicated that that site had been destroyed. A total of 355 shovel tests, 20 1x1-meter test units, and two 50x50-centimeter test units were excavated at the site.

158 shovel tests and 12 test units were excavated at Site 44NN0024, with an additional 81 placements not excavated due to modern disturbance, slope, or water. Prehistoric and limited historic artifacts were recovered from 25 shovel tests and the test units, and two subsurface cultural features (prehistoric shell middens/pits) were identified, in addition to the presence of a surface scatter of shell within the core of the site.

54 shovel tests, four test units, and 2 50x50-centimeter test unit quads were excavated at Site 44NN0127. Two shovel test locations were not excavated due to a delineated wetland. Prehistoric and historic artifacts were recovered from six shovel tests, and all of the test units, and one subsurface feature (historic brick pier) was identified at the site, in addition to an associated adjacent surface brick rubble pile.

92 shovel tests and four test units were excavated in or adjacent to Site 44NN0213. One shovel test location was not excavated due to a modern pushpile disturbance. Prehistoric and historic artifacts were recovered from ten shovel tests and all four test units at the site, and two subsurface features (cultural shell middens/pits, cultural affiliation not determined) were identified. In addition, seven surface features (six prick piers and one brick rubble pile) were identified at the site. These surface features formed the outline for a historic rectangular foundation labeled as Structure 1.

51 shovel tests were excavated at Site 44NN0214. No artifacts were recovered from the shovel tests, nor were any surface artifacts encountered, and so no test units were excavated at this site. The site is believed to be destroyed.

Current Land Use	Date of Use	Comments
Forest	8/6/2015 12:00:00 AM	Training Area for US Army military exercises

Threats to Resource: None Known
Site Conditions: Subsurface Integrity
Survey Strategies: Subsurface Testing
Specimens Collected: Yes
Specimens Observed, Not Collected: Yes
Artifacts Summary and Diagnostics:

Total Artifacts= 2423- 87 Prehistoric, historic=5, faunal= 2331
Faunal Specimens: 2331
Freshwater Snail= 1
Oyster= 2327
Unidentified Gastropod= 2
Unidentified Shell= 1

Historic Artifacts:
Brick= 4
Machine Cut Nail=1

Lithics: (n=68), quartzite, quartz, minor amount of chert, milky quartz, granite
Biface, General= 1- not diagnostic
Biface Reduction Flake= 16
Core, General= 1
Cracked Rock= 1
Debitage, General= 7
Decortication Flake= 6
Early Reduction Flake= 2
Early Stage Biface= 1- not diagnostic
FCR= 20
Flake Fragment= 3
Groundstone Debitage= 1
Hematite= 1
Middle-stage Biface= 2
Shatter= 6

Prehistoric Ceramics (n=19) (Cordmarked= 7; Indeterminate=12) ;
Indeterminate Exterior Decoration=10
Interior: Plain/ Burnished=4, Plain/Smoothed= 5, or Indeterminate=10) Tempers: grit=5, shell=4, quartz=1, or multiple=4; indeterminate=5
Specific Ware Types could not be determined
Body Sherd= 16
Neck Sherd= 2
Rimsherd= 1

Stratum A: 41 artifacts (47 percent)
Stratum B: 31 artifacts (36 percent)
Feature Stratum A: 13 prehistoric artifacts (15 percent)
Feature Stratum B: 2 artifacts (2 percent)

Summary of Specimens Observed, Not Collected:

Oyster- sampled; remainder weighed and discarded in the field

Test Unit 4: 3.2 kilograms (7.1 pounds) discarded
Test Unit 10: 0.8 kilograms (1.8 pounds) discarded
Feature 1: 23.8 kilograms (52.5 pounds) discarded
Feature 2: 1.4 kilograms (3.1 pounds) discarded

Current Curation Repository: Louis Berger

Permanent Curation Repository: Fort Lee Curation Facility (Army)

Field Notes: Yes

Field Notes Repository: Fort Lee Curation Facitlity (Army)

Photographic Media: Digital

Survey Reports: Yes

Survey Report Information:

National Register Evaluation of Archaeological Sites 44NN0024, 44NN0127, 44NN0213, and 44NN0214, Joint Base Langley-Eustis, City of Newport News, Virginia. Andrew Wilkins, Tracey Jones< Eric Barr, Eric Voight. 2015

Survey Report Repository: VDHR

DHR Library Reference Number: NN-130

Significance Statement: Though the archaeological assemblage is relatively small, the presence of intact subsurface cultural features and feature clusters associated with temporally diagnostic artifacts indicates that Site 44NN0024 has the potential to yield information that would further understanding of Woodland-period occupation sites in the coastal plain of Virginia. Though only shell middens were encountered during the archaeological evaluations, the intact nature of these deposits in relatively shallow stratigraphy suggests that other subsurface cultural features related to long-term occupation sites, such as postholes, pits, or hearths, may also be present. Research themes pertinent to sites with intact Woodland period components include the settlement patterns of indigenous groups prior to the contact period, subsistence practices, diet, and the spatial organization of Woodland occupation sites.

As Site 44NN0024 has the potential to yield information important to subsistence practices, settlement patterns, and domestic activities at Woodland-period long-term occupation sites, Louis Berger recommends the site as eligible for inclusion in the National Register under Criterion D. Louis Berger further concludes that the minor historic component present at the site does not contribute to the eligibility of the site. Louis Berger further recommends that the original site boundaries be revised to exclude locations devoid of cultural materials or features. Louis Berger does not recommend the site as eligible for the National Register under Criterion A or Criterion B, as the site is not associated with events important to the broad pattern of local, state, or national history, or with individuals of local, state, or national significance. Criterion C was applied and found to be not applicable to the site.

Surveyor's Eligibility Recommendations: Recommended Eligible

Surveyor's NR Criteria Recommendations, : D

Surveyor's NR Criteria Considerations: No Data

Event Type: NRHP Nomination

DHR ID: 44NN0024
Staff Name: VDHR-James Christian Hill
Event Date: 7/27/1993
Staff Comment No Data

Event Type: Survey:Phase I/Reconnaissance

Project Staff/Notes:
No Data
Project Review File Number: No Data
Sponsoring Organization: No Data
Organization/Company: Unknown (DSS)
Investigator: MAI
Survey Date: 8/1/1986
Survey Description:

Site was initially identified through surface collection and shovel testing.
The presence of exposed and intact shell midden deposits suggest this site to be entirely undisturbed except for the recent road grading and troop training activities. Systematic shovel testing and test excavation revealed in situ subsurface features and additional subsurface shell deposits. Additional occupational loci of various temporal periods were identified. Site is presently unused, though increased levels of troop training activities are anticipated. Site is undisturbed and apparently never cutlivated.

Current Land Use	Date of Use	Comments
Other	*No Data*	military facility

Threats to Resource: No Data
Site Conditions: Site Condition Unknown
Survey Strategies: Subsurface Testing
Specimens Collected: Yes
Specimens Observed, Not Collected: Yes
Artifacts Summary and Diagnostics:

quartzite cobble, FCR, quartzite core, chipping debris (quartz, quartzite, rhyolite), decortication flakes (qquartz and quartzite), processual flakes (quartzite, quartz, chert, rhyolite), quartzite preform, quartzite bifacial blades, quartzite projectile point fragments, quartzite contracting stem projectile point fragment, quartzite triangular concave base projectile point, coarse sand tempered pottery (plain, net impressed), sand tempered pottery, shell tempered pottery (net impressed and cord marked), Townsend Ware, English kaolin pipestem (5/64"), 18th century window glass, phial glass

Summary of Specimens Observed, Not Collected:
No Data
Current Curation Repository: U.S. Army Transportation Museum, Va
Permanent Curation Repository: No Data
Field Notes: Yes
Field Notes Repository: MAI
Photographic Media: No Data
Survey Reports: No Data
Survey Report Information:

An Archaeological Overview and Management Plan of Fort Eustis and Fort Story, Cities of Newport News and Virginia Beach, Virginia by Antony F. Opperman on file at VDHL [VDHR] in Richmond; Special Military Map, Camp Abraham Eustis, Virginia, Corps of Engineers, U.S. Army, 1918; An Archaelolgical Survey of Mulberry Island by Mary C. Beaudry, 1975; Archaeological Evaluations of Significance, 44NN24, 44NN102, 44NN120, 44NN164, 44NN165, Fort Eustis, Virginia, by Harding Polk II, Antony F. Opperman, Stephen J. Hinks on file at VDHL [VDHR] in Richmond

Survey Report Repository: No Data
DHR Library Reference Number: No Data
Significance Statement: No Data
Surveyor's Eligibility Recommendations: No Data
Surveyor's NR Criteria Recommendations, : No Data
Surveyor's NR Criteria Considerations: No Data

From: Morrow, D Keith CIV USAF 733 MSG (USA) <david.k.morrow.civ@mail.mil>
Sent: Wednesday, August 19, 2020 8:31 AM
To: wfrankadams@verizon.net
Cc: Capellan, Miguel L CIV USAF 733 MSG (USA); Akpan, Laurence P CIV USAF 733 MSG (USA); Twigg, Virginia R CIV USAF (USA); McDaid, Christopher L CIV USAF 733 MSG (USA); Sugg, Tracey L CIV USAF (USA); Calder, Donald W Jr CIV USAF 733 MSG (USA); Bateman, Joanna G CIV USAF 733 MSG (USA)
Subject: Follow up to invitation to consult (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Dear Chief Adams,

In January, I wrote to you about our proposed project to stabilize the shoreline in Training Area 1 on Fort Eustis. We are currently finalizing our environmental assessment of the three options under consideration. I want to provide another opportunity to share any thoughts or concerns you may have about this proposed action. One area that the Air Force is particularly concerned about are Traditional Cultural Properties (TCPs). These are places associated with cultural practices or beliefs of a community that are rooted in the history of the community, and are important in maintaining the continuing cultural identity of the community.

Within the project area for the shoreline stabilization is Archaeological Site 44NN0024. That site has been determined eligible for the National Register of Historic places (NRHP). We believe that our proposed project will not adversely affect the archaeological information contained by the site. If anyone views a location within or adjacent to our project area as a TCP, we will work with them to ensure there is no adverse effect to the TCP. I understand you may have concerns about sharing traditional places, or practices in a manner that is part of the public record. The location of TCPs is considered sensitive information by the Air Force. Air Force policy and the National Historic Preservation Act allow us to withhold that information from the public.

I understand that you see an incredible amount of requests to consult on projects and need to prioritize which projects receive your attention. If you could let us know if you have concerns or not, I would appreciate it; please relay them directly to our Cultural Resources Manager, Dr. Chris McDaid, at christopher.l.mcdaid.civ@mail.mil.

Respectfully,

D. Keith Morrow
Deputy Commander
733d Mission Support Group
Fort Eustis, VA 23604
DSN: 826-2908
Comm: 757-878-2908
Cell: 757-272-5497
Fax: 757-878-5722
email: david.k.morrow.civ@mail.mil

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Deputy Commander
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Cell: 757-272-5497
Fax: 757-878-5722
email: david.k.morrow.civ@mail.mil

CLASSIFICATION: UNCLASSIFIED

From: Calder, Donald W Jr CIV USAF 733 MSG (USA) <donald.w.calder.civ@mail.mil>
Sent: Friday, August 14, 2020 3:21 PM
To: wayne.adkins@att.net
Cc: McDaid, Christopher L CIV USAF 733 MSG (USA); Sugg, Tracey L CIV USAF (USA); Bateman, Joanna G CIV USAF 733 MSG (USA)
Subject: Follow up on invitation to consult (Adkins)

Dear First Assistant Chief Adkins,

In January I wrote to you about our proposed project to stabilize the shoreline in Training Area 1 on Fort Eustis. We are currently finalizing our environmental assessment of the three options under consideration. I want to provide another opportunity to share any thoughts or concerns you may have about this proposed action. One area that the Air Force is particularly concerned about are Traditional Cultural Properties (TCPs). These are places associated with cultural practices or beliefs of a community that are rooted in the history of the community, and are important in maintaining the continuing cultural identity of the community.

Within the project area for the shoreline stabilization is Archaeological Site 44NN0024. That site has been determined eligible for the National Register of Historic places (NRHP). We believe that our proposed project will not adversely affect the archaeological information contained by the site. If anyone views a location within or adjacent to our project area as a TCP we will work with them to ensure there is no adverse effect to the TCP. I understand you may have concerns about sharing traditional places or practices in a manner that is part of the public record. The location of TCPs is considered sensitive information by the Air Force. Air Force policy and the National Historic Preservation Act allow us to withhold that information from the public.

I understand that you see an incredible amount of requests to consult on projects and need to prioritize which projects receive your attention. If you could let me know if you have concerns or not, I would appreciate it.

Respectfully,

Don C.
Donald W. Calder, Jr.
Chief, Environmental Element (CEIE)
Installation Management Flight
733d Civil Engineer Division
1407 Washington Boulevard
JBLE-Eustis, VA 23604
Donald.W.Calder.Civ@mail.mil

From: Morrow, D Keith CIV USAF 733 MSG (USA) <david.k.morrow.civ@mail.mil>
Sent: Wednesday, August 19, 2020 8:51 AM
To: samflyingeagle48@yahoo.com
Cc: Capellan, Miguel L CIV USAF 733 MSG (USA); Akpan, Laurence P CIV USAF 733 MSG (USA); Twigg, Virginia R CIV USAF (USA); McDaid, Christopher L CIV USAF 733 MSG (USA); Sugg, Tracey L CIV USAF (USA); Calder, Donald W Jr CIV USAF 733 MSG (USA); Bateman, Joanna G CIV USAF 733 MSG (USA)
Subject: Follow up on invitation to consult (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Dear Chief Bass,

In January, I wrote to you about our proposed project to stabilize the shoreline in Training Area 1 on Fort Eustis. We are currently finalizing our environmental assessment of the three options under consideration. I want to provide another opportunity to share any thoughts or concerns you may have about this proposed action. One area that the Air Force is particularly concerned about are Traditional Cultural Properties (TCPs). These are places associated with cultural practices or beliefs of a community that are rooted in the history of the community, and are important in maintaining the continuing cultural identity of the community.

Within the project area for the shoreline stabilization is Archaeological Site 44NN0024. That site has been determined eligible for the National Register of Historic places (NRHP). We believe that our proposed project will not adversely affect the archaeological information contained by the site. If anyone views a location within or adjacent to our project area as a TCP, we will work with them to ensure there is no adverse effect to the TCP. I understand you may have concerns about sharing traditional places or practices in a manner that is part of the public record. The location of TCPs is considered sensitive information by the Air Force. Air Force policy, and the National Historic Preservation Act allow us to withhold that information from the public.

I understand that you see an incredible amount of requests to consult on projects and need to prioritize which projects receive your attention. If you could let us know if you have concerns or not, I would appreciate it; please relay them directly to our Cultural Resources Manager, Dr. Chris McDaid, at christopher.l.mcdaid.civ@mail.mil.

Respectfully,

D. Keith Morrow
Deputy Commander
733d Mission Support Group
Fort Eustis, VA 23604
DSN: 826-2908
Comm: 757-878-2908
Cell: 757-272-5497
Fax: 757-878-5722
email: david.k.morrow.civ@mail.mil

CLASSIFICATION: UNCLASSIFIED

From: Calder, Donald W Jr CIV USAF 733 MSG (USA) <donald.w.calder.civ@mail.mil>
Sent: Friday, August 14, 2020 3:25 PM
To: info@rappahannocktribe.org
Cc: McDaid, Christopher L CIV USAF 733 MSG (USA); Sugg, Tracey L CIV USAF (USA); Bateman, Joanna G CIV USAF 733 MSG (USA)
Subject: Follow up on invitation to consultation (Fortune)

Dear Assistant Chief Fortune,

In January I wrote to you about our proposed project to stabilize the shoreline in Training Area 1 on Fort Eustis. We are currently finalizing our environmental assessment of the three options under consideration. I want to provide another opportunity to share any thoughts or concerns you may have about this proposed action. One area that the Air Force is particularly concerned about are Traditional Cultural Properties (TCPs). These are places associated with cultural practices or beliefs of a community that are rooted in the history of the community, and are important in maintaining the continuing cultural identity of the community.

Within the project area for the shoreline stabilization is Archaeological Site 44NN0024. That site has been determined eligible for the National Register of Historic places (NRHP). We believe that our proposed project will not adversely affect the archaeological information contained by the site. If anyone views a location within or adjacent to our project area as a TCP we will work with them to ensure there is no adverse effect to the TCP. I understand you may have concerns about sharing traditional places or practices in a manner that is part of the public record. The location of TCPs is considered sensitive information by the Air Force. Air Force policy and the National Historic Preservation Act allow us to withhold that information from the public.

I understand that you see an incredible amount of requests to consult on projects and need to prioritize which projects receive your attention. If you could let me know if you have concerns or not, I would appreciate it.

Respectfully,

Don C.
Donald W. Calder, Jr.
Chief, Environmental Element (CEIE)
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733d Civil Engineer Division
1407 Washington Boulevard
JBLE-Eustis, VA 23604
Donald.W.Calder.Civ@mail.mil

From: Calder, Donald W Jr CIV USAF 733 MSG (USA) <donald.w.calder.civ@mail.mil>
Sent: Friday, August 14, 2020 3:23 PM
To: Remedios.holmes@cied.org
Cc: McDaid, Christopher L CIV USAF 733 MSG (USA); Sugg, Tracey L CIV USAF (USA); Bateman, Joanna G CIV USAF 733 MSG (USA)
Subject: Follow up on invitation to consult (Holmes)

Dear Ms. Holmes,

In January I wrote to you about our proposed project to stabilize the shoreline in Training Area 1 on Fort Eustis. We are currently finalizing our environmental assessment of the three options under consideration. I want to provide another opportunity to share any thoughts or concerns you may have about this proposed action. One area that the Air Force is particularly concerned about are Traditional Cultural Properties (TCPs). These are places associated with cultural practices or beliefs of a community that are rooted in the history of the community, and are important in maintaining the continuing cultural identity of the community.

Within the project area for the shoreline stabilization is Archaeological Site 44NN0024. That site has been determined eligible for the National Register of Historic places (NRHP). We believe that our proposed project will not adversely affect the archaeological information contained by the site. If anyone views a location within or adjacent to our project area as a TCP we will work with them to ensure there is no adverse effect to the TCP. I understand you may have concerns about sharing traditional places or practices in a manner that is part of the public record. The location of TCPs is considered sensitive information by the Air Force. Air Force policy and the National Historic Preservation Act allow us to withhold that information from the public.

I understand that you see an incredible amount of requests to consult on projects and need to prioritize which projects receive your attention. If you could let me know if you have concerns or not, I would appreciate it.

Respectfully,

Don C.
Donald W. Calder, Jr.
Chief, Environmental Element (CEIE)
Installation Management Flight
733d Civil Engineer Division
1407 Washington Boulevard
JBLE-Eustis, VA 23604
Donald.W.Calder.Civ@mail.mil

From: McDaid, Christopher L CIV USAF 733 MSG (USA) <christopher.l.mcdaid.civ@mail.mil>
Sent: Friday, September 04, 2020 1:57 PM
To: chiefannerich@aol.com
Cc: Calder, Donald W Jr CIV USAF 733 MSG (USA); Bateman, Joanna G CIV USAF 733 MSG (USA)
Subject: National Environmental Policy Act (NEPA)/National Historic Preservation Act (NHPA) Native American consultation for shoreline stabilization project in Training Area 1 on Fort Eustis.
Attachments: Atch 1. Training Area 1 Shoreline Corrective Action Plan.pdf; Atch 2. Training Area 1 Shoreline Stabilization Corrective Action Plan maps.pdf; Atch 3. Technical Archaeological report.pdf

Dear Chief Richardson,
It was a pleasure to speak to you on the phone today. Here is the information about our proposed shoreline stabilization project. Attachments 1 and 2 describe the different alternatives we are considering and attachment 3 is the archaeological report that is the basis for our determination that none of the alternatives would be an adverse effect on the site.

The Air Force is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with shoreline stabilization and erosion protection at Joint Base Langley-Eustis - Eustis (JBLE-Eustis) Training Area 1 in Newport News, Virginia (Proposed Action) (attachment). The EA will be prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321, et seq.), the Council of Environmental Quality NEPA Implementing Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR 989).

The Air Force is considering four proposed alternatives, including the No Action Alternative, to the Proposed Action. Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. Alternative B would create a living shoreline by utilizing a sill (low profile stone structure) to support new planted marshes and constructing man-made oyster reefs to serve as a shoreline barrier. Alternative C would include the construction of precast concrete walls to stabilize sections of the eroded shoreline. The No Action Alternative, which reflects the status quo, will also be considered as a benchmark against which effects of the Proposed Action can be evaluated.

As part of the data gathering for this EA archaeological fieldwork was conducted on Archaeological Site 44NN0024 to determine if the proposed shoreline stabilization would have an adverse effect on the site (see attached report). Site 44NN0024 was occupied during the Woodland period 1200 B.C. to A.D. 1600 and was determined eligible for the National Register of Historic Places (NRHP) in 2016. The purpose of the limited fieldwork was to assess the potential for the site to be adversely affected by the proposed alternatives being considered to stabilize the shoreline in TA 1.

The recently concluded fieldwork on Site 44NN0024 has allowed the Air Force to determine the execution of any of the proposed alternatives will have no adverse effect on the qualities of Site 44NN0024 that make it eligible for the NRHP. The site was determined eligible for the NRHP due to its potential to provide information about the past. The proposed stabilization actions all are on the edge of the site and will not damage the portions of the site that make it eligible for the NRHP. The Air Force has determined that selecting and executing any of the three identified alternatives will result in no adverse effect to Site 44NN0024. However, if the additional environmental analysis undertaken during the development of the EA indicates that our determination was erroneous we will contact your office to continue consultation on the matter.

We invite you to join us as a consulting party as we conduct this EA in accordance with 36 CFR Part 800.2, Executive Order 13175, and Air Force Instruction 90-2002 - Interactions with Federally Recognized Tribes. With your advice and assistance, we hope to maintain an ongoing cooperative relationship between your Nation and the Air Force.

If you have any questions regarding this undertaking, please contact me at telephone phone at (757) 570-5939, or via email at christopher.l.mcdaid.civ@mail.mil.

Sincerely
Chris McDaid

Dr. Christopher L. McDaid
Archaeologist
Cultural Resources Manager
Environmental Element
Civil Engineer Division
733d Mission Support Group
Joint Base Langley-Eustis (Eustis)
EMAIL ADDRESS: christopher.l.mcdaid.civ@mail.mil

COMMONWEALTH of VIRGINIA

Department of Historic Resources

Matt Strickler
Secretary of Natural Resources

2801 Kensington Avenue, Richmond, Virginia 23221

Julie V. Langan
Director

Tel: (804) 367-2323
Fax: (804) 367-2391
www.dhr.virginia.gov

6 March 2020

Mr. Donald W. Calder, Jr.
Department of the Air Force
Headquarters, 733D Mission Support Group
Joint Base Langley-Eustis
Fort Eustis, Virginia 23604

RE: Stabilization shoreline of Training Area (TA) 1—Archaeological investigation of Site 44NN0024 at Joint Base Langley-Eustis, City of Newport News
DHR File No. 2016-1148

Dear Mr. Calder:

The Department of Historic Resources (DHR) has received for our review and comment the report "Archaeological Investigation of Site 44NN0024, Joint Base Langley-Eustis (JBLE-Eustis), Newport News, Virginia (October 2019) prepared by AECOM. We provide our comments as assistance to the Department of the Air Force (Air Force) in meeting its responsibilities under Section 106 of the National Historic Preservation Act.

In a letter dated 18 April 2016, DHR concurred with the recommendation that Site 44NN0024 is eligible for listing in the National Register of Historic Places (NRHP). On 21 September 2018, the Air Force informed DHR about its plan to conduct additional investigations at Site 44NN0024 in support of a proposed shoreline stabilization project. In a 3 October 2018 correspondence DHR stated archaeological investigations beyond what is required to determine NRHP eligibility are considered an adverse effect. However, DHR acknowledged that the consultant minimally tested the western-most portion of Site 44NN0024 during the Phase II evaluation and we agreed the proposed investigations would not adversely affect the historic property. The October 2019 report prepared by AECOM presents the results of supplemental investigations in the western-most portion of Site 44NN0024.

Administrative Services
10 Courthouse Ave.
Petersburg, VA 23803
Tel: (804) 862-6408
Fax: (804) 862-6196

Eastern Region Office
2801 Kensington Avenue
Richmond, VA 23221
Tel: (804) 367-2323
Fax: (804) 367-2391

Western Region Office
962 Kime Lane
Salem, VA 24153
Tel: (540) 387-5443
Fax: (540) 387-5446

Northern Region Office
5357 Main Street
PO Box 519
Stephens City, VA 22655
Tel: (540) 868-7029
Fax: (540) 868-7033

Based on the information provided, DHR agrees that the western portion of Site 44NN0024, identified by the consultant as Artifact Cluster 4, contributes to the NRHP eligibility of the resource. We further agree that the Air Force should avoid impacts to the site. However, we are unable to concur with the Air Force's finding of no adverse effect without additional information. While it appears the proposed bank grading associated with Options A, B, and C would not affect known archaeological deposits, the Air Force must also consider impacts due to construction access. According to the August 2015 document prepared by Angler Environmental, titled "Training Area 1 Shoreline Erosion Corrective Action Plan for the 733D Mission Support Group, Civil Engineering Division, Joint Base Langley Eustis, Fort Eustis, Virginia," stated, "Additional temporary access roads will need to be cleared to allow for equipment access to the areas of bank grading and shoreline." To complete our review, please provide answers to the following questions: Where and how will the Air Force construct the access roads? What protective measures will the Air force employ to ensure that the construction will not impact Site 44NN0024?

If you have any questions regarding our comments, please contact me at (804) 482-6090.

Sincerely,

Marc Holma, Architectural Historian
Division of Review and Compliance

The VDHR concurs with the Air Force's determination of no adverse effect to historic properties

Project FE2018.013 Supplemental Fieldwork TA 1

Signature/Date 22 OCT 202

2016-1148

The Delaware Nation
Historic Preservation Department
31064 State Highway 281
Anadarko, OK 73005
Phone (405)247-2448

February 25, 2020

To Whom It May Concern:

The Delaware Nation Historic Preservation Department received correspondence regarding the following referenced project(s).

Project(s): Shoreline Stabilization Project in Training Area 1 on Fort Eustis

Our office is committed to protecting tribal heritage, culture and religion with particular concern for archaeological sites potentially containing burials and associated funerary objects.

The Lenape people occupied the area indicated in your letter prior to European contact until their eventual removal to our present locations. According to our files, the location of the proposed project does not endanger cultural, or religious sites of interest to the Delaware Nation. **Please continue with the project as planned** keeping in mind during construction should an archaeological site or artifacts inadvertently be uncovered, all construction and ground disturbing activities should immediately be halted until the appropriate state agencies, as well as this office, are notified (within 24 hours), and a proper archaeological assessment can be made.

Please note the Delaware Nation, the Delaware Tribe of Indians, and the Stockbridge Munsee Band of Mohican Indians are the only Federally Recognized Delaware/Lenape entities in the United States and consultation must be made only with designated staff of these three tribes. We appreciate your cooperation in contacting the Delaware Nation Historic Preservation Office to conduct proper Section 106 consultation. Should you have any questions, feel free to contact our offices at 405-247-2448 ext. 1403.

Erin N. Paden

Erin Paden
Director of Historic Preservation
Delaware Nation
31064 State Highway 281
Anadarko, OK 73005
Ph. 405-247-2448 ext. 1403
epaden@delawarenation-nsn.gov

PAMUNKEY INDIAN TRIBE

Terry Clouthier
Cultural Resource Director

TRIBAL GOVERNMENT
Tribal Office

1054 Pocahontas Trail
King William, VA 23086

(804) 339-1629
FAX (866) 422-3387

THPO File Number: 2020-05

Date: 02/25/2020

Donald W. Calder, Jr.
Chief, Environmental Element (CEIE)
Installation Management Flight
733d Civil Engineer Division
1407 Washington Boulevard
JBLE-Eustis, VA 23604

RE: National Environmental Policy Act (NEPA)/National Historic Preservation Act (NHPA) Native American Consultation Request for Shoreline Stabilization Project in Training Area 1 on Fort Eustis, VA

Dear Mr. Calder,

Thank you for contacting the Pamunkey Indian Tribe regarding the proposed undertaking to evaluate the potential environmental impacts associated with the proposed undertaking of shoreline stabilization and erosion protection at Joint Base Langley-Eustis - Fort Eustis (JBLE-Eustis), Training Area 1, in Newport News, Virginia. My office offers the following comments regarding the undertaking.

We would like to be consultants for this proposed undertaking.

My office has concerns with Option C as revetments such as these include the potential for increased erosion occurring along the sides and behind the stone or concrete revetment. This is definitely a concern with regards to 44NN0024. I have witnessed this erosion along other river systems in the past when stone revetments have been placed to protect a portion of riverbank. Unfortunately, this erosion does not take long to develop. Our office prefers option A or B over C for this reason. If option C is chosen, our office recommends that periodic site visits are conducted to determine if erosion is in fact occurring as described and that we consult on mitigative measures if it does occur.

Based on the current information, my office concurs with the current No Adverse Effect determination and the proposed measures to avoid site 44NN0024 during construction of the shore stabilization.

Should any human remains or cultural properties be inadvertently discovered, please cease all operations and contact our office immediately to reinitiate consultation for this undertaking.

Thank you for considering our cultural heritage in your decision-making process.

If you have any questions feel free to email me at terry.clouthier@pamunkey.org.

Sincerely,

Terry Clouthier

Digitally signed by Terry Clouthier
Date: 2020.02.25 10:08:43 -05'00'

Catawba Indian Nation
Tribal Historic Preservation Office
1536 Tom Steven Road
Rock Hill, South Carolina 29730

Office 803-328-2427
Fax 803-328-5791

March 5, 2020

Attention: Christopher L. McDaid
Dept. of the Air Force
Joint Base Langley-Eustis
Fort Eustis, Virginia 23604

Re. THPO #	TCNS #	Project Description
2020-702-2		Proposed Action of shoreline stabilization & erosion protection at Joint Base Langley-Eustis

Dear Mr. McDaid,

The Catawba have no immediate concerns with regard to traditional cultural properties, sacred sites or Native American archaeological sites within the boundaries of the proposed project areas. **However, the Catawba are to be notified if Native American artifacts and / or human remains are located during the ground disturbance phase of this project.**

If you have questions please contact Caitlin Rogers at 803-328-2427 ext. 226, or e-mail caitlinh@ccppcrafts.com.

Sincerely,

Caitlin Rogers for

Wenonah G. Haire
Tribal Historic Preservation Officer

To: Sugg, Tracey L CIV USAF (USA)
Subject: RE: [Non-DoD Source] Re: Fort Eustis site visit call

-----Original Message-----
From: Ellen Chapman [mailto:ellen@culturalheritagepartners.com]
Sent: Saturday, September 12, 2020 12:42 PM
To: McDaid, Christopher L CIV USAF 733 MSG (USA) <christopher.l.mcdaid.civ@mail.mil>
Subject: [Non-DoD Source] Re: Fort Eustis site visit call

All active links contained in this email were disabled. Please verify the identity of the sender, and confirm the authenticity of all links contained within the message prior to copying and pasting the address to a Web browser.

PS - I clarified with Chief Anne and she'd like to visit but doesn't need to visit during COVID or before the EA is finalized. She would like to get access to any archaeological reports associated with the EA and I think is generally curious about what resources are at the base. Do you have any good survey reports or perhaps a summary of resources on the base that would be a good place to start?
Thanks!
Ellen

On Fri, Sep 11, 2020 at 1:22 PM Ellen Chapman <ellen@culturalheritagepartners.com < Caution-mailto:ellen@culturalheritagepartners.com > > wrote:

Dear Chris,

Nice to speak with you today! Attached is the current Rappahannock consultation policy. It definitely may be revised in subsequent updates but this is it currently.

Faye Fortune is the tribal secretary for the Rappahannock, her email is rappahannocktrib@aol.com < Caution-mailto:rappahannocktrib@aol.com > and it would be a good idea to CC her on messages to Chief Anne.

Please also CC me on emails related to cultural resources issues. And if there are high level or high importance communications, please also CC marion@culturalheritagepartners.com < Caution-mailto:marion@culturalheritagepartners.com > - she is the Rappahannock Tribe's attorney.

I appreciate you letting me know about the dynamics with getting a site visit - let me know what you find, and I will reach out to Chief Anne to see if she has a preferred timeline or any specific concerns.

Best,
Ellen

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Ellen Chapman, PhD
Cultural Resources Specialist
Cultural Heritage Partners, PLLC
1811 East Grace St, Suite A
Richmond, VA 23223
Direct/Text: 434-327-6663
Caution-https://urldefense.proofpoint.com/v2/url?u=http-3A__www.culturalheritagepartners.com&d=DwIGaQ&c=TQzoP61-bYDBLzNd0XmHrw&r=qxG5SlwFg2JYYEHIUeHshw9ZM5yxQkqTBWqqSVJ8OmM&m=B_yAizJbNIO0YPocvXj9C99byU0UI5oCB1tG4RE7nJg&s=SrqtT9s0klcrGE9UDwfeN-XfST_EH7weVCyGMzKFBUg&e= < Caution-https://urldefense.proofpoint.com/v2/url?u=http-3A__www.culturalheritagepartners.com&d=DwIGaQ&c=TQzoP61-bYDBLzNd0XmHrw&r=qxG5SlwFg2JYYEHIUeHshw9ZM5yxQkqTBWqqSVJ8OmM&m=B_yAizJbNIO0YPocvXj9C99byU0UI5oCB1tG4RE7nJg&s=SrqtT9s0klcrGE9UDwfeN-XfST_EH7weVCyGMzKFBUg&e= >

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Ellen Chapman, PhD
Cultural Resources Specialist
Cultural Heritage Partners, PLLC
1811 East Grace St, Suite A
Richmond, VA 23223
Direct/Text: 434-327-6663
Caution-https://urldefense.proofpoint.com/v2/url?u=http-3A__www.culturalheritagepartners.com&d=DwIGaQ&c=TQzoP61-bYDBLzNd0XmHrw&r=qxG5SlwFg2JYYEHIUeHshw9ZM5yxQkqTBWqqSVJ8OmM&m=B_yAizJbNIO0YPocvXj9C99byU0UI5oCB1tG4RE7nJg&s=SrqtT9s0klcrGE9UDwfeN-XfST_EH7weVCyGMzKFBUg&e= < Caution-https://urldefense.proofpoint.com/v2/url?u=http-3A__www.culturalheritagepartners.com&d=DwIGaQ&c=TQzoP61-bYDBLzNd0XmHrw&r=qxG5SlwFg2JYYEHIUeHshw9ZM5yxQkqTBWqqSVJ8OmM&m=B_yAizJbNIO0YPocvXj9C99byU0UI5oCB1tG4RE7nJg&s=SrqtT9s0klcrGE9UDwfeN-XfST_EH7weVCyGMzKFBUg&e= >

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sending an email to ellen@culturalheritagepartners.com < Caution-mailto:ellen@culturalheritagepartners.com > — and destroy all copies of this message and any attachments. Thank you.

APPENDIX B

EARLY NOTICE, NOTICE OF AVAILABILITY, AND PUBLIC COMMENTS

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DAILY PRESS MEDIA GROUP

EARLY NOTICE OF A PROPOSED ACTIVITY WITH THE POTENTIAL TO IMPACT WETLANDS AND FLOODPLAINS JOINT BASE LANGLEY-EUSTIS, FORT EUSTIS, VIRGINIA

The United States Air Force is preparing an Environmental Assessment (EA) to evaluate the potential environmental impacts associated with a shoreline stabilization and erosion protection project for the Joint Base Langley-Eustis - Eustis (JBLE-Eustis). The purpose of this proposed action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land (and associated resources) at JBLE-Eustis Training Area 1 (TA1). The need for the proposed action is to protect available training land in order to maintain the quality of the training necessary to meet JBLE-Eustis mission and national defense requirements. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis.

The shoreline restoration project is subject to requirements and objectives of Executive Orders (EOs) 11990, **Protection of Wetlands** and 11988, **Floodplain Management**, as it is located along a shoreline with identified wetlands and within a Special Flood Hazard Area. The area to be disturbed during construction and restoration activities would be less than 5 acres of wetlands and 8 acres of Federal Emergency Management Act 100-year floodplain. The proposed action would not contribute to any measureable loss with regard to flood control capacity.

This notice complies with Section 2(a)(4) of EO 11988 and Section 2(b) of EO 11990. The Air Force requests advance public comment to determine if there are any public concerns regarding the project's potential impacts on wetlands and floodplains. The Air Force would also like to solicit public input or comments on potential project alternatives. The proposed project will be analyzed in the forthcoming EA and the public will have the opportunity to comment on the draft EA when it is released.

The public comment period is 23 August to 22 September 2019. Please submit comments or requests for more information to Ms. Tracey Sugg by email at tracey.l.sugg.civ@mail.mil or by mail at 733 Civil Engineer Division, Environmental Element (CED/CEIE), 1407 Washington Blvd, Fort Eustis, VA 23604.

NOTICE OF AVAILABILITY
DRAFT ENVIRONMENTAL ASSESSMENT FOR TRAINING AREA 1 SHORELINE STABILIZATION AND EROSION PROTECTION JOINT BASE LANGLEY- EUSTIS NEWPORT NEWS, VIRGINIA

Description: Interested parties are hereby notified that a Draft Environmental Assessment (EA), Draft Finding of No Significant Impact (FONSI), and Draft Finding of No Practicable Alternative (FONPA) have been prepared for the Proposed Action described below.

Authority: This notice is being issued to all interested parties in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code 4321, et seq.), the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Air Force Environmental Impact Analysis Process (32 CFR Part 989).

Proposed Action: The Department of the Air Force (Air Force) proposes to stabilize and protect the existing erosion-affected shoreline of Training Area 1 at Joint Base Langley Eustis – Eustis in the City of Newport News, Virginia. Construction would be conducted over the course of approximately one year, beginning with site preparation, including vegetation clearing and grubbing. After implementation of appropriate stabilization techniques, revegetation would occur and the appropriate marsh, shrub zones, and/or bank areas would be planted. A long-term vegetation management program would be implemented to stabilize and protect newly-planted vegetation. The Air Force is considering three alternatives towards meeting the objectives and goals of the Proposed Action: 1) Alternative A, which would utilize a non-structural stabilization approach focused on enhancing, managing, and protecting existing marshes to maximize the natural protective features of the existing ecosystem; 2) Alternative B, which would employ a living shoreline design to create a structural solution that maintains the natural functionality and connectivity of the existing ecosystem; and 3) Alternative C, which would include the construction of precast concrete walls (bulkheads) to stabilize sections of eroded shoreline. In addition to these three action alternatives, the No Action Alternative is also being considered, which provides a comparative baseline as required under the CEQ regulations.

The Draft EA evaluates the potential direct, indirect, and cumulative impacts on the environment from implementing the Proposed Action. The evaluation concludes there would be no significant impact, either individually or cumulatively, as a result of implementing the Proposed Action, which includes routine best management practices and impact minimization measures.

Public Review: The Draft EA, Draft FONSI, and Draft FONPA will be available for a 30-day public comment period, from 3 April to 3 May 2020 on-line at: https://www.jble.af.mil/Units/Army/Eustis-Enviromental/.

Comments: The public may obtain information on the Draft EA and submit written comments during the review period, via US postal mail to 733d Mission Support Group, CED/CEIE, JLBE-Eustis, 1407 Washington Blvd, Fort Eustis, VA 2360; by email to USAF.jble.733-msg.list.ced-ee-p2-procurement@mail.mil; or by phone at (757) 878-7578.

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

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April 29, 2020

733 Mission Support Group
CED/CEIE JLBE-Eustis
1407 Washington Boulevard
Fort Eustis, Virginia 23604
Via email: usaf.jble.733-msg.list.ced-ee-p2-procurement@mail.mil

RE: Draft Environmental Assessment for the Training Area 1 Shoreline Stabilization and Erosion Protection Project, U.S. Air Force, Joint Base Langley Eustis-Eustis, City of Newport News, DEQ 20-045F.

Dear Sir or Madam:

The Commonwealth of Virginia has completed its review of the above-referenced project. The Department of Environmental Quality (DEQ) is responsible for coordinating Virginia's review of environmental documents submitted under the National Environmental Policy Act (NEPA) and responding to appropriate federal officials on behalf of the Commonwealth. DEQ is also responsible for coordinating Virginia's review of federal consistency documents submitted pursuant to the Coastal Zone Management Act (CZMA) and providing the state's response. DEQ responded to a Federal Consistency Determination (FCD) submitted by the U.S. Air Force for the proposal on March 20, 2020 (DEQ #20-018F). This letter is in response to the EA dated April 2020 (received April 6, 2020), submitted by the U.S. Air Force at Joint Base Langley Eustis-Eustis. The following agencies and planning district commission participated in this review:

Department of Environmental Quality
Department of Game and Inland Fisheries
Department of Conservation and Recreation
Marine Resources Commission
Department of Health
Hampton Roads Planning District Commission

In addition, the Department of Historic Resources, Virginia Institute of Marine Science, and the City of Newport News were invited to comment on the proposal.

PROJECT DESCRIPTION

The U.S. Air Force (Air Force) proposes to install shoreline stabilization and erosion protection measures at Joint Base Langley Eustis-Eustis (JBLE-Eustis) at Training Area 1 (TA1) in the City of Newport News. The Proposed Action would include the implementation of appropriate stabilization techniques to protect TA1's 1,800 linear feet (LF) of contiguous shoreline along Bailey Creek and Skiffes Creek. The Air Force is considering three proposed alternatives:

- Construction of Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. This alternative would be implemented in areas higher than the mean tide level where there is minimal wave action and boat wake. This alternative includes proposed adjacent bank grading, a fiber log, vegetation restoration, and long-term vegetation management.
- Alternative B would employ a living shoreline design to create a structural solution that maintains the natural functionality and connectivity of the existing ecosystem. This alternative includes proposed adjacent bank grading, a stone structure, an oyster reef, vegetation restoration, and long-term vegetation management.
- Alternative C would include the construction of 500 LF of precast concrete walls ("bulkheads") for the purposes of stabilizing sections of eroded shoreline, and focusing on bluff areas that have eroded into steep and unstable banks. Bulkheads would also be constructed in areas where there is frequent navigation as more environmentally preferred designs would preclude or impair navigation use.

Construction would be conducted over the course of approximately one year, beginning with site preparation, including vegetation clearing and grubbing. After implementation of appropriate stabilization techniques, revegetation would occur and the appropriate marsh, shrub zones, and/or bank areas would be planted. As part of the vegetation management program, additional stabilization erosion control matting would protect the graded areas from erosion and the newly-planted vegetation from waterfowl until the vegetation can become established.

CONCLUSION

Provided activities are performed in accordance with the recommendations which follow in the Environmental Impacts and Mitigation section of this report, the project is unlikely to have significant effects on ambient air quality, important farmland, forest resources, and wetlands. It is unlikely to adversely affect species of plants or insects listed by state agencies as rare, threatened, or endangered.

Of the agencies expressing a preference, the staff of the Virginia Marine Resources Commission supports the living shoreline option (Alternative B) as the preferred choice.

The Department of Game and Inland Fisheries prefers Alternative B followed by the non-structural stabilization approach (Alternative A). The construction of a concrete bulkhead (Alternative C) is not supported.

ENVIRONMENTAL IMPACTS AND MITIGATION

1. Water Quality and Wetlands. According to the EA (Section 4.5, pages 4-7 through 4-10), construction of Alternatives A, B, and C would result in increased turbidity and sedimentation from soil disturbance, degrading the water quality in Bailey Creek and Skiffes Creek. The implementation of erosion and sediment controls will limit the impacts of construction activities. In the long-term, implementation of any of the Alternatives would minimize erosion events along the TA1 shoreline, decreasing sedimentation and reducing turbidity; thus, resulting in an incremental improvement to water quality in Bailey Creek and Skiffes Creek.

1(a) Agency Jurisdiction. The State Water Control Board promulgates Virginia's water regulations covering a variety of permits to include the Virginia Pollutant Discharge Elimination System Permit regulating point source discharges to surface waters, Virginia Pollution Abatement Permit regulating sewage sludge, storage and land application of biosolids, industrial wastes (sludge and wastewater), municipal wastewater, and animal wastes, the Surface and Groundwater Withdrawal Permit, and the Virginia Water Protection (VWP) Permit regulating impacts to streams, wetlands, and other surface waters. The VWP permit is a state permit which governs wetlands, surface water, and surface water withdrawals and impoundments. It also serves as §401 certification of the federal Clean Water Act §404 permits for dredge and fill activities in waters of the U.S. The VWP Permit Program is under the Office of Wetlands and Stream Protection, within the DEQ Division of Water Permitting. In addition to central office staff that review and issue VWP permits for transportation and water withdrawal projects, the six DEQ regional offices perform permit application reviews and issue permits for the covered activities:

- Clean Water Act, §401;
- Section 404(b)(i) Guidelines Mitigation Memorandum of Agreement (2/90);
- State Water Control Law, Virginia Code section 62.1-44.15:20 *et seq*.; and
- State Water Control *Regulations*, 9 VAC 25-210-10.

In addition, the Virginia Marine Resources Commission (VMRC) regulates encroachments on tidal wetlands pursuant to Virginia Code §28.2-1200 through 1400.

1(b) Agency Findings.

(i) Department of Environmental Quality

The Virginia Water Protection (VWP) Permit program at the DEQ Tidewater Regional Office (TRO) finds that the Proposed Action is anticipated to qualify for U.S. Army Corps

of Engineers (Corps) Nationwide and/or Regional Permits, for which DEQ has provided Section 401 Water Quality Certification.

(ii) Virginia Marine Resources Commission

VMRC finds that a wetlands permit from the Newport News Wetlands Board will be required for any fill placed in tidal wetlands.

1(c) Recommendations. In general, DEQ recommends that stream and wetland impacts be avoided to the maximum extent practicable. To minimize unavoidable impacts to wetlands and waterways, DEQ recommends the following practices:

- Operate machinery and construction vehicles outside of stream-beds and wetlands; use synthetic mats when in-stream work is unavoidable.
- Preserve the top 12 inches of trench material removed from wetlands for use as wetland seed and root-stock in the excavated area.
- Erosion and sediment controls should be in place prior to clearing and grading, and maintained in good working order to minimize impacts to state waters. The controls should remain in place until the area is stabilized.
- Place heavy equipment, located in temporarily impacted wetland areas, on mats, geotextile fabric, or use other suitable measures to minimize soil disturbance, to the maximum extent practicable.
- Restore all temporarily disturbed wetland areas to pre-construction conditions and plant or seed with appropriate wetlands vegetation in accordance with the cover type (emergent, scrub-shrub, or forested). The applicant should take all appropriate measures to promote revegetation of these areas. Stabilization and restoration efforts should occur immediately after the temporary disturbance of each wetland area instead of waiting until the entire project has been completed.
- Place all materials which are temporarily stockpiled in wetlands, designated for use for the immediate stabilization of wetlands, on mats, geotextile fabric in order to prevent entry in state waters. These materials should be managed in a manner that prevents leachates from entering state waters and must be entirely removed within thirty days following completion of that construction activity. The disturbed areas should be returned to their original contours, stabilized within thirty days following removal of the stockpile, and restored to the original vegetated state.
- Flag or clearly mark all non-impacted surface waters within the project or right-of-way limits that are within 50 feet of any clearing, grading, or filling activities for the life of the construction activity within that area. The project proponent should notify all contractors that these marked areas are surface waters where no activities are to occur.
- Employ measures to prevent spills of fuels or lubricants into state waters.

For additional information, contact DEQ-TRO, Jeff Hannah at (757)518-2146 or jeff.hannah@deq.virginia.gov.

2. State Subaqueous Lands. The EA does not include an evaluation of potential project impacts to state subaqueous lands. However, the Federal Consistency Determination included in the EA (Appendix D, page 5) states that the construction and placement of in-water erosion protection measures, such as concrete bulkheads and sills under Alternatives B and C, would have the potential to disturb subaqueous bottomlands in Bailey Creek and Skiffes Creek, tributaries to the James River. While Alternative A would not require structural improvements, grading, earthwork, and marsh planting activities would increase turbidity and sedimentation, potentially affecting subaqueous bottomlands. The Air Force will consult with the Virginia Marine Resources Commission on the submission of a Joint Permit Application (JPA) for review and/or authorization for work in Bailey and Skiffes Creeks.

2(a) Agency Jurisdiction. The Virginia Marine Resources Commission (VMRC) regulates encroachments in, on or over state-owned subaqueous beds as well as tidal wetlands pursuant to Virginia Code §28.2-1200 through 1400. For nontidal waterways, VMRC states that it has been the policy of the Habitat Management Division to exert jurisdiction only over the beds of perennial streams where the upstream drainage area is 5 square miles or greater. The beds of such waterways are considered public below the ordinary high water line.

2(b) Agency Findings. VMRC finds that a submerged bottomland permit may be required if structures are placed channelward of mean low water.

2(c) Requirement. The Air Force must coordinate with VMRC to ensure project consistency with the subaqueous lands management enforceable policy. VMRC serves as the clearinghouse for agency review under the JPA process. The submission of a JPA to VMRC initiates reviews by VMRC, DEQ, local wetlands board, and U.S. Army Corps of Engineers.

2(d) Conclusion. In accordance with §104.1 of Title 28.2 of the Code of Virginia, living shorelines (Alternative B) are the preferred alternative for stabilizing shorelines in the Commonwealth.

3. Nonpoint Source Pollution Control. According to the EA (Section 4.3, pages 4-3 through 4-5), best management practices (BMPs) would be used to prevent and mitigate potential erosion and sedimentation during construction. All three Alternatives would disturb more than 2,500 square feet of land. Erosion and Sediment Control and Stormwater Management Plans would be required. Alternative A would disturb less than one acre of land, therefore a Stormwater Pollution Prevention Plan (SWPPP) would not be required. Alternatives B and C would disturb more than one acre of land, therefore a SWPP would be required. Construction crews would adhere to standard BMPs as well as BMPs outlined in the ESCP and SWM plan to reduce erosion and sedimentation.

3(a) Agency Jurisdiction. The DEQ Office of Stormwater Management (OSWM) administers the following laws and regulations governing construction activities:

- Virginia Erosion and Sediment Control Law (§ 62.1-44.15:51 *et seq*.) and *Regulations* (9 VAC 25-840) (VESCL&R);
- Virginia Stormwater Management Act (VSMA, § 62.1-44.15:24 *et seq*.);
- Virginia Stormwater Management Program (VSMP) Regulation (9 VAC 25-870); and
- 2014 General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Construction Activities (9 VAC 25-880).

In addition, DEQ is responsible for the VSMP General Permit for Stormwater Discharges from Construction Activities related to Municipal Separate Storm Sewer Systems (MS4s) and construction activities for the control of stormwater discharges from MS4s and land disturbing activities under the Virginia Stormwater Management Program (9 VAC 25-890-40).

3(b) Requirements.

(i) Erosion and Sediment Control and Stormwater Management Plans

The Air Force and its authorized agents conducting regulated land-disturbing activities on private and public lands in the state must comply with *VESCL&R* and *VSWML&R,* including coverage under the general permit for stormwater discharge from construction activities, and other applicable federal nonpoint source pollution mandates (e.g. Clean Water Act-Section 313, federal consistency under the Coastal Zone Management Act). Clearing and grading activities, installation of staging areas, parking lots, roads, buildings, utilities, borrow areas, soil stockpiles, and related land-disturbing activities that result in the total land disturbance of equal to or greater than 2,500 square feet in a Chesapeake Bay Preservation Area would be regulated by *VESCL&R.* Accordingly, DEQ-OSWM concurs that the Air Force must prepare and implement an erosion and sediment control (ESC) plan to ensure compliance with state law and regulations.

Land-disturbing activities that result in the total land disturbance of equal to or greater than 2,500 square feet in Chesapeake Bay Preservation Area would be regulated by *VSWML&R.* Accordingly, DEQ-OSWM concurs that the Air Force must prepare and implement a Stormwater Management (SWM) plan to ensure compliance with state law and regulations. The ESC/SWM plan is submitted to DEQ-TRO, which serves the area where the project is located, for review for compliance. The Air Force is ultimately responsible for achieving project compliance through oversight of on-site contractors, regular field inspection, prompt action against non-compliant sites, and other mechanisms consistent with agency policy. [Reference: VESCL 62.1-44.15 *et seq*.]

(ii) General Permit for Discharges of Stormwater from Construction Activities (VAR10)

The owner or operator of projects involving land-disturbing activities of equal to or greater than one acre is required to apply for registration coverage under the General Permit for Discharges of Stormwater from Construction Activities and develop a project-

specific stormwater pollution prevention plan (SWPPP). Construction activities requiring registration also include land disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan of development will collectively disturb equal to or greater than one acre

- The SWPPP must be prepared prior to submission of the registration statement for coverage under the General Permit.
- The SWPPP must address water quality and quantity in accordance with the VSMP Permit Regulations.

General information and registration forms for the general permit are available at http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPermits/ConstructionGeneralPermit.aspx. [Reference: Virginia Stormwater Management Act 62.1-44.15 *et seq*.; VSMP Permit Regulations 9 VAC 25-880 *et seq.*].

4. Chesapeake Bay Preservation Areas. According to the EA (Section 4.6, pages 4-14 through 4-18), the Alternatives would impact land analogous to Resource Protection Areas (RPAs). In the long-term, RPAs would benefit from the newly planted vegetation from Alternative A and B, as well as from increased stability of the shoreline. Alternative C would place permanent structures within the RPA, resulting in a small loss of RPA in the long term. However, shoreline protection measures would improve the overall quality and integrity of RPAs in the region of influence (ROI), and cleared areas would be replanted to the extent practical.

4(a) Agency Jurisdiction. The DEQ Office of Watersheds and Local Government Assistance Programs (OWLGAP) administers the Chesapeake Bay Preservation Act (Virginia Code §62.1-44.15:67 *et seq*.) and *Chesapeake Bay Preservation Area Designation and Management Regulations* (9 VAC 25-830-10 *et seq*.). Each Tidewater locality must adopt a program based on the Bay Act and *Regulations*. The Act and *Regulations* recognize local government responsibility for land use decisions and are designed to establish a framework for compliance without dictating precisely what local programs must look like. Local governments have flexibility to develop water quality preservation programs that reflect unique local characteristics and embody other community goals. Such flexibility also facilitates innovative and creative approaches in achieving program objectives. The regulations address nonpoint source pollution by identifying and protecting certain lands called Chesapeake Bay Preservation Areas. The regulations use a resource-based approach that recognizes differences between various land forms and treats them differently.

4(b) Chesapeake Bay Preservation Areas. In the City of Newport News, the areas protected by the Bay Act, as locally implemented, require conformance with performance criteria. These areas include RPAs and Resource Management Areas (RMAs). RPAs include:

- tidal wetlands,
- certain non-tidal wetlands,

- tidal shores, and
- a 100-foot vegetated buffer area located adjacent to and landward of these features and along both sides of any water body with perennial flow.

RMAs in Newport News include:

- floodplains,
- highly erodible soils, and
- all lands adjacent to and 100 feet landward of the RPA.

Newport News also designated Intensely Developed Areas (IDAs) as redevelopment areas of the city, which incorporates both the RPA and RMA.

4(c) Agency Findings. DEQ-OWLGAP finds that the Proposed Action would occur on land analogous to RPAs located along Skiffes Creek and/or the tidal and non-tidal wetlands connected and contiguous to Skiffes Creek. RPA disturbance would result from vegetation clearing, soil excavation, grading, filling, and compaction.

4(d) Requirements. Federal activities on installations located within Virginia's designated coastal zone must be consistent with the performance criteria of the *Regulations* on lands analogous to locally designated RPAs and RMAs, as provided in 9 VAC 25-830-130 and 140 of the *Regulations*, including the requirements to:

- conduct a water quality impact analysis (WQIA) for encroachment or impacts to the RPA,
- minimize land disturbance (including access and staging areas),
- retain existing vegetation,
- minimize impervious cover,
- comply with the requirements of the *Virginia Erosion and Sediment Control Handbook,* and
- satisfy stormwater management criteria consistent with water quality protection provisions of the *Virginia Stormwater Management Regulations.*

4(e) Conclusion. Provided adherence to the above requirements, particularly as it relates to the requirements to minimize land disturbance, retain existing vegetation and minimize impervious cover, the Proposed Action would be consistent with the Bay Act and *Regulations*.

5. Air Emissions. According to the EA (Section 4.8, pages 4-21 through 4-25), the majority of air emissions associated with the construction of the Alternatives would be temporary in nature (limited to the duration of and construction activities) and would be caused by fuel combustion in vehicles and construction equipment, and by dust generated from grubbing, clearing, grading, and vehicle travel over unpaved areas.

5(a) Agency Jurisdiction. The DEQ Air Division, on behalf of the State Air Pollution Control Board, is responsible for developing regulations that implement Virginia's Air

Pollution Control Law (Virginia Code §10.1-1300 *et seq.*). DEQ is charged with carrying out mandates of the state law and related regulations as well as Virginia's federal obligations under the Clean Air Act as amended in 1990. The objective is to protect and enhance public health and quality of life through control and mitigation of air pollution. The division ensures the safety and quality of air in Virginia by monitoring and analyzing air quality data, regulating sources of air pollution, and working with local, state and federal agencies to plan and implement strategies to protect Virginia's air quality. The appropriate DEQ regional office is directly responsible for the issuance of necessary permits to construct and operate all stationary sources in the region as well as monitoring emissions from these sources for compliance. As a part of this mandate, EIRs of projects to be undertaken in the state are also reviewed. In the case of certain projects, additional evaluation and demonstration must be made under the general conformity provisions of state and federal law.

5(b) Agency Findings. The DEQ Air Division finds that the project site is located in an ozone (O_3) attainment area and emission control area for volatile organic compounds (VOCs) and oxides of nitrogen (NO_x).

5(c) Recommendation. All precautions should be taken to restrict the emissions of VOCs and NO_x during construction principally by controlling or limiting the burning of fossil fuels.

5(d) Requirements.

(i) Fugitive Dust

During construction, fugitive dust must be kept to a minimum by using control methods outlined in 9 VAC 5-50-60 *et seq.* of the *Regulations for the Control and Abatement of Air Pollution*. These precautions include, but are not limited to, the following:

- Use, where possible, of water or chemicals for dust control;
- Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials;
- Covering of open equipment for conveying materials; and
- Prompt removal of spilled or tracked dirt or other materials from paved streets and removal of dried sediments resulting from soil erosion.

(ii) Open Burning

Should activities include the open-burning of vegetation waste or the use of special incineration devices, these activities must meet the requirements under 9 VAC 5-130 *et seq.* of the *Regulations* for open burning, and may require a permit. The *Regulations* provide for, but do not require, the local adoption of a model ordinance concerning open burning. The Air Force should contact local fire officials to determine what local requirements, if any, exist.

6. Solid and Hazardous Waste Management. According to the EA (Section 3.4, page 3.5), hazardous materials and waste are not evaluated in the EA as these items would be managed in accordance with applicable regulations and procedures; thus, impacts from hazardous materials and waste would not be expected.

6(a) Agency Jurisdiction. On behalf of the Virginia Waste Management Board, the DEQ Division of Land Protection and Revitalization (DLPR) is responsible for carrying out the mandates of the Virginia Waste Management Act (Virginia Code §10.1-1400 et seq.), as well as meeting Virginia's federal obligations under the Resource Conservation and Recovery Act and the Comprehensive Environmental Response Compensation Liability Act, commonly known as Superfund.

Virginia:

- Virginia Waste Management Act, Virginia Code § 10.1-1400 *et seq.*
- *Virginia Solid Waste Management Regulations*, 9 VAC 20-81
  - (9 VAC 20-81-620 applies to asbestos-containing materials)
- *Virginia Hazardous Waste Management Regulations*, 9 VAC 20-60
  - (9 VAC 20-60-261 applies to lead-based paints)
- *Virginia Regulations for the Transportation of Hazardous Materials*, 9 VAC 20-110.

Federal:

- Resource Conservation and Recovery Act (RCRA), 42 U.S. Code sections 6901 *et seq.*
- U.S. Department of Transportation *Rules for Transportation of Hazardous Materials*, 49 *Code of Federal Regulations*, Part 107
- Applicable rules contained in Title 40, *Code of Federal Regulations*.

DEQ-DLPR also administers laws and regulations on behalf of the State Water Control Board governing Petroleum Storage Tanks (Virginia Code § 62.1-44.34:8 *et seq*.), including Aboveground Storage Tanks (9 VAC 25-91 *et seq*.) and Underground Storage Tanks (9 VAC 25-580 *et seq*. and 9 VAC 25-580-370 *et seq*.), also known as 'Virginia Tank Regulations' and § 62.1-44.34:14 *et seq*. which covers oil spills.

6(b) Agency Findings. DEQ-DLPR staff conducted a search of solid and hazardous waste databases (including petroleum releases) to identify waste sites in close proximity (500-foot radius) to the project area. The search did not identify any waste sites within the project area which might impact the project.

6(c) Requirements.

(i) Waste Management

Any soil, sediment or groundwater that is suspected of contamination or wastes that are generated must be tested and disposed of in accordance with applicable federal, state, and local laws and regulations. All construction waste must be characterized in accordance with the *Virginia Hazardous Waste Management Regulations* prior to management at an appropriate facility.

(ii) Petroleum Contamination

If evidence of a petroleum release is discovered during construction, it must be reported to DEQ-TRO in accordance with Virginia Code § 62.1-44.34.8 through 9 and 9 VAC 25-580-10 *et seq*. The disposal of contaminated soils and groundwater must be done in accordance with DEQ regulatory guidelines.

(iii) Petroleum Storage Tanks

The use of above-ground storage tanks (ASTs) with a capacity of greater than 660 gallons for temporary fuel storage (>120 days) during construction must follow the requirements in 9 VAC 25-91-10 *et seq*.

6(d) Recommendation. DEQ encourages all construction projects and facilities to implement pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately.

For additional questions or further information regarding waste comments, contact DEQ-DLPR, Carlos Martinez at (804) 698-4575 or carlos.martinez@deq.virginia.gov.

7. Pesticides and Herbicides. DEQ recommends that the use of herbicides or pesticides for construction or landscape maintenance should be in accordance with the principles of integrated pest management. The least toxic pesticides that are effective in controlling the target species should be used to the extent feasible. Contact the Department of Agriculture and Consumer Services at (804) 786-3501 for more information.

8. Natural Heritage Resources. According to the EA (page 4-12), the Virginia Department of Conservation and Recreation stated in a February 27, 2020 letter that no natural heritage resources have been documented within TA1.

8(a) Agency Jurisdiction.

(i) The Virginia Department of Conservation and Recreation (DCR) Division of Natural Heritage (DNH)

DNH's mission is conserving Virginia's biodiversity through inventory, protection and stewardship. The Virginia Natural Area Preserves Act (Virginia Code §10.1-209 through 217), authorizes DCR to maintain a statewide database for conservation planning and project review, protect land for the conservation of biodiversity, and the protect and ecologically manage the natural heritage resources of Virginia (the habitats of rare, threatened and endangered species, significant natural communities, geologic sites, and other natural features).

(ii) Virginia Department of Agriculture and Consumer Services (VDACS)

The Endangered Plant and Insect Species Act of 1979 (Virginia Code Chapter 39 §3.1-1020 through 1030) authorizes VDACS to conserve, protect and manage endangered and threatened species of plants and insects. Under a Memorandum of Agreement established between VDACS and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species.

8(b) Agency Findings.

(i) Natural Heritage Resources

According to information currently in DCR's Biotics Data System (Biotics), natural heritage resources have not been documented within the project boundary including a 100 foot buffer. The absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources. In addition, the project boundary does not intersect any of the predictive models identifying potential habitat for natural heritage resources.

(ii) Ecological Cores

DCR-DNH finds that the proposed project may fragment an Ecological Core C4 as identified in the Virginia Natural Landscape Assessment, if tree clearing is proposed in the northeastern corner of the project site. The Virginia Natural Landscape Assessment (https://www.dcr.virginia.gov/natural-heritage/vaconvisvnla) is one of a suite of tools in Virginia ConservationVision that identify and prioritize lands for conservation and protection.

Fragmentation occurs when a large, contiguous block of natural cover is dissected by development, and other forms of permanent conversion, into one or more smaller patches. Habitat fragmentation results in biogeographic changes that disrupt species interactions and ecosystem processes, reducing biodiversity and habitat quality due to limited recolonization, increased predation and egg parasitism, and increased invasion by weedy species. Mapped cores in the project area can be viewed via the Virginia Natural Heritage Data Explorer at http://vanhde.org/content/map. See detailed DCR-DNH comments attached for additional information.

(iii) State-listed Plant and Insect Species

DCR-DNH finds that the activity will not affect any documented state-listed plants or insects at the site.

(iv) State Natural Area Preserves

DCR files do not indicate the presence of any State Natural Area Preserves under the agency's jurisdiction in the project vicinity.

8(c) Recommendations.

(i) Natural Heritage Resources

Contact DCR-DNH to secure updated information on natural heritage resources if the scope of the project changes or six months pass before the project is implemented, since new and updated information is continually added to the Biotics Data System.

(ii) Ecological Cores

Minimizing fragmentation is a key mitigation measure that will reduce deleterious effects and preserve the natural patterns and connectivity of habitats that are key components of biodiversity. DCR-DNH recommends the implementation of measures to minimize edge in remaining fragments, retain natural corridors that allow movement between fragments, and designing the intervening landscape to minimize its hostility to native wildlife (natural cover versus lawns). For additional information and coordination, contact the DCR Natural Heritage Information Manager, Joe Weber at joseph.weber@dcr.virginia.gov.

9. Wildlife Resources and Protected Species. According to the EA (Section 4.6, pages 4-11 through 4-17), construction of the Alternatives would result in minimal disruption to vegetation communities and the disturbance and displacement of terrestrial wildlife and habitats. Implementation may affect the federally-listed threatened Northern long-eared bat (*Myotis septentrionalis*) and the Indiana bat (*Myotis sodalis*). While bald eagles may be temporarily disturbed by construction activities, they would not experience permanent impacts and construction would remain localized; therefore, short-term, less-than-significant adverse impacts are anticipated.

9(a) Agency Jurisdiction. The Virginia Department of Game and Inland Fisheries (DGIF), as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over wildlife and freshwater fish, including state- or federally-listed endangered or threatened species, but excluding listed insects (Virginia Code, Title 29.1). DGIF is a consulting agency under the U.S. Fish and Wildlife Coordination Act (16 U.S. Code §661 *et seq*.) and provides environmental analysis of projects or permit applications coordinated through DEQ and

several other state and federal agencies. DGIF determines likely impacts upon fish and wildlife resources and habitat, and recommends appropriate measures to avoid, reduce or compensate for those impacts. For more information, see the DGIF website at *www.dgif.virginia.gov*.

9(b) Agency Findings.

(i) Atlantic Sturgeon

DGIF documents the federal-listed Endangered Atlantic sturgeon from the project area and the James River downstream of the project area has been designated a Threatened and Endangered Species Water due to the presence of this species. However, DGIF agrees with the conclusion in the EA that the project is not likely to result in significant adverse impacts upon Atlantic Sturgeon.

(ii) Anadromous Fish Use Area

DGIF notes that the James River has been designated a Confirmed Anadromous Fish Use Area due to the presence of other anadromous species in addition to Atlantic sturgeon, and Skiffes Creek and its tributaries at the project site have been designated as a Potential Anadromous Fish Use Area.

(iii) Bald Eagle

The project site is located within close proximity of historic and/or active Bald eagle nests and the James River Bald Eagle Concentration and Roost Area.

9(c) Recommendations.

(i) Protection of Anadromous Fish

The Air Force is encouraged to consider the following measures for the protection of anadromous fish in addition to the Atlantic sturgeon.

- Adhere to a time-of-year restriction from February 15 through June 30 of any year for instream work.
- Conduct instream activities during low- or no-flow conditions.
- Use non-erodible cofferdams or turbidity curtains to isolate the construction area.
- Block no more than 50% of the streamflow at any given time (minimal overlap of construction footprint notwithstanding).
- Stockpile excavated material in a manner that prevents reentry into the stream.
- Restore original streambed and streambank contours.
- Revegetate barren areas with native vegetation.
- Implement strict erosion and sediment control measures.
- Design and perform instream work in a manner that minimizes impacts upon natural streamflow and movement of resident aquatic species.

- Use matting made from natural/organic materials such as coir fiber, jute, and/or burlap to minimize potential wildlife entanglements resulting from use of synthetic/plastic erosion and sediment control matting.
- Install concrete (e.g. Tremie method, grout bags, and poured concrete) "in the dry" to allow the concrete to harden and cure prior to contact with open water to minimize harm to the aquatic environment.

(ii) General Protection of Wildlife Resources

DGIF recommends the following for the general protection of wildlife resources.

- Adhere to a time-of-year restriction (TOYR) protective of resident and migratory songbird nesting from March 15 through August 15 of any year for all tree removal and ground clearing.
- Adhere to erosion and sediment controls during ground disturbance.
- Use matting made from natural/organic materials such as coir fiber, jute, and/or burlap to minimize potential wildlife entanglements resulting from use of synthetic/plastic erosion and sediment control matting.

(iii) Atlantic Sturgeon

Coordinate with the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) regarding potential impacts upon Atlantic sturgeon.

(iv) Bald Eagle

To ensure protection of bald eagles in compliance with the Bald and Golden Eagle Act, DGIF recommends using the Center for Conservation Biology (CCB) Eagle Nest Locator to determine if any active eagle nests are known from the project area. If active bald eagle nests have been documented from the project area, the project should move forward in a manner consistent with state and federal guidelines for protection of bald eagles found in Management of Bald Eagle Nests, Concentration Areas, and Communal Roosts in Virginia: A Guide for Landowners (2012) and coordinate, as indicated, with the U.S. Fish and Wildlife Service regarding possible impacts upon bald eagles or the need for a federal bald eagle take permit.

9(d) Conclusion. DGIF prefers shoreline stabilization techniques that do not result in a hardened shoreline, but rather ones that continue to allow access to habitat by aquatic species and which provide shoreline stabilization through development of marsh and wetland habitats appropriately restored to attenuate wave and wake action. Accordingly, DGIF supports Alternatives A and B in the following order:

(1) Alternative B (living shoreline).
(2) Alternative A (marsh management).

DGIF does not support Alternative C (concrete bulkhead) and believes the No Action Alternative will leave the shoreline vulnerable to continued erosion.

10. Floodplain Management. The EA (Section 4.5, pages 4-7 through 4-10) states that, according to the Federal Emergency Management Agency's (FEMA) National Flood Hazard Layer Viewer, 7.37 acres of the Proposed Action area is within the 100-year floodplain. Alternative A would not introduce any new habitable structures or obstructions that would impede or divert overland floodwater flow or alter the existing hydrologic regime at JBLE-Eustis such that downstream flood hazards would be increased or newly created. Alternative B requires more clearing (1 acre compared to 0.2 acre under Alternative A), and would also introduce new structures (e.g., sills and oyster reefs) within the floodplain; these structures would not impede or divert overland floodwater flow or alter the existing hydrologic regime at JBLE-Eustis. Alternative C would require the placement of permanent concrete bulkheads within the floodplain. These structures would slightly alter the existing hydrologic regime at JBLE-Eustis; however, downstream flood hazards would not be increased or newly created. The Air Force would comply with all applicable federal, state, and local regulations with regard to development within a floodplain to ensure impacts are minimized to the extent practicable.

10(a) Agency Jurisdiction. The DCR Division of Dam Safety and Floodplain Management (DSFM) is the lead coordinating agency for the Commonwealth's floodplain management program and the National Flood Insurance Program (Executive Oder 45). The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA), and communities who elect to participate in this voluntary program manage and enforce the program on the local level through that community's local floodplain ordinance. Each local floodplain ordinance must comply with the minimum standards of the NFIP, outlined in 44 CFR 60.3; however, local communities may adopt more restrictive requirements in their local floodplain ordinance, such as regulating the 0.2% annual chance flood zone (shaded Zone X).

10(b) Requirements. All development within a Special Flood Hazard Area (SFHA) or floodplain, as shown on the locality's Flood Insurance Rate Map (FIRM), must be permitted and comply with the requirements of the local floodplain ordinance. Projects conducted by federal agencies within the SFHA must comply with federal Executive Order 11988: Floodplain Management.

DCR's Floodplain Management Program does not have regulatory authority for projects in the SFHA. The applicant/developer must contact the local floodplain administrator for an official floodplain determination and comply with the community's local floodplain ordinance, including receiving a local permit. Failure to comply with the local floodplain ordinance could result in enforcement action from the locality. The Air Force is encouraged reach out to the local floodplain administrator to ensure compliance with the local floodplain ordinance.

10(c) Recommendations. DCR recommends the Air Force access the Virginia Flood Risk Information System (VFRIS) at www.dcr.virginia.gov/vfris to find flood zone information. Local floodplain administrator contact information may be found on DCR's Local Floodplain Management Directory at www.dcr.virginia.gov/dam-safety-and-floodplains/floodplain-directory.

11. Public Water Supply. According to the EA (Section 4.5, pages 4-6 through 4-9), in the long-term, implementation of any of the Alternatives would minimize erosion events along the TA1 shoreline, decreasing sedimentation and reducing turbidity; thus, resulting in an incremental improvement to water quality in Bailey Creek and Skiffes Creek.

11(a) Agency Jurisdiction. Virginia Department of Health (VDH) Office of Drinking Water (ODW) reviews projects for the potential to impact public drinking water sources (groundwater wells, springs and surface water intakes). VDH administers both federal and state laws governing waterworks operation.

11(b) Agency Findings. VDH-ODW finds that the Newport News (PWS ID 3700500) public groundwater wells 1A and 1B are located is within a 1-mile radius of the project site, and its Lee Hall and Skiffes Creek surface water intakes are located within a 5-mile radius of the project site. The project site is not within the watershed of any public surface water intakes.

11(c) Requirements. Potential impacts to public water distribution systems must be verified by the local utility.

11(d) Recommendations. VDH-ODW recommends the following measures for the protection of water supply sources:

- Best Management Practices should be employed on the project site, including erosion and sediment control and Spill Prevention Controls and Countermeasures.
- Materials should be managed while on-site and during transport to prevent impacts to nearby surface water.

For additional information, contact VDH-ODW, Arlene Fields Warren at (804) 864-7781 or arlene.warren@vdh.virginia.gov.

12. Regional Review.

12(a) Agency Jurisdiction. In accordance with the Virginia Code, §15.2-4207, planning district commissions encourage and facilitate local government cooperation and state-local cooperation in addressing, on a regional basis, problems of greater than local significance. The cooperation resulting from this is intended to facilitate the recognition and analysis of regional opportunities and take account of regional influences in planning and implementing public policies and services. Planning district

commissions promote the orderly and efficient development of the physical, social and economic elements of the districts by planning, and encouraging and assisting localities to plan for the future.

12(b) Agency Findings. The Hampton Roads Planning District Commission (HRPDC) staff reviewed the EA and coordinated with staff from the City of Newport News. HRPDC has no comments on the EA.

For additional information, contact HRPDC, Ben McFarlane at (757) 420-8300 or bmcfarlane@hrpdcva.gov.

13. Pollution Prevention. DEQ advocates that principles of pollution prevention and sustainability be used in all construction projects as well as in facility operations. Effective siting, planning, and on-site BMPs will help to ensure that environmental impacts are minimized. However, pollution prevention and sustainability techniques also include decisions related to construction materials, design, and operational procedures that will facilitate the reduction of wastes at the source.

13(a) Recommendations. We have several pollution prevention recommendations that may be helpful in construction projects and operational activities at Fort Eustis:

- Consider development of an effective Environmental Management System (EMS). An effective EMS will ensure that the proposed facility is committed to minimizing its environmental impacts, setting environmental goals, and achieving improvements in its environmental performance. DEQ offers EMS development assistance and it recognizes facilities with effective Environmental Management Systems through its Virginia Environmental Excellence Program (VEEP). VEEP provides recognition, annual permit fee discounts, and the possibility for alternative compliance methods.
- Consider environmental attributes when purchasing materials. For example, the extent of recycled material content, toxicity level, and amount of packaging should be considered and can be specified in purchasing contracts.
- Consider contractors' commitment to the environment (such as an EMS) when choosing contractors. Specifications regarding raw materials and construction practices can be included in contract documents and requests for proposals.
- Choose sustainable materials and practices for construction and design. These could include asphalt and concrete containing recycled materials, and integrated pest management in landscaping, among other things.
- Integrate pollution prevention techniques into the project's maintenance and operation. Maintenance facilities should be designed with sufficient and suitable space to allow for effective inventory control and preventative maintenance.

DEQ's Office of Pollution Prevention provides information and technical assistance relating to pollution prevention techniques and EMS. For more information, contact DEQ's Office of Pollution Prevention, Meghann Quinn at (804) 698-4021 or meghann.quinn@deq.virginia.gov.

REGULATORY AND COORDINATION NEEDS

1. Surface Waters and Wetlands. Review by the Newport News Wetlands Board may be required for fill placed in tidal wetlands. The submission of a JPA to VMRC initiates the review process. For additional information and coordination, contact the Newport News Wetlands Board at the Office of City Clerk, Sharon Neal at (757) 933-2352 or sneal@nnva.gov or DEQ-TRO, Jeff Hannah at (757)518-2146 or jeff.hannah@deq.virginia.gov.

2. Subaqueous Lands Management. Coordinate with VMRC pursuant to Virginia Code §28.2-1200 through 1400, to obtain a permit for structures placed channelward of mean low water. This requires the submission of a JPA to VMRC. For additional information and coordination, contact VMRC, Allison Lay at (757) 247-2254 or allison.lay@mrc.virginia.gov.

3. Erosion and Sediment Control and Stormwater Management.

3(a) Erosion and Sediment Control and Stormwater Management. The Proposed Action must comply with Virginia's *Erosion and Sediment Control Law* (Virginia Code § 62.1-44.15:61) and *Regulations* (9 VAC 25-840-30 *et seq*.) and *Stormwater Management Law* (Virginia Code § 62.1-44.15:31) and *Regulations* (9 VAC 25-870-210 *et seq*.) as administered by DEQ in Virginia. Activities that disturb 2,500 square feet or more in CBPAs would be regulated by *VESCL&R* and *VSWML&R*. Erosion and sediment control and stormwater management requirements should be coordinated with DEQ-TRO, Courtney Smith at (757) 493-1073 or courtney.smith@deq.virginia.gov.

3(b) General Permit for Stormwater Discharges from Construction Activities (VAR10). For land-disturbing activities of equal to or greater than one acre, the Air Force is required to apply for registration coverage under the Virginia Stormwater Management Program General Permit for Discharges of Stormwater from Construction Activities (9 VAC 25-880-1 *et seq.*). Specific questions regarding the Stormwater Management Program requirements should be directed to DEQ-TRO, Courtney Smith at (757) 493-1073 or courtney.smith@deq.virginia.gov.

4. Chesapeake Bay Preservation Areas. The Proposed Action must be consistent with the Bay Act (Virginia Code §§ 62.1-44.15:67 through 62.1-44.15:78) and *Regulations* (9 VAC 25-830-10 *et seq*.) as administered by DEQ. For additional information and coordination, contact the DEQ-OWLGP, Amber Foster at (804) 698-4086 or amber.foster@deq.virginia.gov.

5. Air Pollution Control. Guidance on minimizing the emission of volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) during construction may be obtained from DEQ-TRO. Activities associated with the Proposed Action may be subject to air regulations administered by DEQ. The state air pollution regulations that may apply to the construction of the Proposed Action are:

- fugitive dust and emissions control (9 VAC 5-50-60 *et seq*.); and
- open-burning restrictions (9 VAC 5-130).

The Air Force should contact the appropriate local fire officials for information on any local requirements pertaining to open burning. For more information, contact DEQ-TRO, John Brandt at (757) 518-2010 or john.brandt@deq.virginia.gov.

6. Solid and Hazardous Wastes.

6(a) Solid and Hazardous Waste Management Regulations. All solid waste, hazardous waste, and hazardous materials must be managed in accordance with all applicable federal, state, and local environmental regulations. For additional information concerning location and availability of suitable waste management facilities in the project area or if free product, discolored soils, or other evidence of contaminated soils are encountered, contact DEQ-TRO, Melinda Woodruff at (757) 518-2174 or melinda.woodruff@deq.virginia.gov.

6(b) Petroleum Contamination. In accordance with Virginia Code §§ 62.1-44.34.8 through 9 and 9 VAC 25-580-10 *et seq*., contact DEQ-TRO, Tom Madigan at (757) 518-2115 or tom.madigan@deq.virginia.gov, if evidence of a petroleum release is discovered during construction.

6(c) Petroleum Storage Tanks. The use of above-ground ASTs with a capacity of greater than 660 gallons for temporary fuel storage (>120 days) must be conducted in accordance with 9 VAC 25-91-10 *et seq*. Contact DEQ-TRO, Tom Madigan at (757) 518-2115 or tom.madigan@deq.virginia.gov, for additional details.

7. Natural Heritage Resources.

7(a) Biotics Data System. Contact DCR-DNH, Rene Hypes at (804) 371-2708 or rene.hypes@dcr.virginia.gov, to secure updated information on natural heritage resources if the scope of the project changes and/or six months has passed before it is utilized, since new and updated information is continually added to the Biotics Data System.

7(b) Ecological Cores. A discussion of fragmentation impacts on ecological cores, including a fragmentation analysis to estimate direct impacts to cores and habitat fragments and indirect impacts to cores, may be initiated with the DCR Natural Heritage Information Manager, Joe Weber at joseph.weber@dcr.virginia.gov.

8. Wildlife Resources and Protected Species.

8(a) Bald Eagle. To ensure compliance with the Bald and Golden Eagle Act, coordinate, as necessary, with the U.S. Fish and Wildlife Service Virginia Field Office,

Troy Andersen at (804) 654-9235 or troy.andersen@fws.gov, regarding possible impacts upon bald eagles or the need for a federal bald eagle take permit.

8(b) Atlantic Sturgeon. Coordinate with the NOAA Fisheries Virginia Field Office at (804) 684-7828, regarding potential impacts upon Atlantic sturgeon.

8(c) Protection of Aquatic and Terrestrial Resources. Contact DGIF, Amy Ewing at (804) 367-2211 or amy.ewing@dgif.virginia.gov, on recommendations for the protection of aquatic and terrestrial wildlife resources associated with the proposed project.

9. Floodplain Management. The Proposed Action must comply with the Newport News floodplain ordinance. For additional information and coordination, contact the City of Newport News, Hai Tran at (757) 926-8264 or htran@nnva.gov.

Thank you for the opportunity to review and respond to the EA for the Training Area 1 Shoreline Stabilization and Erosion Protection Project in the City of Newport News. The detailed comments submitted by reviewing agencies are attached. Please contact me at (804) 698-4204 or John Fisher at (804) 698-4339 for clarification of these comments.

Sincerely,

Bettina Rayfield, Program Manager
Environmental Impact Review and Long-Range Priorities

Enclosures

Ec: Amy Ewing, DGIF
Robbie Rhur, DCR
Allison Lay, VMRC
Roger Kirchen, DHR
Arlene Fields Warren, VDH
Emily Hein, VIMS
Everett Skipper, City of Newport News
Ben McFarlane, HRPDC

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR PROGRAM COORDINATION

ENVIRONMENTAL REVIEW COMMENTS APPLICABLE TO AIR QUALITY

TO: John Fisher

We thank **OEIR** for providing DEQ-AIR an opportunity to review the following project:

Document Type: Environmental Assessment
Project Sponsor: DOD/U.S. Air Force
Project Title: Training Area 1 Shoreline Stabilization and Erosion Protection
Location: City of Newport News
Project Number: DEQ #20-045F

Accordingly, I am providing following comments for consideration.

PROJECT LOCATION: X OZONE ATTAINMENT AND EMISSION CONTROL AREA FOR NOX & VOC

REGULATORY REQUIREMENTSMAY BE APPLICABLE TO: X CONSTRUCTION ☐ OPERATION

STATE AIR POLLUTION CONTROL BOARD REGULATIONS THAT MAY APPLY:

1. ☐ 9 VAC 5-40-5200 C & 9 VAC 5-40-5220 E – STAGE I
2. ☐ 9 VAC 5-45-760 et seq. – Asphalt Paving operations
3. X **9 VAC 5-130 et seq. – Open Burning**
4. X **9 VAC 5-50-60 et seq. Fugitive Dust Emissions**
5. ☐ 9 VAC 5-50-130 et seq. - Odorous Emissions; Applicable to_____
6. ☐ 9 VAC 5-60-300 et seq. – Standards of Performance for Toxic Pollutants
7. ☐ 9 VAC 5-50-400 Subpart_____, Standards of Performance for New Stationary Sources, designates standards of performance for the_____
8. ☐ 9 VAC 5-80-1100 et seq. of the regulations – Permits for Stationary Sources
9. ☐ 9 VAC 5-80-1605 et seq. Of the regulations – Major or Modified Sources located in PSD areas. This rule may be applicable to the _____
10. ☐ 9 VAC 5-80-2000 et seq. of the regulations – New and modified sources located in non-attainment areas
11. ☐ 9 VAC 5-80-800 et seq. Of the regulations – State Operating Permits. This rule may be applicable to _____

COMMENTS SPECIFIC TO THE PROJECT:

All precautions are necessary to restrict the emissions of volatile organic compounds (VOC) and oxides of nitrogen (NO_x).

(Kotur S. Narasimhan)
Office of Air Data Analysis **DATE: April 9, 2020**

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

MEMORANDUM

TO: John Fisher, DEQ/EIR Environmental Program Planner

FROM: Carlos A. Martinez, Division of Land Protection & Revitalization Review Coordinator

DATE: April 20, 2020

COPIES: Sanjay Thirunagari, Division of Land Protection & Revitalization Review Manager; file

SUBJECT: Environmental Impact Review: 20-045F Training Area 1 Shoreline Stabilization and Erosion Protection in Fort Eustis, Virginia.

The Division of Land Protection & Revitalization (DLPR) has completed its review of the DOD/ U.S. Air Force's April 8, 2020 EIR for Training Area 1 Shoreline Stabilization and Erosion Protection in Fort Eustis, Virginia.

DLPR staff conducted a search (500 ft. radius) of the project area of solid and hazardous waste databases (including petroleum releases) to identify waste sites in close proximity to the project area. DLPR search did not identify any waste sites within the project area which might impact the project.

DLPR staff has reviewed the submittal and offers the following comments:

Hazardous Waste/RCRA Facilities – none in close proximity to the project area

CERCLA Sites – none in close proximity to the project area

Formerly Used Defense Sites (FUDS) – none in close proximity to the project area.

Solid Waste – none in close proximity to the project area

Virginia Remediation Program (VRP) – none in close proximity to the project area

Petroleum Releases – none in close proximity to the project area

PROJECT SPECIFIC COMMENTS

None

GENERAL COMMENTS

Soil, Sediment, Groundwater, and Waste Management

Any soil, sediment or groundwater that is suspected of contamination or wastes that are generated must be tested and disposed of in accordance with applicable Federal, State, and local laws and regulations. Some of the applicable state laws and regulations are: Virginia Waste Management Act, Code of Virginia Section 10.1-1400 *et seq.*; Virginia Hazardous Waste Management Regulations (VHWMR) (9VAC 20-60); Virginia Solid Waste Management Regulations (VSWMR) (9VAC 20-81); Virginia Regulations for the Transportation of Hazardous Materials (9VAC 20-110). Some of the applicable Federal laws and regulations are: the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section 6901 *et seq.*, and the applicable regulations contained in Title 40 of the Code of Federal Regulations; and the U.S. Department of Transportation Rules for Transportation of Hazardous Materials, 49 CFR Part 107.

Pollution Prevention – Reuse - Recycling

Please note that DEQ encourages all construction projects and facilities to implement pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately.

If you have any questions or need further information, please contact Carlos A. Martinez by phone at (804) 698-4575 or email carlos.martinez@deq.virginia.gov.

Commonwealth of Virginia

Fisher, John <john.fisher@deq.virginia.gov>

Re: NEW PROJECT AIR FORCE Training Area 1 Shoreline Stabilization and Erosion Protection, DEQ #20-045F

1 message

Gavan, Lawrence <larry.gavan@deq.virginia.gov> Wed, Apr 8, 2020 at 2:10 PM
To: "Fisher, John" <john.fisher@deq.virginia.gov>

(a) Agency Jurisdiction. The Department of Environmental Quality (DEQ) administers the *Virginia Erosion and Sediment Control Law and Regulations* (*VESCL&R*) and *Virginia Stormwater Management Law and Regulations* (*VSWML&R*).

(b) Erosion and Sediment Control and Stormwater Management Plans. The Applicant and its authorized agents conducting regulated land-disturbing activities on private and public lands in the state must comply with *VESCL&R* and *VSWML&R*, including coverage under the general permit for stormwater discharge from construction activities, and other applicable federal nonpoint source pollution mandates (e.g. Clean Water Act-Section 313, federal consistency under the Coastal Zone Management Act). Clearing and grading activities, installation of staging areas, parking lots, roads, buildings, utilities, borrow areas, soil stockpiles, and related land-disturbing activities that result in the total land disturbance of equal to or greater than 10,000 square feet (2,500 square feet in Chesapeake Bay Preservation Area) would be regulated by *VESCL&R*. Accordingly, the Applicant must prepare and implement an erosion and sediment control (ESC) plan to ensure compliance with state law and regulations. Land-disturbing activities that result in the total land disturbance of equal to or greater than 1 acre (2,500 square feet in Chesapeake Bay Preservation Area) would be regulated by *VSWML&R*. Accordingly, the Applicant must prepare and implement a Stormwater Management (SWM) plan to ensure compliance with state law and regulations. The ESC/SWM plan is submitted to the DEQ Regional Office that serves the area where the project is located for review for compliance. The Applicant is ultimately responsible for achieving project compliance through oversight of on-site contractors, regular field inspection, prompt action against non-compliant sites, and other mechanisms consistent with agency policy. [Reference: VESCL 62.1-44.15 et seq.]

(c) General Permit for Stormwater Discharges from Construction Activities (VAR10). DEQ is responsible for the issuance, denial, revocation, termination and enforcement of the Virginia Stormwater Management Program (VSMP) General Permit for Stormwater Discharges from Construction Activities related to municipal separate storm sewer systems (MS4s) and construction activities for the control of stormwater discharges from MS4s and land disturbing activities under the Virginia Stormwater Management Program.

The owner or operator of projects involving land-disturbing activities of equal to or greater than 1 acre is required to register for coverage under the General Permit for Discharges of Stormwater from Construction Activities and develop a project-specific Stormwater Pollution Prevention Plan. Construction activities requiring registration also include land disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan of development will collectively disturb equal to or greater than one acre The SWPPP must be prepared prior to submission of the registration statement for coverage under the general permit and the SWPPP must address water quality and quantity in accordance with the *VSMP Permit Regulations*. General information and registration forms for the General Permit are available at: http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPermits/ConstructionGeneralPermit.aspx

Commonwealth of Virginia
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
1111 E. Main Street, Suite 1400, Richmond, Virginia 23219
P.O. Box 1105, Richmond, Virginia 23218
(800) 592-5482
www.deq.virginia.gov

Matthew J. StricklerDavid K. Paylor
Secretary of Natural ResourcesDirector
(804) 698-4000

MEMORANDUM

TO: John Fisher, DEQ Office of Environmental Impact Review

FROM: Amber Foster, DEQ Principal Environmental Planner

DATE: April 9, 2020

SUBJECT: DEQ #20-045F – DOD/U.S. Air Force, Training Area 1 Shoreline Stabilization and Erosion Protection

We have reviewed the Federal Consistency Certification submittal for the proposed project and offer the following comments regarding consistency with the provisions of the *Chesapeake Bay Preservation Area Designation and Management Regulations* (Regulations):

In the City of Newport News, the areas protected by the Chesapeake Bay Preservation Act, as locally implemented, require conformance with performance criteria. These areas include Resource Protection Areas (RPAs) and Resource Management Areas (RMAs). RPAs include tidal wetlands, certain non-tidal wetlands and tidal shores. RPAs also include a 100-foot vegetated buffer area located adjacent to and landward of these features and along both sides of any water body with perennial flow. RMA lands in Newport News include floodplains, highly erodible soils and all lands adjacent to and 100 feet landward of the RPA. The City of Newport News also designated Intensely Developed Areas (IDAs) as redevelopment areas of the City, which incorporates both the RPA and RMA.

The purpose of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land (and associated resources) at Joint Base Langley - Eustis TA1. As described in the Environmental Assessment, the Proposed Action would occur in RPAs located along Skiffes Creek and/or the tidal and non-tidal wetlands connected and contiguous to Skiffes Creek. RPA disturbance would result from vegetation clearing, and soil excavation, grading, fill, and compaction.

Under the Federal Consistency Regulations of the *Coastal Zone Management Act of 1972*, federal actions in Virginia must be conducted in a manner "consistent to the maximum extent

practicable" with the enforceable policies of the Virginia Coastal Zone Management Program. Those enforceable policies are administered through the Chesapeake Bay Preservation Act and Regulations. Federal actions on installations located within Tidewater Virginia are required to be consistent with the performance criteria of the Regulations on lands analogous to locally designated RPAs and RMAs, as provided in §9VAC25-830-130 and 140 of the Regulations, including the development of a water quality impact analysis (WQIA) for encroachment or impacts to the RPA, minimize land disturbance (including area of access and material staging), retain existing vegetation, and minimize impervious cover, as well as compliance with the requirements of the *Virginia Erosion and Sediment Control Handbook*, and stormwater management criteria consistent with water quality protection provisions of the *Virginia Stormwater Management Regulations*."

Provided adherence to the above requirements, particularly as it relates to the requirements to minimize land disturbance, retain existing vegetation and minimize impervious cover, the proposed activity would be consistent with the *Chesapeake Bay Preservation Act* and Regulations.

DEPARTMENT OF ENVIRONMENTAL QUALITY
TIDEWATER REGIONAL OFFICE

Environmental Impact Review
Coordination Review

To: Valerie A. Fulcher, Office of Environmental Impact Review

From: Craig Nicol, Regional Director

Date: April 22, 2020

Project: Air Force Training Area 1 – Shoreline Stabilization DEQ#20-045F

As requested, the DEQ Tidewater Regional Office has reviewed the supplied information and offers the following comments:

Air Compliance Program :
The following air regulations may be applicable: Virginia Administrative Code 9 VAC 5-50-60 *et seq.* which addresses the abatement of visible emissions and fugitive dust emissions, and Virginia Administrative Code 9 VAC 5-130-10 et *seq.* which addresses open burning. For additional information, contact John Brandt, DEQ-TRO at (757) 518-2010.

Land Program (Solid and Hazardous Waste):
All construction and demolition waste, including any excess soil, must be characterized in accordance with the Virginia Hazardous Waste Management Regulations and disposed of at an appropriate facility as applicable.
For additional information, contact Sean Priest, DEQ-TRO at (757)518-2141.

Stormwater:
A construction general permit (CGP) is required prior to commencement of land disturbing activities for the discharge of sediment from construction activities. In addition, DEQ is the review authority for plan review and approval to coincide with permit application processing. For additional information, contact Courtney Smith, DEQ-TRO at (757)493-1072.

Virginia Water Protection Permit Program (VWPP):
Potential adverse impacts to water quality and wetlands resulting from surface runoff due to construction activities must be minimized. This can be achieved by using Best Management Practices (BMPs). Permanent or temporary impacts to surface waters and wetlands may require a permit pursuant to §401 of the Clean Water Act, Virginia Code §62.1-44.15:20, and Virginia Administrative Code 9 VAC 25-210-10 *et seq.* Provided that any and all necessary permits are obtained and complied with, the project will be consistent with DEQ program requirements.
The proposed action is anticipated to qualify for U.S. Army Corps of Engineers Nationwide and/or Regional Permits, for which DEQ has provided Section 401 Water Quality Certification. For additional information, contact Jeff Hannah, DEQ-TRO at (757)518-2146.

Water Permit Program (VPDES):

The project may require a VPDES construction general permit. Please contact DEQ Central Office for additional information. There does not appear to be any other permit requirements under the VPDES permit regulations applicable to the activity described in this document. For additional information, contact Julie Laferriere, DEQ-TRO at (757)518-2084.

Petroleum Storage Tank Program:

DEQ records do not indicate any reported petroleum releases within the proposed project footprint. If evidence of a petroleum release is discovered during implementation of this project, it must be reported to DEQ, as authorized by CODE # 62.1-44.34.8 through 19 and 9 VAC 25-580-10 et seq. Contact Mr. Tom Madigan at (757) 518-211. Petroleum-contaminated soils and ground water generated during implementation of this project must be properly characterized and disposed of properly.

The installation and use of an AST (>660 gallons) for temporary fuel storage (>120 days) during the project must follow the requirements in 9 VAC 25-91-10 et. seq. Please contact Tom Madigan of the DEQ Tidewater Regional Office (757) 518-2115 for additional details

Based on the submitted information, it appears the proposed project will result in a *[Level of impact]* environmental impact.

Commonwealth of Virginia

Fisher, John <john.fisher@deq.virginia.gov>

ESSLog# 40530_20-045F_EustisShoreline_DGIF_AME20200423

1 message

Ewing, Amy <amy.ewing@dgif.virginia.gov> Thu, Apr 23, 2020 at 11:05 AM
To: John Fisher <john.fisher@deq.virginia.gov>
Cc: Clinton Morgeson <clinton.morgeson@dgif.virginia.gov>, rr nhreview <nhreview@dcr.virginia.gov>

John,
We have reviewed the Environmental Assessment (EA) for shoreline protection along Skiffes Creek and its tributaries at Ft. Eustis in Newport News. We document federal Endangered Atlantic sturgeon from the project area. The James River, downstream of this project area, has been designated a Threatened and Endangered Species Water due to the presence of this species. We agree, however, with the conclusion in the EA that this project is not likely to result in significant adverse impacts upon Atlantic Sturgeon. We do recommend coordination with NOAA Fisheries Service regarding potential impacts upon this species.

The James River also has been designated a Confirmed Anadromous Fish Use Area due to the presence of other anadromous species, in addition to Atlantic sturgeon. Skiffes Creek and its tributaries at this project site have been designated Potential Anadromous Fish Use Areas. To best protect anadromous fishes from harm associated with instream work, we recommend that such work associated with this project adhere to a time of year restriction from February 15 through June 30 of any year. In addition, we recommend conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams or turbidity curtains to isolate the construction area, blocking no more than 50% of the streamflow at any given time (minimal overlap of construction footprint notwithstanding), stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures. We recommend that instream work be designed and performed in a manner that minimizes impacts upon natural streamflow and movement of resident aquatic species. To minimize potential wildlife entanglements resulting from use of synthetic/plastic erosion and sediment control matting, we recommend use of matting made from natural/organic materials such as coir fiber, jute, and/or burlap. To minimize harm to the aquatic environment and its residents resulting from use of the Tremie method to install concrete, installation of grout bags, and traditional pouring of concrete, we recommend that such activities occur only in the dry, allowing all concrete to harden and cure prior to contact with open water.

We prefer shoreline stabilization techniques that do not result in a hardened shoreline, but rather ones that continue to allow access to habitat by aquatic species and which provide shoreline stabilization through development of marsh and wetland habitats appropriately restored to attenuate wave and wake action. As such, we prefer in order, Alternative B - Living Shoreline then Alternative A - Marsh Management. We do not support Alternative C - Concrete Bulkhead and believe the No Action Alternative will leave the shoreline vulnerable to continue erosion.

We recommend that all tree removal and ground clearing adhere to a time of year restriction (TOYR) protective of resident and migratory songbird nesting from March 15 through August 15 of any year.

We recommend adherence to erosion and sediment controls during ground disturbance. To minimize potential wildlife entanglements resulting from use of synthetic/plastic erosion and sediment control matting, we recommend use of matting made from natural/organic materials such as coir fiber, jute, and/or burlap.

This project site is located within close proximity of historic and/or active bald eagle nests and the James River Bald Eagle Concentration and Roost Area. To ensure protection of bald eagles in compliance with the Bald and Golden Eagle Act, we recommend using the Center for Conservation Biology (CCB) Eagle Nest Locator to determine if any active eagle nests are known from the project area. If active bald eagle nests have been documented from the project area, we recommend that the

project move forward in a manner consistent with state and federal guidelines for protection of bald eagles; and coordination, as indicated, with the U.S. Fish and Wildlife Service regarding possible impacts upon bald eagles or the need for a federal bald eagle take permit.

This project is located within 2 miles of a documented occurrence of a state or federal threatened or endangered plant or insect species and/or other Natural Heritage coordination species. Therefore, we recommend coordination with VDCR-DNH regarding the protection of these resources.

Thanks, Amy

Amy Ewing
Environmental Services Biologist
Manager, Fish and Wildlife Information Services
P 804.367.2211
Virginia Department of Game & Inland Fisheries
CONSERVE. CONNECT. PROTECT.
A 7870 Villa Park Drive, P.O. Box 90778, Henrico, VA 23228
www.dgif.virginia.gov

Commonwealth of Virginia

Fisher, John <john.fisher@deq.virginia.gov>

RE: NEW PROJECT AIR FORCE Training Area 1 Shoreline Stabilization and Erosion Protection, DEQ #20-045F

1 message

Ben McFarlane <bmcfarlane@hrpdcva.gov> Wed, Apr 22, 2020 at 12:27 PM
To: "John.Fisher@deq.virginia.gov" <John.Fisher@deq.virginia.gov>
Cc: "Fulcher, Valerie" <valerie.fulcher@deq.virginia.gov>, Cynthia Mulkey <cmulkey@hrpdcva.gov>

Mr. Fisher,

The HRPDC staff has reviewed the draft environmental assessment for this project and coordinated with staff from the City of Newport News. We have no comments on the draft EA.

We appreciate the opportunity to comment on this project. If you have any questions, please let me know.

Ben

Benjamin J. McFarlane, AICP, CFM

Senior Regional Planner

Hampton Roads Planning District Commission

723 Woodlake Drive

Chesapeake, VA 23320

Phone: 757-420-8300 | Fax: 757-420-9300

All email correspondence to and from this address is subject to the Virginia Freedom of Information Act and to the Virginia Public Records Act, which may result in monitoring and disclosure to third parties, including law enforcement.

From: Fulcher, Valerie <valerie.fulcher@deq.virginia.gov>
Sent: Wednesday, April 8, 2020 1:49 PM
To: rr dgif-ESS Projects <essprojects@dgif.virginia.gov>; Roberta Rhur <robbie.rhur@dcr.virginia.gov>; odwreview (VDH) <odwreview@vdh.virginia.gov>; Carlos Martinez <carlos.martinez@deq.virginia.gov>; Kotur Narasimhan <kotur.narasimhan@deq.virginia.gov>; Lawrence Gavan <larry.gavan@deq.virginia.gov>; Daniel Moore <daniel.moore@deq.virginia.gov>; Holly Sepety <holly.sepety@deq.virginia.gov>; Nicol, Craig <craig.nicol@deq.virginia.gov>; Roger Kirchen <roger.kirchen@dhr.virginia.gov>; Emily A. Hein <eahein@vims.edu>; Allison Lay <allison.norris@mrc.virginia.gov>; Ben McFarlane <bmcfarlane@hrpdcva.gov>; Everett Skipper <eskipper@nngov.com>
Cc: John Fisher <john.fisher@deq.virginia.gov>
Subject: NEW PROJECT AIR FORCE Training Area 1 Shoreline Stabilization and Erosion Protection, DEQ #20-045F

COMMONWEALTH of VIRGINIA

Marine Resources Commission
380 Fenwick Road
Bldg 96
Fort Monroe, VA 23651-1064

Matthew J. Strickler
Secretary of Natural Resources

Steven G. Bowman
Commissioner

April 20, 2020

Department of Environmental Quality
Attn: John Fisher
P.O. Box 1105
Richmond, VA 23218

Re: Environmental Assessment
Training Area 1 Shoreline Stabilization and Erosion Protection DEQ #20-045F

Dear Mr. Fisher:

This will respond to the request for comments regarding the Environmental Assessment for the Training Area 1 Shoreline Stabilization and Erosion Protection Project (DEQ #20-045F), prepared by the Department of the Air Force. Specifically, the Air Force has proposed to stabilize the existing erosion-affected shoreline to prevent loss of land at Training Area 1 located at Fort Eustis in Newport News, Virginia.

We reviewed the provided project documents and found the proposed project is within the jurisdictional areas of the Virginia Marine Resources Commission (VMRC) and may require a permit from this agency. Additionally, fill within tidal wetlands will require a permit from the Newport News Wetlands Board. Per Section 104.1 of Title 28.2 of the Code of Virginia, living shorelines are the preferred alternative for stabilizing shorelines in the Commonwealth. Please be advised that the VMRC pursuant to Chapter 12, 13, & 14 of Title 28.2 of the Code of Virginia administers permits required for submerged lands, tidal wetlands, and beaches and dunes. Any jurisdictional impacts will be reviewed by the VMRC during the Joint Permit Application process.

If you have any questions please contact me at 757-247-2254 or by email at Allison.lay@mrc.virginia.gov. Thank you for the opportunity to comment.

Sincerely,

Allison Lay

Allison Lay
Environmental Engineer, Habitat Management

AEL
HM

Matthew J. Strickler
Secretary of Natural Resources

Clyde E. Cristman
Director

Rochelle Altholz
Deputy Director of Administration and Finance

Russell W. Baxter
Deputy Director of Dam Safety & Floodplain Management and Soil & Water Conservation

Thomas L. Smith
Deputy Director of Operations

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

MEMORANDUM

DATE: April 22, 2020

TO: John Fisher, DEQ

FROM: Roberta Rhur, Environmental Impact Review Coordinator

SUBJECT: DEQ 20-045F, Training Area 1 Shoreline Stabilization and Erosion Protection

Division of Natural Heritage

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in Biotics, natural heritage resources have not been documented within the submitted project boundary including a 100 foot buffer. The absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources. In addition, the project boundary does not intersect any of the predictive models identifying potential habitat for natural heritage resources.

If tree clearing is proposed in the northeastern corner of the project site, the project may fragment an Ecological Core C4 as identified in the Virginia Natural Landscape Assessment (https://www.dcr.virginia.gov/natural-heritage/vaconvisvnla), one of a suite of tools in Virginia ConservationVision that identify and prioritize lands for conservation and protection.

Ecological Cores are areas of unfragmented natural cover with at least 100 acres of interior that provide habitat for a wide range of species, from interior-dependent forest species to habitat generalists, as well as species that utilize marsh, dune, and beach habitats. Cores also provide benefits in terms of open space, recreation, water quality (including drinking water protection and erosion prevention), and air quality (including carbon sequestration and oxygen production), along with the many associated economic benefits of these functions. The cores are ranked from C1 to C5 (C5 being the least ecologically relevant) using many prioritization criteria, such as the proportions of sensitive habitats of natural heritage resources they contain.

Fragmentation occurs when a large, contiguous block of natural cover is dissected by development, and other forms of permanent conversion, into one or more smaller patches. Habitat fragmentation results in biogeographic changes that disrupt species interactions and ecosystem processes, reducing biodiversity and habitat quality due to limited recolonization, increased predation and egg parasitism, and increased invasion by weedy species.

Therefore minimizing fragmentation is a key mitigation measure that will reduce deleterious effects and preserve the natural patterns and connectivity of habitats that are key components of biodiversity. DCR recommends efforts to minimize edge in remaining fragments, retain natural corridors that allow movement between fragments and designing the intervening landscape to minimize its hostility to native wildlife (natural cover versus lawns). Mapped cores in the project area can be viewed via the Virginia Natural Heritage Data Explorer, available here: http://vanhde.org/content/map.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please re-submit project information and map for an update on this natural heritage information if the scope of the project changes and/or six months has passed before it is utilized.

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Ernie Aschenbach at 804-367-2733 or Ernie.Aschenbach@dgif.virginia.gov.

Division of Dam Safety and Floodplain Management

Floodplain Management Program:
The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA), and communities who elect to participate in this voluntary program manage and enforce the program on the local level through that community's local floodplain ordinance. Each local floodplain ordinance must comply with the minimum standards of the NFIP, outlined in 44 CFR 60.3; however, local communities may adopt more restrictive requirements in their local floodplain ordinance, such as regulating the 0.2% annual chance flood zone (Shaded X Zone).

All development within a Special Flood Hazard Area (SFHA), as shown on the locality's Flood Insurance Rate Map (FIRM), must be permitted and comply with the requirements of the local floodplain ordinance.

State Agency Projects Only
Executive Order 45, signed by Governor Northam and effective on November 15, 2019, establishes mandatory standards for development of state-owned properties in Flood-Prone Areas, which include Special Flood Hazard Areas, Shaded X Zones, and the Sea Level Rise Inundation Area. These standards shall apply to all state agencies.

1. Development in Special Flood Hazard Areas and Shaded X Zones
    A. All development, including buildings, on state-owned property shall comply with the locally-adopted floodplain management ordinance of the community in which the state-owned property is located and any flood-related standards identified in the Virginia Uniform Statewide Building Code.
    B. If any state-owned property is located in a community that does not participate in the NFIP, all development, including buildings, on such state-owned property shall comply with the NFIP requirements as defined in 44 CFR §§ 60.3, 60.4, and 60.5 and any flood-related standards identified in the Virginia Uniform Statewide Building Code.

(1) These projects shall be submitted to the Department of General Services (DGS), for review and approval.
(2) DGS shall not approve any project until the State NFIP Coordinator has reviewed and approved the application for NFIP compliance.
(3) DGS shall provide a written determination on project requests to the applicant and the State NFIP Coordinator. The State NFIP Coordinator shall maintain all documentation associated with the project in perpetuity.

C. No new state-owned buildings, or buildings constructed on state-owned property, shall be constructed, reconstructed, purchased, or acquired by the Commonwealth within a Special Flood Hazard Area or Shaded X Zone in any community unless a variance is granted by the Director of DGS, as outlined in this Order.

The following definitions are from Executive Order 45:

Development for NFIP purposes is defined in 44 CFR § 59.1 as "Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials."

The Special Flood Hazard Area may also be referred to as the 1% annual chance floodplain or the 100-year floodplain, as identified on the effective Flood Insurance Rate Map and Flood Insurance Study. This includes the following flood zones: A, AO, AH, AE, A99, AR, AR/AE, AR/AO, AR/AH, AR/A, VO, VE, or V.

The Shaded X Zone may also be referred to as the 0.2% annual chance floodplain or the 500- year floodplain, as identified on the effective Flood Insurance Rate Map and Flood Insurance Study.

The Sea Level Rise Inundation Area referenced in this Order shall be mapped based on the National Oceanic and Atmospheric Administration Intermediate-High scenario curve for 2100, last updated in 2017, and is intended to denote the maximum inland boundary of anticipated sea level rise.

"State agency" shall mean all entities in the executive branch, including agencies, offices, authorities, commissions, departments, and all institutions of higher education.

"Reconstructed" means a building that has been substantially damaged or substantially improved, as defined by the NFIP and the Virginia Uniform Statewide Building Code.

The Department of Conservation and Recreation (DCR) Division of Soil and Water Conservation coordinates and directs programs and services to prevent degradation of the commonwealth's water quality caused by nonpoint source pollution. Statewide nonpoint source pollution control programs and services support both individual natural resource stewardship and assist local governments with resource management. These programs include nutrient management, agricultural best management practices, resource management planning, shoreline erosion advice, and assistance for Virginia's water conservation districts.

The remaining DCR divisions have no comments regarding the scope of this project. Thank you for the opportunity to comment.

APPENDIX C

CORRECTIVE ACTION PLAN

This page has been intentionally left blank.

Training Area 1 Shoreline Erosion Corrective Action Plan

For

THE 733D MISSION SUPPORT GROUP
CIVIL ENGINEERING DIVISION
JOINT BASE LANGLEY EUSTIS, FORT EUSTIS, VIRGINIA

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EXECUTIVE SUMMARY

This Corrective Action Plan (CAP) was developed to provide an analysis, conceptual design options for consideration, and recommended project budget estimates to incorporate into future scope of work proposals. This design options were developed in order to address ongoing shoreline erosion and bluff failure located along the terminus of Training Area 1 (TA1) at Fort Eustis, Virginia. Training Area 1 is located at the western terminus of an east to west trending peninsula at the confluence of Skiffes Creek and Bailey Creek. This peninsula was identified by the Environmental Element (EE) of the 733D Mission Support Group, Civil Engineering Division, of Joint Base Langley Eustis as an important resource for military training, recreational use, and contains a documented archaeological resource.

In order to develop the conceptual plans and other components of the CAP, Angler conducted an initial site visit to assess and document current site conditions, completed a topographic survey along the shoreline, and researched available tide range data. Based on the data obtained from the site assessment, topographic survey, and available tide range data, three alternatives were developed that will address the ongoing erosion and provide long term stability of the shoreline along TA1. Angler developed an analysis of the regulatory requirements for each alternative and developed project cost estimates for final design; federal, state, and local permitting requirements; and construction (materials and labor) for planning and funding purposes.

I. BACKGROUND INFORMATION

A. Existing Site Conditions and Land Use

The area of concern is located at the western terminus of an east to west trending peninsula that extends into Skiffes Creek. The project area for this CAP includes approximately 1,800 linear feet (approx. 8 acres) of shoreline. Based on information provided by the ASA, Training Division, and the Range Control ITAM Program Manager, the usage of TA1 is primarily land navigation, tactical bivouac, small unit training and military dog handling training. In addition, recreational uses include deer hunting and fishing. Angler Environmental (Angler) conducted a site evaluation on October 28, 2014 to assess existing conditions. During the site assessment active erosion was observed along the entire shoreline within the project area. The loss of marsh grass, loss of marsh root structure, loss of sand substrate, and the inundation of marsh grass by upland erosion was observed. The long term shoreline erosion rate along Skiffes Creek have been estimated to be -0.6 ft./yr. based on the *Shoreline Evolution: City of Newport News, Virginia, James River and Hampton Roads Shoreline Data Report* published by the Virginia Institute of Marine Science (VIMS) in March 2010, however, localized erosion rates may be greater. The upland bluff is eroding in four (4) separate sections within the project area. This erosion can be observed by tree arching along the bluff rim, tree collapse along the shoreline and into the waterway, vertical or cantilevered bluff faces, exposed bluff faces exceeding 8 to 12 feet in height, and the loss of soil from within the bluff to Skiffes Creek. The bluff erosion appears to be attributed to tide and wave action along the toe-slope, the boat traffic that compounds the influence of the wave action, and the subsequent undermining of the tree root zone which is perpetuating the tree collapse and unstable bluff face. All of the land loss is collapsing onto the shoreline and is subsequently transported into Skiffes Creek delivering a substantial amount of sand and sediment offshore, below mean low water.

Average fetch estimates to the project area, as shown on the attached CAP, includes 0.29 mile to the north, 0.33 mile to the northwest, 0.35 mile to the southwest at the point of the peninsula, and 0.25 mile to the southwest within Bailey Creek near the existing pedestrian bridge. The greatest average fetch is 0.35 mile to the southwest at the point of the peninsula where the project area is experiencing the greatest erosion and is more exposed to the James River.

A documented archaeological site (DHR ID 44NN0024) is located within the TA1. The site is classified as a Native American (terrestrial, open air) site during the middle woodland time period. A Phase II Cultural Resources Survey was completed in late 2014/early 2015 to determine the boundaries and recommended eligibility status of the site. Based on the survey the limits were redefined and are shown on the attached CAP. At the time of developing this CAP, the Virginia Department of Historic Resources (DHR) review of the Phase II survey was not complete. As such, the limits of archaeological site 44NN0024 as shown on the attached CAP, have not been approved and may change based on DHR's review.

B. Topographic Survey

A topographic survey was completed on February 18, 2015, within the project area in order to develop the various design concepts. The survey did not include a boundary survey or verification of property lines and/or easements. The contours (2 ft.) based on the topographic survey are shown on the attached CAP. Since this was completed for a concept level plan, neither a tidal survey nor topographic survey within Skiffes Creek were

completed. As such, prior to completing final design plans it is recommended that a tidal survey be completed as well as additional topographic survey as needed based on the preferred design option. The cost estimates for the final design options provided in Section IV include estimates for completion of a tidal survey and any additional topographic survey that may be needed.

C. Tide Range Research

Tide data used for the development of the CAP was obtained from the Fort Eustis (Marad), James River station (ID #8638017). The mean tide range based on 2015 predictions was approximately 2.24 ft. As discussed above, a tidal survey should be completed prior to final design and cost estimates for completion of a tidal survey are included as part of the design cost estimates provided in Section IV.

II. CONCEPTUAL DESIGN OPTIONS

A. Option A: Marsh and Vegetation Management

The concept design utilizes a non-structural approach to protecting the existing and proposed planted marshes. By enhancing, planting & protecting existing marshes the natural erosion protection benefits of these systems is being protected. This method is only suitable in areas with elevations higher than mean-tide level (MTL), with minimal wave action and boat wake, and with adjacent vegetation management and bank grading and restoration.

This method utilizes a fiber log located at MTL, either placed to protect an existing marsh or placed such that a new or enhanced planted marsh can be installed landward of the fiber log. Proposed planted marshes should be graded at a slope between 8:1 and 10:1. If this is not the natural slope clean coarse grained sand fill can be brought in behind the log to achieve the desired slope. The existing offshore area surrounding Training Area 1 (TA1) falls naturally within this slope range making it a good candidate for this approach. There are pockets along the TA1 peninsula where there is healthy marsh growth that can be blended in to the planted marsh areas providing natural erosion protection and enhancing and extending natural ecosystem. The planted marsh behind the fiber log should be planted with two types of vegetation. From the back of the fiber log to the mean high water (MHW) line a low marsh will be planted with smooth cordgrass (*Spartina alterniflora*). Above MHW to approximately 3-4' above mean low water (MLW) a high marsh will be planted with saltmeadow cordgrass (*Spartina patens*) and saltgrass (*Distichlis spicata*). Behind the planted marsh a 4' wide tidal shrub zone will be planted to help stabilize the toe of the slope beyond, this area is planted with native tidal shrubs such as marsh elder (*Iva frutescens*) and groundsel tree (*Baccharis halimifolia*).

Beyond the planted marsh, bank grading will be utilized to repair the high unstable banks to prevent future erosion of those banks from inundating the new and enhanced planted marshes. In this concept the bank grading slope is noted as 2:1, this is steeper than the typical recommended range, however it minimizes the amount of earthwork necessary. In order to protect the steeper slope from erosion, erosion control matting (ECM) is recommended to help stabilize these slopes, while suitable native vegetation is becoming established, which will provide permanent bank stabilization.

Due to the minimal nature of this design, emphasis is placed on developing a vegetation management program. With proper vegetation management natural systems can be enhanced and can provide natural erosion protection. Vegetation management would include selective tree pruning and clearing, the removal of debris from the shoreline (especially after storm events), supplemental native upland plantings to stabilize adjacent banks and regular inspections and maintenance as necessary.

B. Option B: Living Shoreline

The concept design option employs Living Shoreline design methodologies to create a structural solution that maintains the natural functionality and connectivity of the delicate ecosystem that exists along tidal shores. This design methodology is suitable for areas exposed to longer fetches, greater tidal ranges, more boat wake, adjacent to bank grading, plenty of sunlight and has a shallow hard sand bottom extending offshore.

In this concept design a low profile stone structure, called a sill, is used to contain sand fill which is placed to support a new planted marsh. The sill placement is site-specific and is

dependent on the adjacent bank height, bank grade, water depth, tide ranges and bottom type near the shoreline. In the concept design option recommended for TA1 the sill is placed seaward from the existing shoreline in an attempt to balance the cut/fill required as part of the bank grading behind it. However, by pushing the sill seaward, and thus the planted marsh as well, a larger amount of sand fill will be required to achieve the desired slope range between 8:1 and 10:1 for the planted marsh. The sills are typically located at an elevation near mean low water (MLW) with the height of the sill between 0-1' above mean high water (MHW) in low energy settings (average fetch less than 0.5 miles) to allow for regular wave overtopping. Since the total sill length is greater than 100 ft., tidal gaps should be strategically placed to allow for flushing of the tidal marsh behind the sill, as well as providing connectivity between ecosystems.

The planted marsh behind the sill will be planted with two types of vegetation. From the back of the sill to the MHW line a low marsh will be planted with smooth cordgrass (*Spartina alterniflora*); above MHW to approximately 3-4' above MLW a high marsh will be planted with saltmeadow cordgrass (*Spartina patens*) and saltgrass (*Distichlis spicata*). Due to the sensitivity of this design it is important to allow the sand fill to sit for 1-2 weeks before planting. This allows for settlement, the verification of actual tide levels within the planting area and appropriate adjustments to the slope or height of the marsh area as necessary prior to planting.

Behind the planted marsh a 4' wide tidal shrub zone will be planted to help stabilize the toe of the slope beyond. This area is planted with native tidal shrubs such as marsh elder (*Iva frutescens*) and groundsel tree (*Baccharis halimifolia*). At the areas where there is extensive existing wetland vegetation, and no proposed work, the planted marsh will be blended with the existing vegetation to create a connected ecosystem.

Beyond the planted marsh, bank grading will be utilized to properly connect the marsh with the upland area. Bank grading is recommended in areas with active erosion at the top and bottom of the bank, areas with high unstable banks, undercutting or falling trees, and where sunlight will reach the graded slopes. Target slopes range between 6:1 and 3:1 and are chosen based on natural shore topography, adjacent land uses and design combinations with other shore protection methods. For the bank grading in design Option B the recommended slope is 4:1. This is a stable slope that would allow for good vegetation cover and that would not be impacted negatively by higher than normal wave action.

For the long term success of the project and for the protection of areas not within the bank grading and replanting areas a vegetation management program should be utilized to protect and enhance the natural erosion protection provided by vegetation. Vegetation management would include selective tree pruning and clearing, the removal of debris from the shoreline (especially after storm events), and supplemental native upland plantings to stabilize adjacent banks. The components and benefits of a vegetation management program are discussed further under TA1 design Option A.

C. Option C: Concrete Bulkhead

This concept design option uses a precast concrete wall, called a bulk head, to stabilize sections of eroded shoreline, specifically in bluff areas with toe erosion and high unstable banks. The precast concrete wall is placed into an excavated trench and backfill is placed on top of a rear anchor to hold the wall in place. Bulkheads are appropriate in areas where the channel is used frequently for navigation and where a more environmentally

preferred design option will impair the use of the channel for navigation. At the location of eroded shoreline adjacent to the pedestrian bridge a stone sill and planted marsh, (reference design Option B), are being recommended in order to protect the foundation of the existing pedestrian bridge without requiring modifications to the bridge.

Beyond the bulk head, bank grading will be utilized to tie the adjacent grade into the wall. Target slopes for bank grading typically range between 6:1 and 3:1 and are chosen based on natural shore topography, adjacent land uses and design combinations with other shoreline protection methods. With the use of a bulk head a steeper slope, 3:1, can be used since the upland area will not be exposed to regular wave action.

For the long term success of the project and for the protection of areas not protected by the bulk head, or within the bank grading and replanting areas a vegetation management program should be utilized to protect and enhance the natural erosion protection provided by vegetation. Vegetation management would include selective tree pruning and clearing, the removal of debris from the shoreline (especially after storm events), and supplemental native upland plantings to stabilize adjacent banks. The components and benefits of a vegetation management program are discussed further under TA1 design Option A.

D. Construction Considerations

These design options range from Option A requiring the least amount of heavy construction, to Option C requiring the most amount. Depending on the design, construction equipment will have to access the bank and in some cases the shoreline in order to execute the design. The existing access road to TA1 will provide construction access to the peninsula, however, additional temporary access roads will need to be cleared to allow for equipment access to the areas of bank grading and shoreline. Depending on the cut/fill balance of the chosen design temporary soil stockpile area(s) may be required depending on the sequence of construction. In addition, to house the equipment overnight and when not in use, a temporary material & equipment storage area will be needed. The material and equipment storage area should be located in an upland area and if possible utilize existing cleared areas to minimize additional land clearing and disturbance. Once the bank grading is completed, and the marsh, shrub zones and bank areas planted (as appropriate) additional precautions will need to be taken to protect the graded areas from erosion and the planted vegetation from waterfowl while the vegetation becomes established.

III. REGULATORY ANALYSIS

The following sections describe the regulatory requirements and applicable permits that may be required from local, state, and federal agencies based on the conceptual design options. It should be noted these are requirements that are anticipated to complete the project at the time this CAP was developed. In addition to the following, it is anticipated that due to the nature and location of the project an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) of 1969 will be required.

A. Tidal Wetlands/Waters

Impacts and encroachments (both temporary and permanent) to tidal wetlands and waters are anticipated based on the conceptual design options included in the CAP. As such, authorizations from local, state, and federal agencies including the Local Wetlands Board (LWB) and/or Virginia Marine Resource Commission (VMRC) pursuant to the Virginia Tidal Wetlands Act and the U.S. Army Corps of Engineers (Corps) pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. A Tidewater Joint Permit Application (JPA) will need to be submitted to the VMRC for coordination with the LWB and Corps. Based on the conceptual design options, it is anticipated the project may qualify for authorization under the Corps Regional Permit 19 (13-RP-19). The State Water Control Board has issued unconditional 401 Water Quality Certification for the 13-RP-19. As such, the activities that qualify for this RP also meet the requirements of the Virginia Department of Environmental Quality (DEQ) Virginia Water Protection Permit (VWP) Regulation and no additional authorization from DEQ would be required as long as the project meets the terms and conditions of 13-RP-19. In lieu of the 13-RP-19, it is our understanding the Corps has recently authorized shoreline stabilization projects under Nationwide Permit 13 (Bank Stabilization). Therefore, the regulatory strategy for this project will require further analysis and coordination depending on the chosen option presented in the CAP.

Since the project will likely require federal and state authorizations for impacts and encroachments to tidal wetlands and waters, coordination with other supporting agencies will be required to determine potential adverse effects to Cultural Resources under Section 106 of the National Historic Preservation Act (NHPA) and to threatened and/or endangered species under Section 7 of the Federal Species Act (ESA). As previously discussed, an archaeological site (DHR ID 44NN0024) is located within the TA1 project area. A Phase II survey was completed in early 2015 to define the limits of the site and determined the eligibility status. At this time DHR is in the process of reviewing the Phase II survey. Therefore, the limits of the site may change and it is uncertain, at this time, if the site will be determined eligible or potentially eligible for listing on the National Register of Historic Places (NRHP). Depending on the final limits and status of the site, additional surveys may be required. Angler completed a preliminary review of threatened and endangered species information through available resources including the U.S. Fish and Wildlife Service's (USFWS) Information, Planning, and Conservation System (IPaC), Virginia Department of Game and Inland Fisheries' (VDGIF) Fish and Wildlife Information System (VaFWIS), and the Department of Conservation and Recreation's (DCR) Virginia Natural Heritage Data Explorer (NHDE). Due to its recent listing the Northern Long-eared bat (*Myotis septentrionalis*) was included on the USFWS IPaC report. As such, further coordination with USFWS will likely be required in accordance with the recently implemented 4(d) rule for the Northern Long-eared Bat. At this time the USFWS is recommending a time of year restriction (April 15th to September 15th) for projects involving land clearing activities and require a federal authorization. However, since the 4(d) Rule

was recently implemented requirements and/or recommendations from the USFWS may vary depending on the project scope and location. Furthermore, the Atlantic sturgeon (*Acipenser oxyrinchus*, state and federal endangered) was included on the VDGIF VaFWIS and DCR's NHDE reports. Since the project will occur along Skiffes Creek, a tributary to the James River, coordination with the National Oceanic and Atmospheric Administration (NOAA) Fisheries may be required.

B. Resource Protection Area

A 100-foot Resource Protection Area (RPA) is located along Skiffes Creek and/or the tidal and non-tidal wetlands connected and contiguous to Skiffes Creek. A detailed assessment to determine the RPA limits within the project area has not been completed. Therefore, the RPA limits shown on the CAP are preliminary and based on general site evaluation and mapping. The conceptual design option included in the CAP include a combination of clearing, grading, and structural fill. Although the Chesapeake Bay Preservation Act (CBPA) is administered at the local level and may not apply on federal lands, additional review and coordination may be needed for proposed work within the RPA.

C. 100-Year Floodplain

The limits of the Federal Emergency Management Agency (FEMA) 100-year floodplain are shown on the attached CAP. Since the conceptual design options include fill and grading within the limits of the 100-year floodplain, a floodplain study/analysis will likely be required to determine potential changes to the 100-year floodplain limits based on the final design. Coordination with FEMA and/or Local review will be required for proposed work within the limits of the 100-year floodplain and to determine the need for a Conditional Letter of Map Revision (CLOMR).

D. Construction General Permit

Since the conceptual design options will require land disturbing activities, a Virginia Pollutant Discharge Elimination System (VPDES) Construction General Permit (CGP) and Stormwater Pollution Prevention Plan (SWPPP) may be required and will also depend on the acreage of land disturbance in the final design. The CGP permit fees vary depending on the acreage of land disturbance.

IV. COST ESTIMATES

The cost estimates presented below are based on the conceptual design options included in the CAP. The estimates includes and EA in accordance with NEPA requirements, final design including, local, state, and federal permitting, tidal survey, additional topographic survey that may be needed to complete the design, additional surveys and/or evaluations regarding cultural resources, and surveys and agency coordination related to threatened and endangered species. Construction estimates include site mobilization as well as material and labor for each conceptual design option. The cost estimates include development of a Vegetation Management Program and the anticipated maintenance associated with this type of program for each option. The cost estimates for the Vegetation Management Program vary between options and is based on the type of shoreline stabilization practice proposed and planting.

Ft. Eustis Training Area 1 Shoreline Erosion Corrective Action Plan Cost Estimates

Option A: Coir Logs

Item	Estimated Quantity Unit	Unit Price	Total Price
Environmental Assessment			$100,000.00
Cultural Resources Evaluation/Survey			$100,000.00
Threatened/Endangered Species Surveys/Coord.			$8,000.00
Floodplain Study/FEMA Coordination			$75,000.00
Final Design, Survey, Permitting			$19,500.00
Mobilization/Management	1.00 LS	$19,070.00	$19,070.00
Erosion and Sediment Control	1.00 LS	$21,897.00	$21,897.00
Clearing and Grubbing	0.20 Ac.	$24,579.00	$4,915.80
Earthwork Grading	1,200.00 CY	$52.00	$62,400.00
20" Coir Log Installation	875.00 LF	$31.00	$27,125.00
Marsh Planting (1.5' O.C.)	4,930.00 Each	$3.00	$14,790.00
Tidal Shrub Planting (1.5' O.C.)	2,345.00 Each	$14.00	$32,830.00
Stabilization	4,840.00 SF	$2.00	$9,680.00
Vegetative Management Program	5 Years	$14,000.00	$70,000.00
		Total Price for Option A:	**$565,207.80**

Option B: Stone Sill

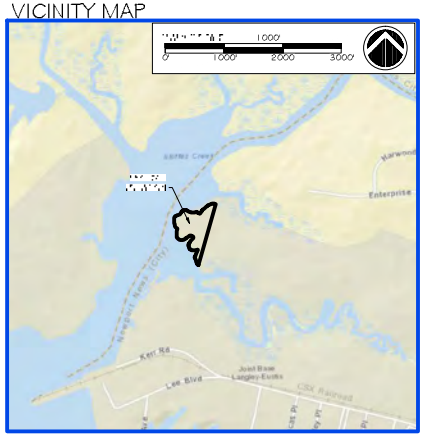
Item	Estimated Quantity Unit	Unit Price	Total Price
Environmental Assessment			$100,000.00
Cultural Resources Evaluation/Survey			$100,000.00
Threatened/Endangered Species Surveys/Coord.			$8,000.00
Floodplain Study/FEMA Coordination			$75,000.00
Final Design, Survey, Permitting			$65,000.00
Mobilization/Management	1.00 LS	$40,663.00	$40,663.00
Erosion and Sediment Control	1.00 LS	$22,535.00	$22,535.00
Clearing and Grubbing	1.00 Acre	$11,376.00	$11,376.00
Earthwork Grading	2,556.00 CY	$21.00	$53,676.00
Stone Sill	1,150.00 LF	$222.00	$255,300.00
Sand Fill	1,150.00 LF	$154.00	$177,100.00
Marsh Planting (1.5' O.C.)	12,975.00 Each	$3.00	$38,925.00
Tidal Shrub Planting (1.5' O.C.)	3,244.00 Each	$15.00	$48,660.00
Native Upland Seeding	3,227.00 SY	$1.00	$3,227.00
Vegetative Management Program	5 Years	$17,000.00	$85,000.00
		Total Price for Option B:	**$1,084,462.00**

Option C: Concrete Bulkhead

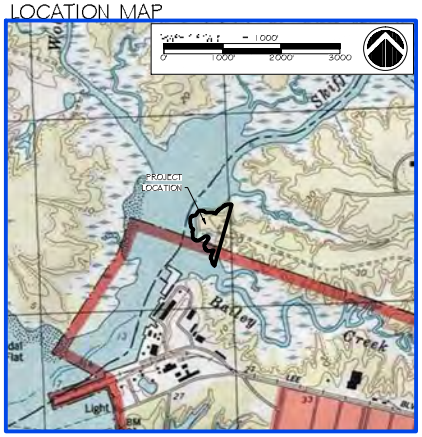
Item	Estimated Quantity Unit	Unit Price	Total Price
Environmental Assessment			$100,000.00
Cultural Resources Evaluation/Survey			$100,000.00
Threatened/Endangered Species Surveys/Coord.			$8,000.00
Floodplain Study/FEMA Coordination			$75,000.00
Final Design, Survey, Permitting			$35,000.00
Mobilization/Management	1.00 LS	$21,619.00	$21,619.00
Erosion and Sediment Control	1.00 LS	$22,535.00	$22,535.00
Clearing and Grubbing	1.00 Acre	$11,376.00	$11,376.00
Earthwork Grading	1,019.00 CY	$21.00	$21,399.00
Stone Sill	200.00 LF	$218.00	$43,600.00
Sand Fill	200.00 LF	$154.00	$30,800.00
Concrete Bulkhead	500.00 LF	$348.00	$174,000.00
Marsh Planting (1.5' O.C.)	2,256.00 Each	$3.00	$6,768.00
Tidal Shrub Planting (1.5' O.C.)	510.00 Each	$15.00	$7,650.00
Native Upland Seeding	1,854.00 SY	$1.00	$1,854.00
Vegetative Management Program	5 Years	$9,000.00	$45,000.00
		Total Price for Option C:	**$704,601.00**

FT. EUSTIS TRAINING AREA (TA) 1 SHORELINE EROSION CORRECTIVE ACTION PLAN
FORT EUSTIS, VIRGINIA

VICINITY MAP



LOCATION MAP



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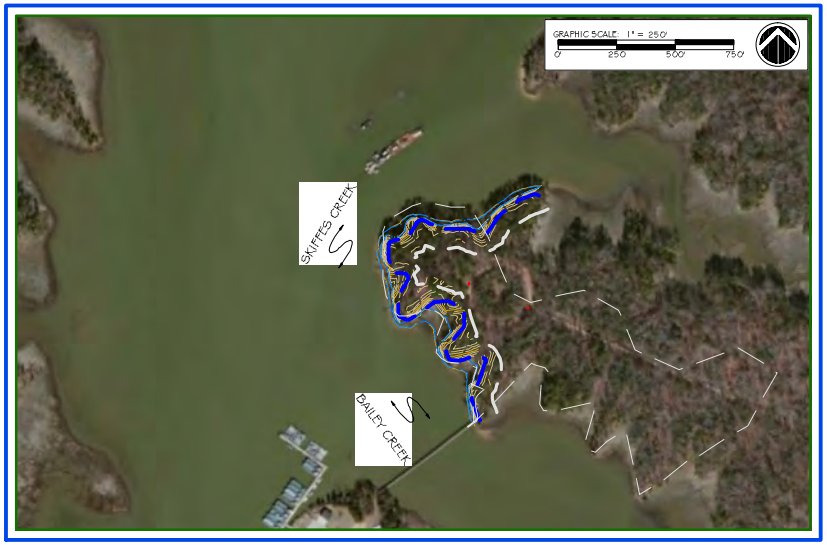
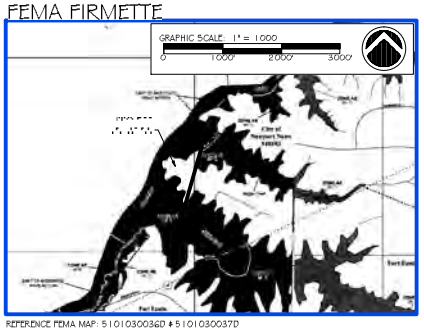


AERIAL PHOTOGRAPH

FEMA FIRMETTE



REFERENCE FEMA MAP: 5101030036D & 5101030037D

SHEET INDEX:

1 - COVERSHEET
2 - EXISTING CONDITIONS
3 - OPTION A
4 - OPTION B
5 - OPTION C

PROJECT MANAGER: RA
PROJECT #: 4857
DESIGNED: BW
DESIGN PHASE: CONCEPTUAL CAP
DRAWN:
DATE: 6/26/2015

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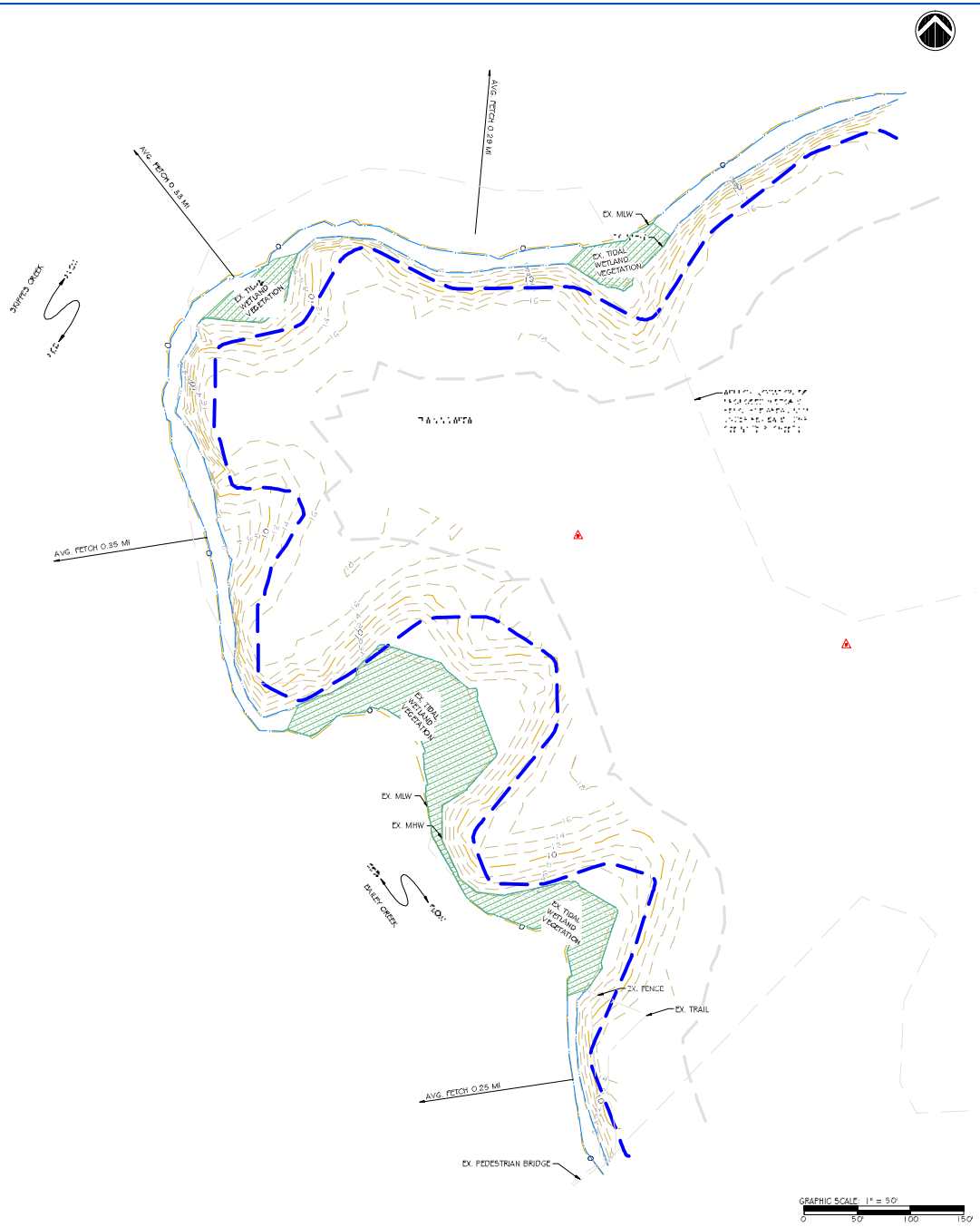

LEGEND

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EXISTING CONDITIONS

FORT EUSTIS, VIRGINIA

REVISIONS:
1

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/2/2015
SHEET NO:	2 OF 5

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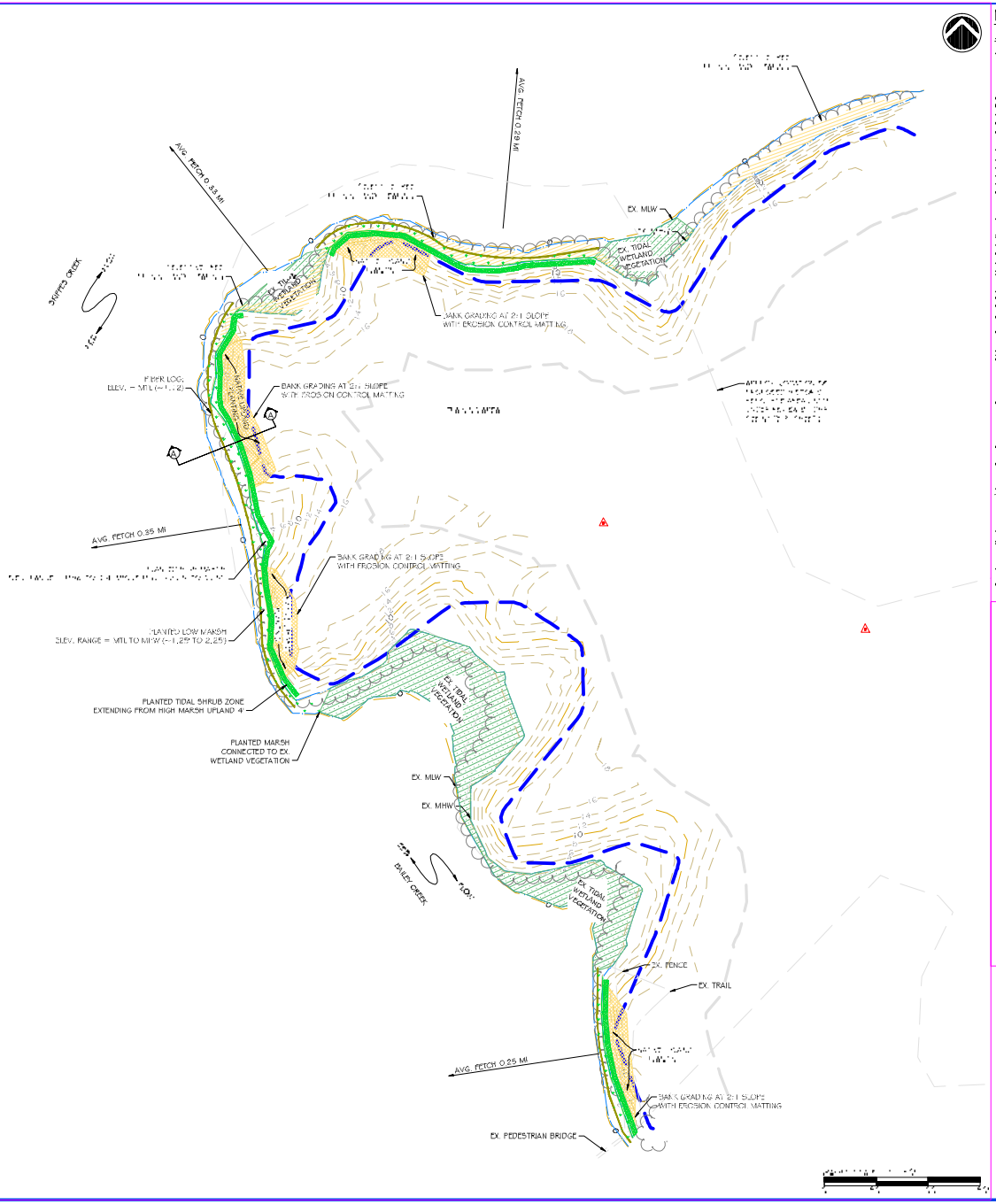
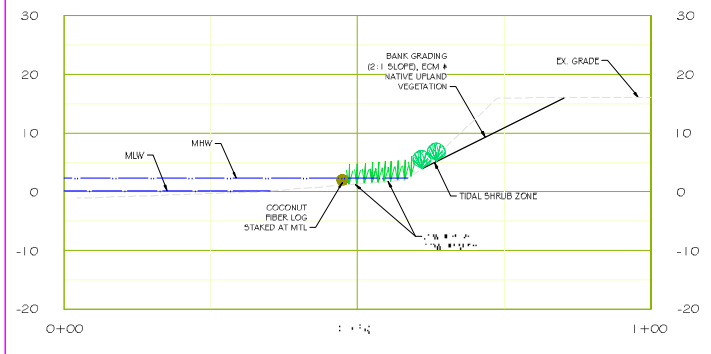


NARRATIVE

LEGEND



GRAPHIC SCALE: 1" = 10'

0 10 20 30

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OPTION A

FORT EUSTIS, VIRGINIA

REVISIONS:
1

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/2/2015
SHEET NO:	3 OF 5

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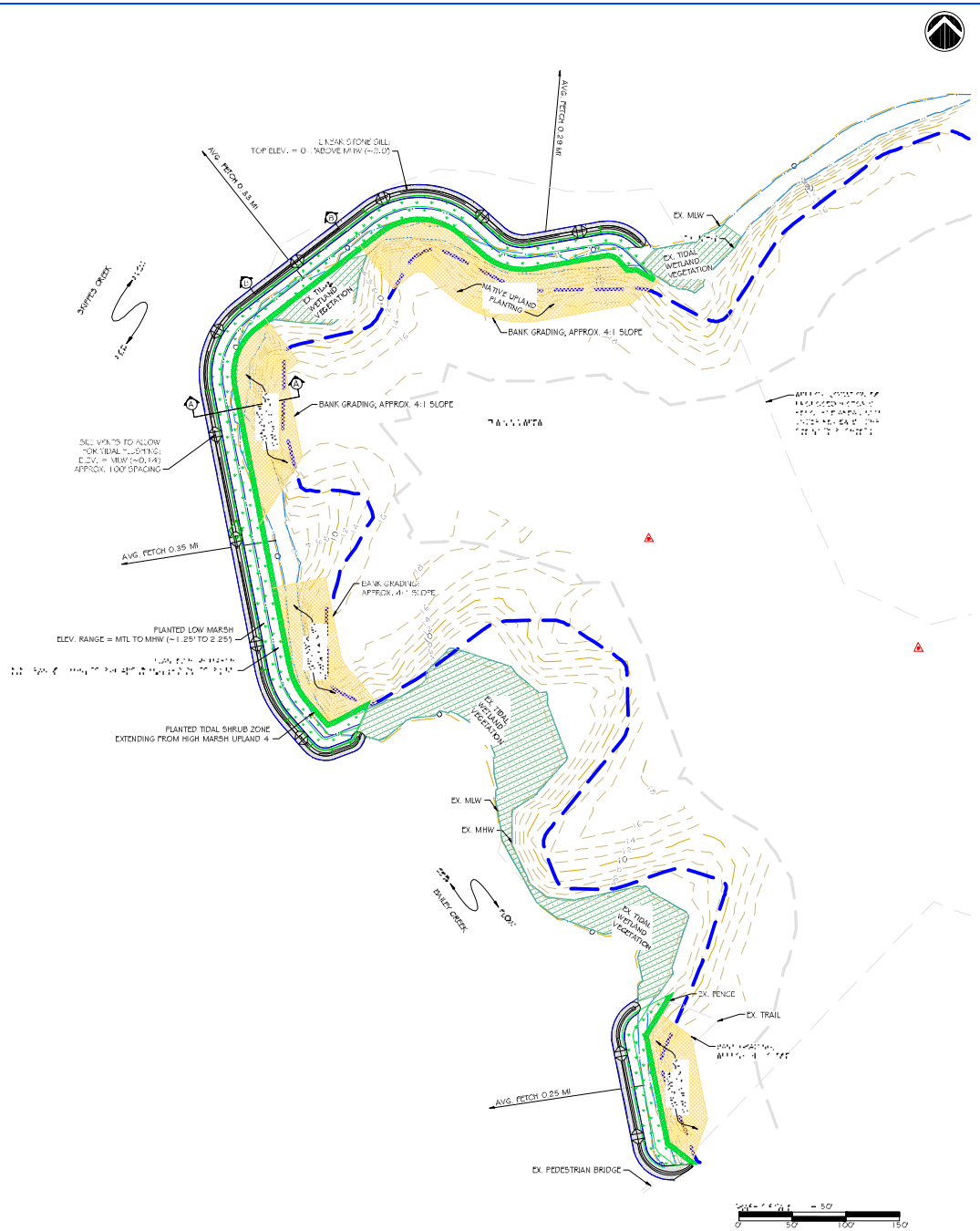
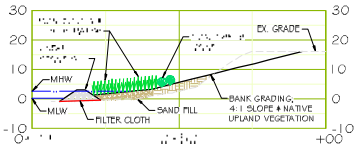
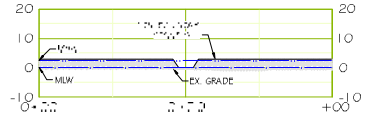


NARRATIVE



A-A TYPICAL BANK SECTION



B-B TYPICAL SILL SECTION

GRAPHIC SCALE: 1" = 20'

LIVING SHORELINE SCHEMATIC

ANGLER ENVIRONMENTAL
CORPORATE | 1387 TELEPHONE ROAD, WARRENTON, VIRGINIA 20187
P: 703.393.4844 | F: 703.393.3954
RICHMOND | 3751 WESTERRE PARKWAY, SUITE A, RICHMOND, VIRGINIA 23233
P: 804.353.6077 | F: 804.353.6018
MARYLAND | 1434 ODENTON ROAD, ODENTON, MARYLAND 21113
P: 443.872.4260 | F: 410.672.4235

OPTION B

FORT EUSTIS, VIRGINIA

REVISIONS:
1

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/2/2015
SHEET NO:	4 OF 5

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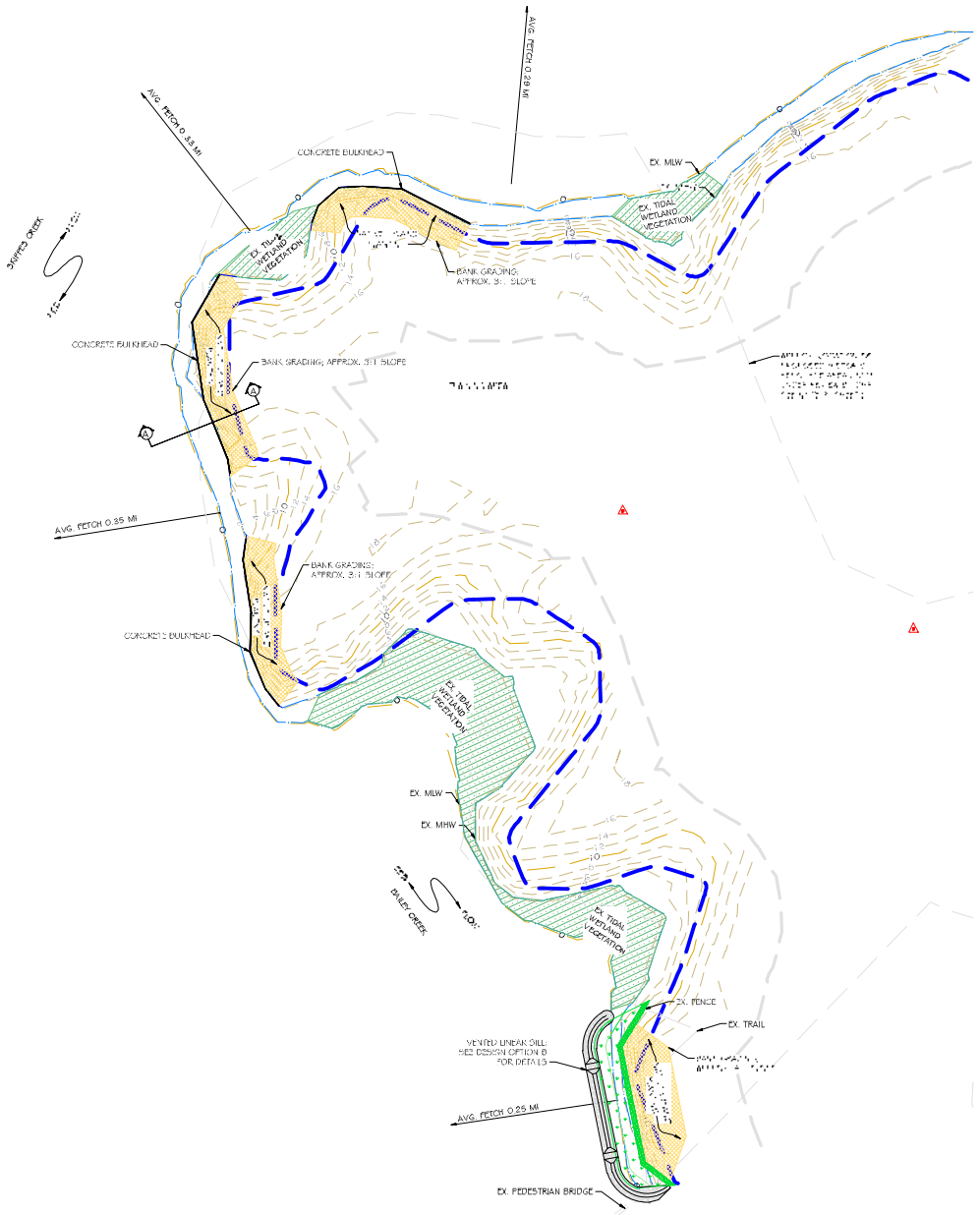
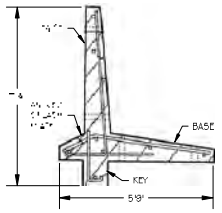


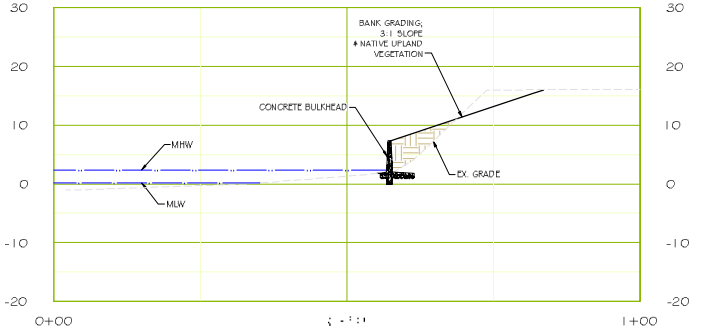
NARRATIVE

LEGEND

- PROPOSED MEAN HIGH WATER LINE
- PROPOSED GRADE
- PROPOSED BULKHEAD
- PROPOSED BANK GRADING
- COMPACTED SOIL FILL
- PROPOSED ROCK SILL
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE



TYP. PRECAST CONCRETE BULKHEAD
(BASIS OF DESIGN SEAMENT SHORELINE SYSTEMS L-WALL)



A-A TYPICAL BULKHEAD / BANK SECTION

0
10
20
30

ANGLER ENVIRONMENTAL
CORPORATE | 1367 TELEPHONE ROAD, WARRENTON, VIRGINIA 20187 | P: 703.393.4844 | F: 703.393.3954
RICHMOND | 3751 WESTERRE PARKWAY, SUITE A, RICHMOND, VIRGINIA 23233 | P: 804.353.6017 | F: 804.353.6018
MARYLAND | 1434 ODENTON ROAD, ODENTON, MARYLAND 21113 | P: 410.672.4250 | F: 410.672.4235

OPTION C

FORT EUSTIS, VIRGINIA

REVISIONS:
1

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/2/2015
SHEET NO:	5 OF 5

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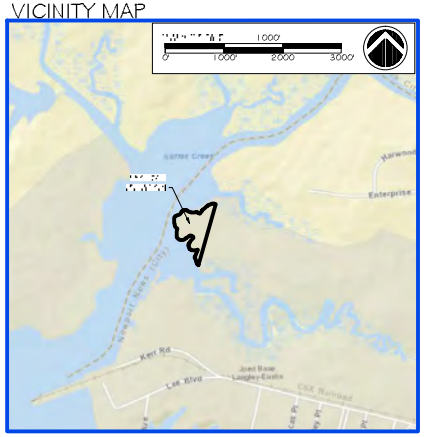
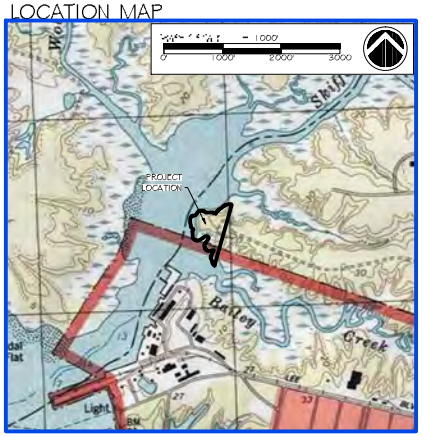
FT. EUSTIS TRAINING AREA (TA) 1 SHORELINE EROSION CORRECTIVE ACTION PLAN
FORT EUSTIS, VIRGINIA

VICINITY MAP



LOCATION MAP



LATITUDE: N 37° 10' 28.9"
LONGITUDE: W 76° 36' 3.3"

[illegible]

SHEET INDEX:

[illegible]
2 - [illegible]
3 - OPTION A
4 - OPTION B
5 - OPTION C

[illegible]

[illegible]

[illegible]

EXISTING CONDITIONS

FORT EUSTIS, VIRGINIA

ANGLER ENVIRONMENTAL
CORPORATE | 5367 TELEPHONE ROAD, WARRENTON, VIRGINIA 20187
P. 703.393.4644 | F. 703.393.3934
RICHMOND | 3731 WESTERRE PARKWAY, SUITE A, RICHMOND, VIRGINIA 23233
P. 804.353.6017 | F. 804.353.6018
MARYLAND | 1454 ODENTON ROAD, ODENTON, MARYLAND 21113
P. 410.672.4224 | F. 410.672.4336

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
QC REVIEW:	MSC
CONTRACT NO.:	4600
DATE:	06/29/2015
SHEET NO:	2 OF 5

REVISIONS

LEGEND

GRAPHIC SCALE 1" = 50'
0 50 100 150

EX. MLW
EX. TIDAL WETLAND VEGETATION
AVG. FETCH 0.29 MI
AVG. FETCH 0.38 MI
AVG. FETCH 0.95 MI
SKIFFES CREEK
FLOW
EX. MLW
EX. MHW
EX. TIDAL WETLAND VEGETATION
BAILEY CREEK
FLOW
EX. TIDAL WETLAND VEGETATION
EX. FENCE
EX. TRAIL
AVG. FETCH 0.25 MI
EX. PEDESTRIAN BRIDGE

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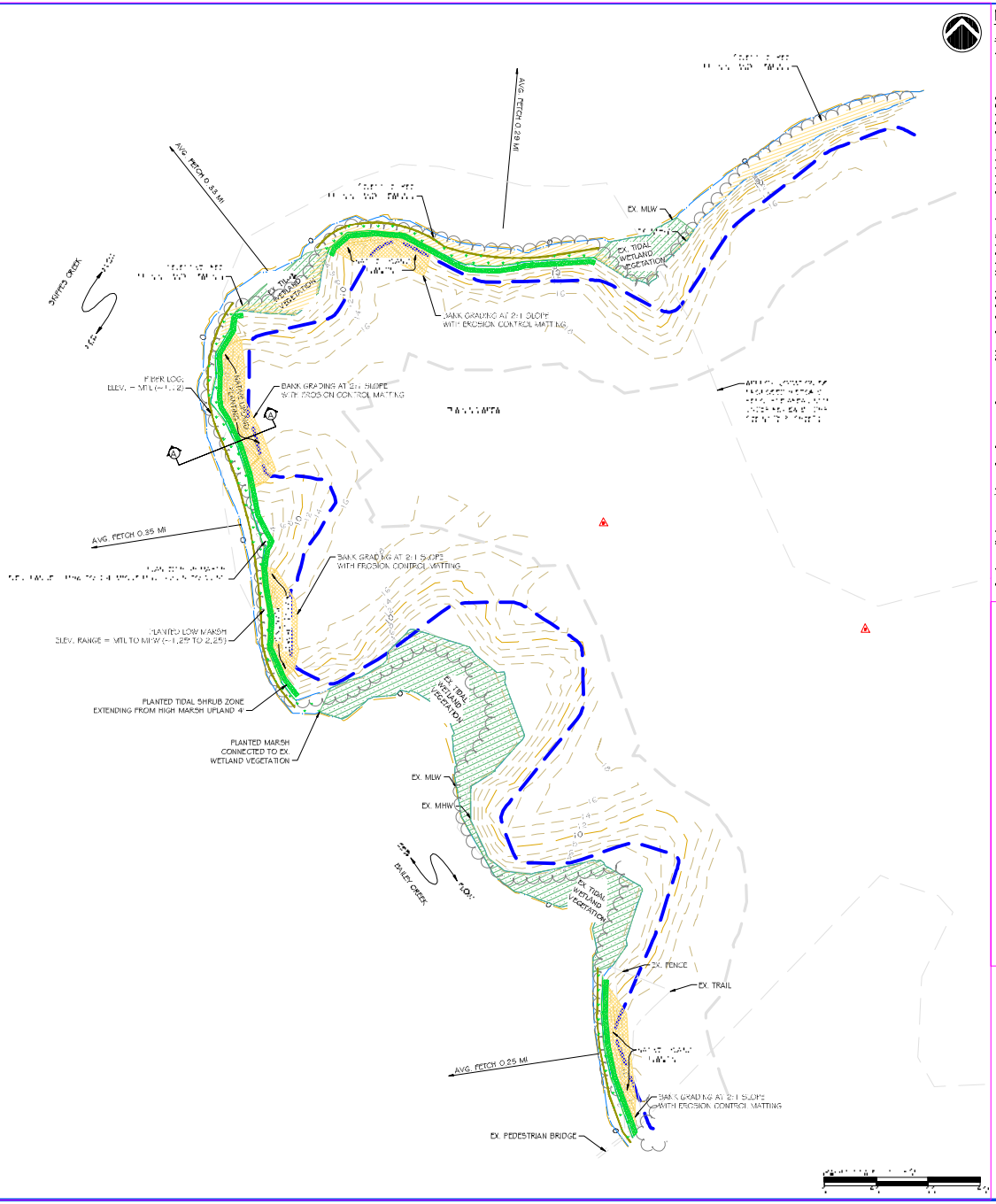
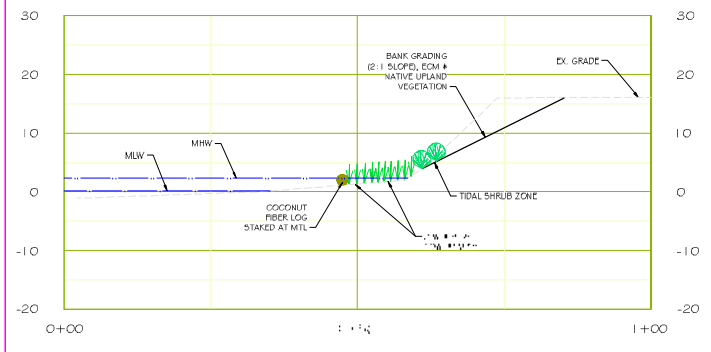


NARRATIVE

LEGEND



GRAPHIC SCALE: 1" = 10'

0 10 20 30

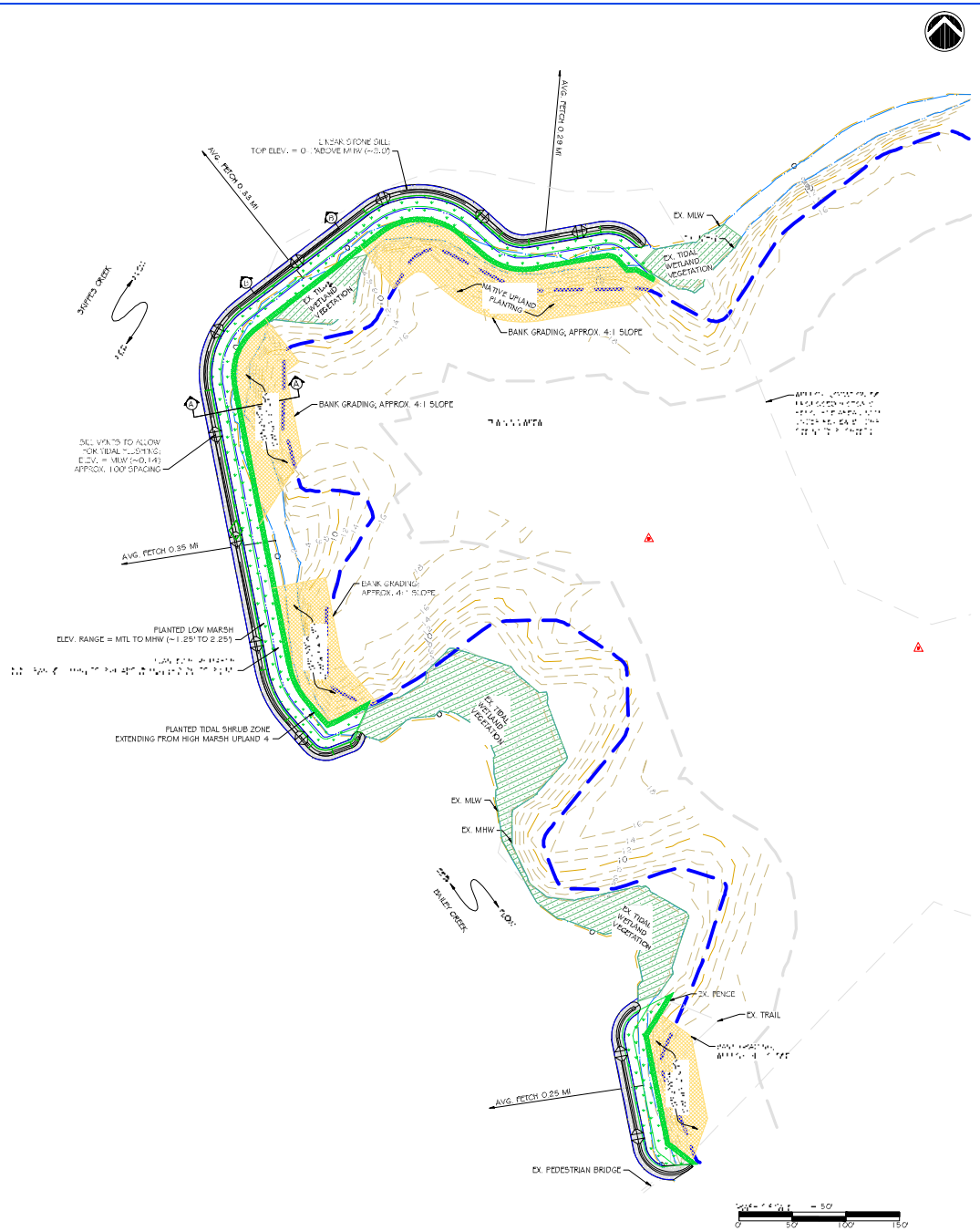
ANGLER ENVIRONMENTAL
CORPORATE | 1367 TELEPHONE ROAD, WARRENTON, VIRGINIA 20187
P: 703.393.4844 | F: 703.393.3954
RICHMOND | 3751 WESTERRE PARKWAY, SUITE A, RICHMOND, VIRGINIA 23233
P: 804.353.6017 | F: 804.353.6018
MARYLAND | 1434 ODENTON ROAD, ODENTON, MARYLAND 21113
P: 410.672.4250 | F: 410.672.4255

OPTION A

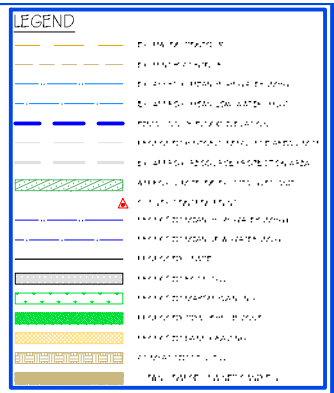
FORT EUSTIS, VIRGINIA

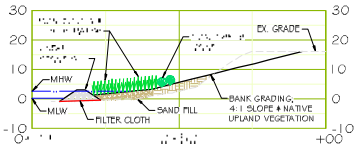
REVISIONS:
1

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/2/2015
SHEET NO:	3OF 5

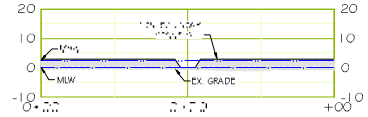


NARRATIVE





A-A TYPICAL BANK SECTION



B-B TYPICAL SILL SECTION

GRAPHIC SCALE: 1" = 20'
0 20 30 40

LIVING SHORELINE SCHEMATIC

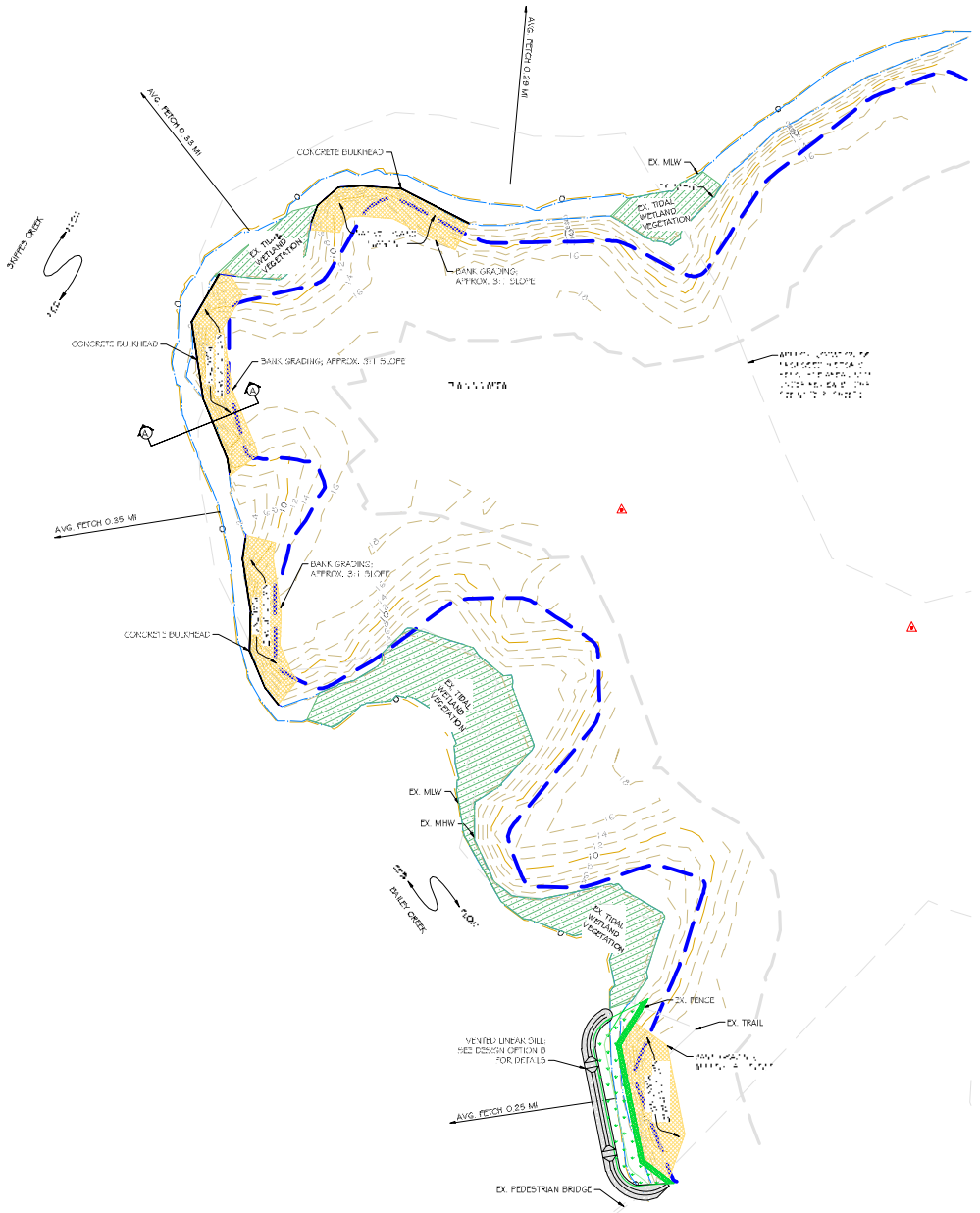
ANGLER ENVIRONMENTAL
CORPORATE | 1367 TELEPHONE ROAD, WARRENTON, VIRGINIA 20187
P: 703.393.4844 | F: 703.393.3954
RICHMOND | 3751 WESTERRE PARKWAY, SUITE A, RICHMOND, VIRGINIA 23233
P: 804.353.6077 | F: 804.353.6018
MARYLAND | 1434 ODENTON ROAD, ODENTON, MARYLAND 21113
P: 443.872.4260 | F: 410.672.4235

OPTION B

FORT EUSTIS, VIRGINIA

REVISIONS:
1

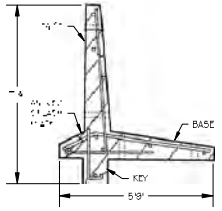
PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/2/2015
SHEET NO:	4 OF 5



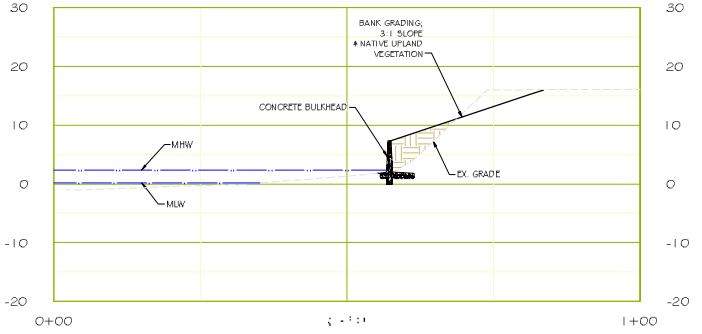
NARRATIVE

LEGEND

- PROPOSED MEAN HIGH WATER LINE
- PROPOSED GRADE
- PROPOSED BULKHEAD
- PROPOSED BANK GRADING
- COMPACTED SOIL FILL
- PROPOSED ROCK SILL
- PROPOSED MARSH PLANTING
- PROPOSED TIDAL SHRUB ZONE



TYP. PRECAST CONCRETE BULKHEAD
(BASIS OF DESIGN SEAMENT SHORELINE SYSTEMS L-WALL)



A-A TYPICAL BULKHEAD / BANK SECTION

ANGLER ENVIRONMENTAL
CORPORATE | 1387 TELEPHONE ROAD, WARRENTON, VIRGINIA 20187
P: 703.393.4844 | F: 703.393.3954
RICHMOND | 3751 WESTERRE PARKWAY, SUITE A, RICHMOND, VIRGINIA 23233
P: 804.353.6077 | F: 804.353.6018
MARYLAND | 1434 ODENTON ROAD, ODENTON, MARYLAND 21113
P: 443.692.4260 | F: 410.672.4235

OPTION C

FORT EUSTIS, VIRGINIA

REVISIONS:
1

PROJECT MANAGER:	RA
DESIGNED:	BW
DRAWN:	BW
JOB NUMBER:	4857
DESIGN TYPE:	CONCEPTUAL CAP
DATE:	6/2/2015
SHEET NO:	5 OF 5

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APPENDIX D

COASTAL ZONE MANAGEMENT ACT, FEDERAL CONSISTENCY DETERMINATION

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS, 733d MISSION SUPPORT GROUP
JOINT BASE LANGLEY-EUSTIS
FORT EUSTIS, VIRGINIA

24 January 2020

Ms. Laura McKay
Virginia Coastal Zone Management Program Manager
Virginia Department of Environmental Quality
P.O. Box 1105
Richmond, VA 23219

Dear Ms. McKay

The US Air Force (Air Force) is submitting the enclosed Federal Consistency Determination, pursuant to Section 307 of the Coastal Zone Management Act (CZMA) of 1972 (16 US Code [USC] § 1456, as amended), and 15 Code of Federal Regulations (CFR) Part 930, Subpart C for the proposed shoreline stabilization and erosion protection project at Training Area 1 (TA1) at Joint Base Langley Eustis-Eustis (JBLE-Eustis) in the City of Newport News, Virginia, henceforth referred to as the "Proposed Action".

The purpose of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land (and associated resources) at JBLE-Eustis TA1. The need for the Proposed Action is to protect available training land in order to maintain the quality of the training necessary to meet JBLE-Eustis mission and national defense requirements. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis. In addition to the loss of land and natural resources, erosion would continue to impact an adjacent National Register of Historic Places (NRHP) eligible archaeological site.

The Proposed Action is within the City of Newport News, which is in Virginia's coastal zone; thus, the Proposed Action would have the potential to affect Virginia's coastal uses or resources. Based on the analysis presented in the attached Federal Consistency Determination, the Air Force has determined the Proposed Action would be consistent to the maximum extent practicable with the enforceable policies of Virginia's Coastal Zone Management Program.

Please forward any comments or questions about this proposal to the Environmental Element (733 CED/CEIE), 1407 Washington Blvd, Fort Eustis, VA 23604, or by email to donald.w.calder.civ@mail.mil, within 30 days of receipt of this letter.

Sincerely

DONALD W. CALDER, JR.
Chief, Environmental Element
733d Civil Engineer Division

Attachment:
Federal Consistency Determination for Training Area 1 Shoreline Stabilization and Erosion Protection Project

FEDERAL CONSISTENCY DETERMINATION
PROPOSED TRAINING AREA 1 SHORELINE STABILIZATION AND EROSION PROTECTION PROJECT AT JOINT BASE LANGLEY- EUSTIS
NEWPORT NEWS, VIRGINIA

This document provides the Commonwealth of Virginia with the US Air Force's (Air Force) Federal Consistency Determination in accordance with Coastal Zone Management Act (CZMA) section 307(c)(1) [or (2)] and 15 CFR Part 930, Subpart C, for the proposed shoreline stabilization and erosion protection at Training Area 1 (TA1) in Joint Base Langley Eustis-Eustis (JBLE-Eustis), in the City of Newport News, Virginia (VA). The information in this Federal Consistency Determination is provided pursuant to 15 CFR §930.39.

The Proposed Action would occur in Virginia's coastal zone. Therefore, the Air Force is required to determine the consistency of the Proposed Action and potential effects on Virginia's coastal resources or uses with the Virginia Coastal Zone Management (CZM) Program.

This consistency determination represents an analysis of the Proposed Action that considers the established Enforceable Policies comprising Virginia's CZM Program. Submission of this consistency determination reflects the commitment of the Air Force to comply to the maximum extent practicable with those Enforceable Policies. The Proposed Action would be operated and implemented in a manner consistent with the Virginia CZM Program.

The Air Force has determined that the effects of the Proposed Action would be less than significant on land and water uses and natural resources of the Commonwealth of Virginia's coastal zone, and is consistent to the maximum extent practicable with the enforceable policies of the CZM Program.

FEDERAL AGENCY ACTION

The Proposed Action would include the implementation of appropriate stabilization techniques to protect TA1's 1,800 linear feet (LF) of contiguous shoreline along Bailey Creek and Skiffes Creek (Figure 1). Virginia's coastal zone encompasses JBLE-Eustis; thus, the Proposed Action would have the potential to affect Virginia's coastal uses or resources. Therefore, the Air Force is required to determine the Proposed Action's consistency with the enforceable policies of Virginia's federally approved CZM Program.

PURPOSE AND NEED

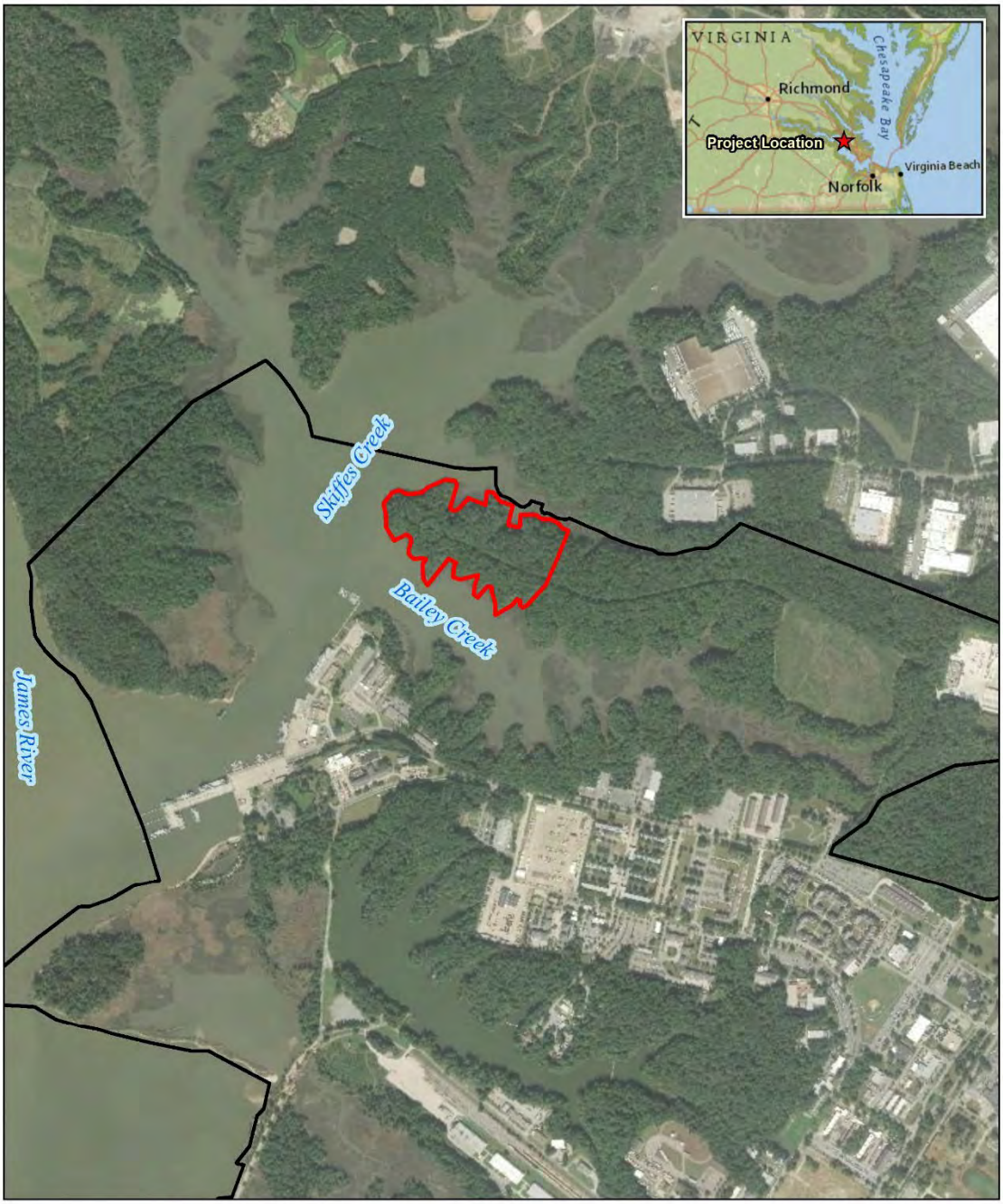
The purpose of the Proposed Action is to stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land at the TA1 site located at JBLE-Eustis. The need for the Proposed Action is to protect available training land in order to maintain the quality of the training necessary to meet JBLE-Eustis mission and national defense requirements.

The primary mission at JBLE-Eustis is to provide mission-ready soldiers, civilians, and leaders to combatant commanders in support of joint and combined operations worldwide. JBLE-Eustis requires appropriate and suitable operational space to host the Army and Air Force to train service members in transportation, aviation maintenance, logistics and deployment doctrine, and applicable Department of Defense, State, and Federal requirements. TA1 was approximately 50 acres at inception; however, the long-term shoreline erosion loss along Skiffes Creek is estimated to be 0.6 feet per year. Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE-Eustis.

SUMMARY OF PROPOSED ACTION AND ANTICIPATED EFFECTS

The Proposed Action involves stabilizing and protecting TA1's shoreline. Construction would be conducted over the course of approximately one year, beginning with site preparation, including vegetation clearing and grubbing. After implementation of appropriate stabilization techniques, revegetation would occur and the appropriate marsh, shrub zones, and/or bank areas would be planted. As part of the vegetation management program, additional stabilization erosion control matting would protect the graded areas from erosion and the newly-planted vegetation from waterfowl until the vegetation can become established.

Figure 1. Proposed Project Location, JBLE-Eustis



Basemap Source: DigitalGlobe 2016 Aerial and National Geographic World Map

The Air Force is considering three proposed alternatives towards meeting the objectives and goals of the Proposed Action:

1) Alternative A – Marsh Management

Construction of Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. This alternative would be implemented in areas higher than the mean tide level where there is minimal wave action and boat wake. This alternative includes proposed adjacent bank grading, a fiber log, vegetation restoration, and long-term vegetation management.

Approximately 875 LF of fiber (a coconut fiber, or coir) log would be placed at mean tide level to protect existing and enhanced marsh. Slopes behind the coir log would be graded to between 8:1 and 10:1. Behind the coir log (i.e., upgradient), existing marsh areas would be enhanced and new marsh areas would be planted with smooth cordgrass (*Spartina alterniflora*), saltmeadow cordgrass (*Spartina patens*), and saltgrass (*Distichlis spicata*). Beyond the high marsh, a 4-foot wide tidal shrub zone would be planted with marsh elder (*Iva frutescens*) and groundsel tree (*Baccharis halimifolia*) to help stabilize the toe of the slope. Where necessary, banks would be graded to a slope of 2:1 to repair the steep, unstable banks and prevent future erosion. Permanent stabilization would be obtained with the installation of 4,480-LF of erosion control matting.

A long-term vegetation management and maintenance program involving selective tree pruning and clearing, shoreline debris removal, visual inspections and maintenance, and supplemental plantings, would be necessary to maintain this alternative.

2) Alternative B – Living Shoreline

Alternative B would employ a living shoreline design to create a structural solution that maintains the natural functionality and connectivity of the existing ecosystem. This alternative includes proposed adjacent bank grading, a stone structure, an oyster reef, vegetation restoration, and long-term vegetation management.

Approximately 1,150 LF of a stone structure called a "sill" would be constructed. A sill is used to contain sand fill that is placed to support a newly planted marsh area. Banks behind the sill would be graded to range between slopes of 8:1 and 10:1. A low and high marsh and a tidal shrub zone would be planted in the same manner as Alternative A. Additionally, Alternative B includes the application of a native upland seed mix to be blended with the existing vegetation, creating a connected ecosystem.

Alternative B would also include the construction of structural, man-made oyster reefs. The oyster reefs would be concrete/granite structures constructed within shallow, near-shore water adjacent to the shoreline. Once complete, the oyster reefs would serve as a barrier between the near- and far-shore, thereby aiding in the protection of the shoreline. The oyster reefs would be installed such that they provide appropriate substrate and habitat for the eastern oyster *(Crassostrea virginica*) and blue crab (*Callinectes sapidus*). These man-made habitat structures intend to promote the recovery and/or enhancement of habitat for these species and promote overall shoreline and near-shore biodiversity.

A long-term vegetation management and maintenance program identical to Alternative A would be necessary to maintain Alternative B. Additionally, long-term management of the oyster reefs would be required to monitor the oyster reefs' performance and integrity over time.

3) Alternative C – Concrete Bulkhead

Alternative C would include the construction of 500 LF of precast concrete walls ("bulkheads") for the purposes of stabilizing sections of eroded shoreline, and focusing on bluff areas that have eroded into steep and unstable banks. Bulkheads would also be constructed in areas where there is frequent navigation as more environmentally preferred designs would preclude or impair navigation use. During construction of Alternative C, bulkheads would be placed in an excavated trench before compacted soil backfill is placed in the trench on top of the rear anchor to hold the bulkhead in place.

Banks adjacent to the bulkhead would be graded to slopes ranging from between 6:1 and 3:1. Unlike Alternatives A and B, a steeply sloped bank could remain in some cases, as upland areas would not be exposed to regular wave action with the implementation of a bulkhead.

Like Alternative B, Alternative C would also include a 200-LF sill along the eroded shoreline adjacent to a pedestrian bridge. In addition, a low and high marsh and a tidal shrub zone would be planted in the same manner as Alternative A. Long-term vegetation management and maintenance program would be necessary to maintain Alternative C and would be the same as described for Alternative A.

ENFORCEABLE POLICIES

The Commonwealth of Virginia has developed and implemented the federally-approved CZM Program encompassing nine enforceable policies for the coastal area pertaining to:

1. Fisheries management
2. Subaqueous lands management
3. Tidal and non-tidal wetlands management
4. Dunes management
5. Non-point source pollution control
6. Point source pollution control
7. Shoreline sanitation
8. Air pollution control
9. Coastal lands management

An analysis of how the Proposed Action would affect each of the enforceable policies is presented below. **Table 1** provides a summary of the Proposed Action's applicability to the enforceable policies. Based upon the analysis, the Air Force finds that the Proposed Action is consistent to the maximum extent practicable with the enforceable policies of the Virginia CZM Program.

Table 1. Enforceable Policies of the CZM Program and Consistency Determination

Policy	Policy Reference	Applicability or Consistency
Fisheries Management	Code of Virginia § 28.2-200 - 28.2-713, § 29.1-100 - 29.1-570, § 3.2-3904 - 3.2-3937	**YES**
Subaqueous Lands Management	Code of Virginia § 28.2-1200 - 28.2-1213	**YES**
Tidal and Nontidal Wetlands Management	Code of Virginia § 28.2-1301 - § 28.2-1320, § 62.1-44.15.5	**YES**
Dunes Management	Code of Virginia § 28.2-1400 - 28.2-1420	**Not Applicable (NA)**
Non-point Source Pollution Control	Code of Virginia § 62.1-44.15:51 *et. seq.*	**YES**
Point Source Pollution Control	Code of Virginia § 62.1-44.15	**NA**
Shoreline Sanitation	Code of Virginia § 32.1-164 - § 32.1-165	**NA**
Air Pollution Control	Code of Virginia § 10-1.1300 - §10.1-1320)	**YES**
Coastal Lands Management	Code of Virginia § 62.1-44.15:67 - 62.1-44.15:79; VAC 25-830-10 *et seq.*	**YES**

Fisheries Management

The program stresses the conservation and enhancement of finfish and shellfish resources and the promotion of commercial and recreational fisheries to maximize food production and recreational opportunities. This program is administered by the Marine Resources Commission (MRC) (Virginia Code §28.2-200 through §28.2-713) and the Department of Game and Inland Fisheries (DGIF) (Virginia Code §29.1-100 through §29.1-570).

The State Tributyltin (TBT) Regulatory Program has been added to the Fisheries Management program.

The General Assembly amended the Virginia Pesticide Use and Application Act as it related to the possession, sale, or use of marine antifoulant paints containing Tributyltin (TBT). The use of TBT in boat paint constitutes a serious threat to important marine animal species. The TBT program monitors boating activities and boat painting activities to ensure compliance with TBT regulations promulgated pursuant to the amendment. The MRC, DGIF, and Virginia Department of Agriculture and Consumer Services share enforcement responsibilities (Virginia Code §3.2-3904 and §3.2-3935 to §3.2-3937).

Consistent to the Maximum Extent Practicable? **YES**

Analysis

The Proposed Action does not involve the use of TBT. In-water activities associated with the Proposed Action would have no potential to affect commercial and recreational fisheries. While construction activities may result in temporary disturbance to aquatic species, impacts would be avoided or minimized through construction Best Management Practices (BMPs) (e.g., sediment curtains and containment booms). In the long term, the Proposed Action would improve water quality and benefit aquatic habitats. In addition, if Alternative B is implemented, new oyster reefs would be established to promote rehabilitation of the eastern oyster and blue crab. Therefore, the Proposed Action would be consistent to the maximum extent practicable.

Subaqueous Lands Management

The management program for subaqueous lands establishes conditions for granting or denying permits to use state-owned bottomlands based on considerations of potential effects on marine and fisheries resources, wetlands, adjacent or nearby properties, anticipated public and private benefits, and water quality standards established by the Virginia Department of Environmental Quality (DEQ) Water Division. The program is administered by the MRC (Virginia Code §28.2-1200 through §28.2-1213).

Consistent to the Maximum Extent Practicable? **YES**

Analysis

The construction and placement of in-water erosion protection measures, such as concrete bulkheads and sills under Alternatives B and C, would have the potential to disturb subaqueous bottomlands in Bailey Creek and Skiffes Creek, tributaries to the James River. Water depths vary from less than 2 meters surrounding the project area to approximately 3 meters in the center of Skiffes Creek. While Alternative A would not require structural improvements, grading, earthwork, and marsh planting activities would increase turbidity and sedimentation, potentially affecting subaqueous bottomlands as well.

The area where in-water work associated with the Proposed Action would occur would vary slightly depending on which alternative is implemented, but would not exceed approximately 1,800-LF in length parallel to the shoreline of TA1. The Air Force would minimize disturbance of subaqueous bottomlands during in-water activities to the extent practicable. Containment booms and sediment curtains would be used during in-water and nearshore work to prevent the migration of disturbed sediment into the water column and to minimize turbidity. If determined necessary through consultation with the Virginia Department of Environmental Quality (VDEQ) and other applicable regulatory agencies, the Air Force would submit a Joint Permit Application (JPA) for review and/or authorization from the Virginia Marine Resources Commission (VMRC), VDEQ, and/or Local Wetlands Board (LWB) to work in the tidal waters and wetlands of Bailey Creek and Skiffes Creek.

Once complete, the Proposed Action would significantly minimize erosion at TA1, subsequently decreasing sedimentation in Bailey Creek and Skiffes Creek; thus, having long-term beneficial effects on subaqueous bottomland habitats. For these reasons, the Proposed Action would be consistent to the maximum extent practicable with this enforceable policy.

Tidal and Nontidal Wetlands Management

The purpose of the wetlands' management program is to preserve tidal wetlands, prevent despoliation, and accommodate economic development in a manner consistent with wetlands preservation.

(i) The tidal wetlands program is administered by the MRC (Virginia Code §28.2-1301 through §28.2-1320).

(ii) The Virginia Water Protection (VWP) Permit program, administered by the VDEQ, includes protection of wetlands --both tidal and non-tidal. This program is authorized by Virginia Code §62.1-44.15.20 and §62.1-44.15-21 and the Water Quality Certification requirements of §401 of the Clean Water Act of 1972.

Consistent to the Maximum Extent Practicable? **YES**

Analysis

Construction activities across all Alternatives, in addition to the installation of sills and bulkheads under Alternatives B and C, would cause temporary and permanent impacts on tidal wetlands. However, the Air Force would limit construction activities and disturbance within wetlands to that necessary to position/secure in-water erosion protection measures. Prior to construction, the Air Force would conduct a final site reconnaissance to verify that the limits of disturbance minimize impacts on wetlands to the greatest extent practicable. If determined necessary through consultation with the VDEQ and other applicable regulatory agencies, the Air Force would submit a JPA for review and/or authorization from the VMRC, VDEQ, US Army Corps of Engineers (USACE), and/or the LWB to work in the tidal waters and wetlands of Bailey Creek and Skiffes Creek. It is also anticipated the Proposed Action may qualify for authorization under the USACE Regional Permit 19 (13-RP-19) and meet the requirements of the VDEQ VWP Regulation. Measures identified as part of these permits would be implemented to minimize impacts to jurisdictional waters including water quality, wetlands, and floodplains.

In the long-term, tidal wetlands in the vicinity of the Proposed Action would benefit from the improved stability and resiliency of the TA1 shoreline, as the Proposed Action would result in the protection of existing wetland habitats from shoreline erosion and degradation. Additionally, the strategic planting of tidal shrub and marsh vegetation would create new wetland habitats and contribute to the enhancement of existing wetland habitats. Therefore, the Proposed Action would be consistent to the maximum extent practicable with this enforceable policy.

Dunes Management

Dune protection is carried out pursuant to the Coastal Primary Sand Dune Protection Act and is intended to prevent destruction or alteration of primary dunes. This program is administered by the Marine Resources Commission (Virginia Code §28.2-1400 through §28.2-1420).

Consistent to the Maximum Extent Practicable? **NA**

Analysis

The Proposed Action has no potential to affect sand dunes as none are located on or near the project site; thus, this enforceable policy is not applicable.

Non-point Source Pollution Control

Virginia's Erosion and Sediment Control Law requires soil-disturbing projects to be designed to reduce soil erosion and to decrease inputs of chemical nutrients and sediments to the Chesapeake Bay, its tributaries, and other rivers and waters of the Commonwealth. This program is administered by DEQ (Virginia Code §62.1-44.15:51 et seq.).

Consistent to the Maximum Extent Practicable? **YES**

Analysis

The Proposed Action would involve more than 2,500 square feet of land disturbance. Therefore, as required by JBLE-Eustis' Virginia Pollutant Discharge Elimination System Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems, the Air Force would be required to prepare an erosion and sediment control plan (ESCP) in accordance with 9VAC25-840-40, as well as a stormwater management (SWM) plan in accordance with 9VAC25-870-55. Under Alternatives B and C, the Proposed Action could result in up to 1 acre of land disturbance. If an alternative is implemented that would result in one acre or more of land disturbance, a Construction General Permit (CGP) for the Discharge of Stormwater from Construction Activities would be obtained and a site-specific Stormwater Pollution Prevention Plan (SWPPP) would be implemented to minimize the potential effects of sedimentation to Bailey Creek and Skiffes Creek. Adherence to the requirements of the CGP and ESCP and SWM plans would manage the quantity and quality of stormwater discharge from land-disturbing activities associated with the Proposed Action and would minimize adverse effects on water quality in receiving water bodies. Alternative A would not require a CGP or SWPPP as only up to 0.2 acre of land would be cleared.

Therefore, the Proposed Action would be consistent to the maximum extent practicable with this enforceable policy.

Point Source Pollution Control

The point source program is administered by the State Water Control Board pursuant to Virginia Code §62.1-44.15. Point source pollution control is accomplished through the implementation of the National Pollutant Discharge Elimination System (NPDES) permit program established pursuant to §402 of the federal Clean Water Act and administered in Virginia as the VPDES permit program. The Water Quality Certification requirements of §401 of the Clean Water Act of 1972 is administered under the Virginia Water Protection Permit program.

Consistent to the Maximum Extent Practicable? **NA**

Analysis

This enforceable policy is not applicable because no new point source discharges of stormwater would be created as a result of the Proposed Action.

Shoreline Sanitation

The purpose of this program is to regulate the installation of septic tanks, set standards concerning soil types suitable for septic tanks, and specify minimum distances that tanks must be placed away from streams, rivers, and other waters of the Commonwealth. This program is administered by the Department of Health (Virginia Code §32.1-164 through §32.1-165).

Consistent to the Maximum Extent Practicable? **NA**

Analysis

The Proposed Action would neither involve the installation of new septic tanks nor the modification or alteration of existing septic tanks, as none are located on or in the vicinity of the project site. For these reasons, this enforceable policy is not applicable.

Air Pollution Control

The program implements the Federal Clean Air Act to provide a legally enforceable State Implementation Plan for the attainment and maintenance of the National Ambient Air Quality Standards. This program is administered by the State Air Pollution Control Board (Virginia Code §10.1-1300 through 10.1-1320).

Consistent to the Maximum Extent Practicable? **YES**

Analysis

Use of construction equipment and vehicles across all Alternatives would temporarily increase air emissions. Fugitive dust would also increase as a result of land disturbing activities. However, construction-related emissions would remain below regulatory thresholds for General Conformity Applicability. In the long term, the implementation of the Proposed Action would not involve the installation of new generators or boilers, nor would it result in an increase of vehicle trips to JBLE-Eustis. The Proposed Action would not create a new source of emissions and thus, would not

exceed applicable *de minimis* limits for criteria pollutants regulated under the Clean Air Act. The only long-term emissions would be caused by vehicles and equipment required to implement the long-term vegetation management and maintenance program. However, these emissions would be negligible.

The Air Force's Air Conformity Applicability Model (ACAM) was used to analyze the potential air quality impacts associated with the Proposed Action. Results from ACAM indicate emissions associated with the Proposed Action would not hinder maintenance of the region's National Ambient Air Quality Standards. Therefore, the Proposed Action would be consistent to the maximum extent practicable with this enforceable policy.

Coastal Lands Management

This is a state-local cooperative program administered by the Department of Conservation and Recreation's Division of Stormwater Management – Local Implementation (previously the Division of Chesapeake Bay Local Assistance) and 88 localities in Tidewater, Virginia established pursuant to the Chesapeake Bay Preservation Act; Virginia Code §§ 10.1-2100 through 10.1-2114 and Chesapeake Bay Preservation Area Designation and Management Regulations; Virginia Administrative code 9 VAC10-20-10 et seq.

Consistent to the Maximum Extent Practicable? **YES**

Analysis

The Proposed Action would occur in Chesapeake Bay Resource Protection Areas (RPAs) recognized by JBLE-Eustis. JBLE-Eustis has established RPAs as 100-foot vegetated buffers located adjacent to and landward of all tidal creeks, streams and wetlands. RPAs are maintained with native vegetation to the greatest extent practical.

Under the Proposed Action, RPA disturbance would result from vegetation clearing, and soil excavation, fill, and compaction. Vegetation clearing and soil disturbance would be temporary and limited to the extent needed to complete the proposed shoreline stabilization activities. All disturbance of the RPA would be limited to the portion of the RPA within the Proposed Action area.

Adherence to requirements of the CGP and associated SWPPP, ESCP, and SWM plans during ground-disturbing activities would minimize or prevent the erosion of exposed soils and manage the quantity and quality of stormwater generated on the site, which would be ultimately discharged to either Bailey Creek or Skiffes Creek, and further downstream to the James River and Chesapeake Bay.

In the long term, shoreline stabilization and re-vegetation of the site following completion of construction activities would have favorable effects on RPAs in this part of JBLE-Eustis and aid in restoration and growth of healthy habitats. Therefore, the Proposed Action would be consistent to the maximum extent practicable with this enforceable policy.

CONCLUSION

The Air Force has determined that the Proposed Action would be consistent to the maximum extent practicable with the federally approved enforceable policies of the Virginia CZM Program, pursuant to the CZMA. Pursuant to 15 CFR Section 930.41, the Virginia Department of Environmental Quality has 60 days from the receipt of this letter to concur with or object to this Federal Consistency Determination, or to request an extension under 15 CFR Section 930.41(b). The Commonwealth's concurrence will be presumed if its response is not received by the Air Force on the 60th day from receipt of this determination. The Commonwealth's response should be sent to Mr. Donald Calder by email at donald.w.calder.civ@mail.mil or by mail at 733 Civil Engineer Division, Environmental Element (CED/CEIE), 1407 Washington Blvd, Fort Eustis, VA 23604.

COMMONWEALTH of VIRGINIA

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March 20, 2020

Mr. Donald Calder
733 Civil Engineer Division
Environmental Element (CED/CEIE)
1407 Washington Boulevard
Fort Eustis, Virginia 23604
Via email: donald.w.calder.civ@mail.mil

RE: Federal Consistency Determination for the Training Area 1 Shoreline Stabilization and Shoreline Protection Project, U.S. Air Force, Joint Base Langley Eustis-Eustis, City of Newport News, DEQ 20-018F.

Dear Mr. Calder:

The Commonwealth of Virginia has completed its review of the Federal Consistency Determination (FCD) for the above-referenced project. The Department of Environmental Quality (DEQ) is responsible for coordinating Virginia's review of FCDs submitted under the Coastal Zone Management Act and responding to appropriate officials on behalf of the Commonwealth. This letter is in response to the FCD dated January 24, 2020 (received February 5, 2020), submitted by the U.S. Air Force at Joint Base Langley Eustis-Eustis. The following agencies participated in this review:

Department of Environmental Quality
Department of Game and Inland Fisheries
Department of Conservation and Recreation
Marine Resources Commission
Department of Historic Resources
Department of Health
Virginia Institute of Marine Science

In addition, the Hampton Roads Planning District Commission and City of Newport News were invited to comment on the proposal.

PROJECT DESCRIPTION

The U.S. Air Force (Air Force) proposes to install shoreline stabilization and erosion protection measures at Joint Base Langley Eustis-Eustis (JBLE-Eustis) at Training Area 1 (TA1) in the City of Newport News. The Proposed Action would include the implementation of appropriate stabilization techniques to protect TA1's 1,800 linear feet (LF) of contiguous shoreline along Bailey Creek and Skiffes Creek. The Air Force is considering three proposed alternatives:

- Construction of Alternative A would utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. This alternative would be implemented in areas higher than the mean tide level where there is minimal wave action and boat wake. This alternative includes proposed adjacent bank grading, a fiber log, vegetation restoration, and long-term vegetation management.
- Alternative B would employ a living shoreline design to create a structural solution that maintains the natural functionality and connectivity of the existing ecosystem. This alternative includes proposed adjacent bank grading, a stone structure, an oyster reef, vegetation restoration, and long-term vegetation management.
- Alternative C would include the construction of 500 LF of precast concrete walls ("bulkheads") for the purposes of stabilizing sections of eroded shoreline, and focusing on bluff areas that have eroded into steep and unstable banks. Bulkheads would also be constructed in areas where there is frequent navigation as more environmentally preferred designs would preclude or impair navigation use.

Construction would be conducted over the course of approximately one year, beginning with site preparation, including vegetation clearing and grubbing. After implementation of appropriate stabilization techniques, revegetation would occur and the appropriate marsh, shrub zones, and/or bank areas would be planted. As part of the vegetation management program, additional stabilization erosion control matting would protect the graded areas from erosion and the newly-planted vegetation from waterfowl until the vegetation can become established.

PUBLIC PARTICIPATION

In accordance with Title 15, Code of Federal Regulations (CFR), §930.42, the public was invited to participate in the review of the FCD. Public notice of this proposed action was published in the OEIR Program Newsletter and on the DEQ website from February 14, 2020 through March 13, 2020. No public comments were received in response to the notice.

FEDERAL CONSISTENCY UNDER THE COASTAL ZONE MANAGEMENT ACT

Pursuant to the Coastal Zone Management Act of 1972 (CZMA), as amended, and the federal consistency regulations implementing the CZMA (15 CFR, Part 930, Subpart C, Section 930.30 *et seq*.), federal activities located inside or outside of Virginia's designated coastal management area that can have reasonably foreseeable effects on coastal resources or coastal uses must be implemented in a manner consistent, to the maximum extent practicable, with the Virginia Coastal Zone Management (CZM) Program. The Virginia CZM Program consists of a network of programs administered by several agencies. The DEQ coordinates the review of FCDs with agencies administering the enforceable and advisory policies of the Program.

FEDERAL CONSISTENCY CONCURRENCE

Based on our review of the consistency determination and the comments submitted by agencies administering the enforceable policies of the Virginia CZM Program, DEQ concurs that the proposal is consistent to the maximum extent practicable with the Program provided all applicable permits and approvals are obtained as described below. If, prior to implementation, the proposed activities should change significantly and any of the enforceable policies of the Virginia CZM Program would be affected, pursuant to 15 CFR, Part 930, Subpart C, §930.46(a), the Air Force must submit supplemental information to DEQ for review and approval. However, other state approvals which may apply to this project are not included in this consistency concurrence. Therefore, the applicant must ensure that this project is constructed and operated in accordance with all applicable federal, state and local laws and regulations.

FEDERAL CONSISTENCY ANALYSIS

According to information in the FCD, the proposed project would have no effect on the following enforceable policies: dunes management, point source pollution control; and shoreline sanitation. The agencies responsible for the administration of the enforceable policies of the Virginia CZM Program generally agree with the determination. The Air Force must ensure that the proposed action is consistent with the aforementioned policies. In addition, DEQ encourages the Air Force to consider the effects of the proposal on the advisory policies of the Virginia CZM Program in accordance with 15 CFR §930.39(c). The analysis which follows responds to the discussion of the enforceable policies of the Virginia CZM Program that apply to this project and review comments submitted by agencies that administer the enforceable policies.

1. Fisheries Management. According to the FCD (page 5), while construction activities may result in temporary disturbance to aquatic species, impacts would be avoided or minimized through construction Best Management Practices (BMPs) (e.g., sediment curtains and containment booms). In the long term, the Proposed Action would improve water quality and benefit aquatic habitats. In addition, if Alternative B is implemented, new oyster reefs would be established to promote rehabilitation of the eastern oyster and blue crab.

1(a) Agency Jurisdiction. The fisheries management enforceable policy is administered by the Virginia Marine Resources Commission (VMRC) (Virginia Code §28.2-200 to §28.2-713) and the Department of Game and Inland Fisheries (DGIF) (Virginia Code §29.1-100 to §29.1-570). In addition, the Virginia Department of Health (VDH) Division of Shellfish Sanitation (DSS) is responsible for protecting the health of the consumers of molluscan shellfish and crustacea by ensuring that shellfish growing waters are properly classified for harvesting, and that molluscan shellfish and crustacea processing facilities meet sanitation standards.

1(b) Agency Findings.

(i) Virginia Marine Resources Commission

VMRC did not indicate that fish and shellfish resources under its jurisdiction would be adversely impacted by the Proposed Action. VMRC has no objection to the consistency finding provided by the applicant.

(ii) Department of Game and Inland Fisheries

DGIF finds that Bailey Creek and Skiffes Creek have been designated Potential Anadromous Fish Use Areas. In addition, the James River, downstream of this area has been designated a Confirmed Anadromous Fish Use Area. DGIF also documents the federal-listed Endangered Atlantic Sturgeon from the project area. The James River is designated a Threatened and Endangered Species Water due to the presence of this species. However, based on the scope and location of the proposed work, DGIF does not anticipate it to result in adverse impacts upon this species.

DGIF supports the implementation of either Alternative A or Alternative B.

(iii) Virginia Department of Health

VDH-DSS did not comment on the proposal.

1(c) Recommendations.

(i) Protection of Fisheries Resources

The Air Force is encouraged to consider the following measures for the protection of fisheries resources.

- Adhere to a time-of-year restriction from February 15 through June 30 of any year.
- Conduct instream activities during low- or no-flow conditions.
- Use non-erodible cofferdams or turbidity curtains to isolate the construction area.

- Block no more than 50% of the streamflow at any given time (minimal overlap of construction footprint notwithstanding).
- Stockpile excavated material in a manner that prevents reentry into the stream.
- Restore original streambed and streambank contours.
- Revegetate barren areas with native vegetation.
- Implement strict erosion and sediment control measures.
- Design and perform instream work in a manner that minimizes impacts upon natural streamflow and movement of resident aquatic species.
- Use matting made from natural/organic materials such as coir fiber, jute, and/or burlap to minimize potential wildlife entanglements resulting from use of synthetic/plastic erosion and sediment control matting.
- Install concrete (e.g. Tremie method, grout bags, and poured concrete) “in the dry” to allow the concrete to harden and cure prior to contact with open water to minimize harm to the aquatic environment.

(ii) Atlantic Sturgeon

Coordinate with the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) regarding potential impacts upon Atlantic Sturgeon.

1(d) Conclusion. The Proposed Action is consistent to the maximum extent practicable with the fisheries management enforceable policy of the Virginia CZM Program, provided project activities adhere to erosion and sediment controls.

For additional information regarding these comments, contact VMRC, Allison Lay at (757) 247-2254 or allison.lay@mrc.virginia.gov, DGIF, Amy Ewing at (804) 367-2211 or amy.ewing@dgif.virginia.gov, and/or VDH-DSS, Adam Wood at (804) 864-7479 or adam.wood@vdh.virginia.gov.

2. Subaqueous Lands Management. According to the FCD (page 5), the construction and placement of in-water erosion protection measures, such as concrete bulkheads and sills under Alternatives B and C, would have the potential to disturb subaqueous bottomlands in Bailey Creek and Skiffes Creek, tributaries to the James River. While Alternative A would not require structural improvements, grading, earthwork, and marsh planting activities would increase turbidity and sedimentation, potentially affecting subaqueous bottomlands. The Air Force will consult with the Virginia Marine Resources Commission on the submission of a Joint Permit Application (JPA) for review and/or authorization for work in Bailey and Skiffes Creeks.

2(a) Agency Jurisdiction. The management program for subaqueous lands establishes conditions for granting or denying permits to use state-owned bottomlands based on considerations of potential effects on marine and fisheries resources, tidal wetlands, adjacent or nearby properties, anticipated public and private benefits, and water quality standards established by the Department of Environmental Quality. The program is administered by the Virginia Marine Resources Commission (Virginia Code §28.2-1200 to §28.2-1213).

2(b) Agency Findings. VMRC finds that a submerged bottomland permit will be required if structures are placed channelward of mean low water. Per §104.1 of Title 28.2 of the Code of Virginia, living shorelines (Alternative B) are the preferred alternative for stabilizing shorelines in the Commonwealth. VMRC has no objection to the consistency finding provided by the applicant.

2(c) Requirement. The Air Force must coordinate with VMRC to ensure project consistency with the subaqueous lands management enforceable policy. VMRC serves as the clearinghouse for agency review under the JPA process. The submission of a JPA to VMRC initiates reviews by VMRC, DEQ, local wetlands board, and U.S. Army Corps of Engineers.

2(d) Conclusion. The Proposed Action is consistent to the maximum extent practicable with the subaqueous lands management enforceable policy of the Virginia CZM Program, provided the Air Force coordinates with the VMRC on anticipated impacts to state bottomlands.

3. Wetlands Management. According to the FCD (page 6), construction activities across all Alternatives, in addition to the installation of sills and bulkheads under Alternatives B and C, would cause temporary and permanent impacts on tidal wetlands. Prior to construction, the Air Force would conduct a final site reconnaissance to verify that the limits of disturbance minimize impacts on wetlands to the greatest extent practicable. If determined necessary through consultation with DEQ and other applicable regulatory agencies, the Air Force will submit a JPA for review and/or authorization to work in the tidal waters and wetlands of Bailey Creek and Skiffes Creek. It is anticipated the Proposed Action may qualify for authorization under the Corps Regional Permit 19 (13-RP-19).

3(a) Agency Jurisdiction. The wetlands management enforceable policy is administered by the Virginia Marine Resources Commission (tidal wetlands) (Virginia Code §28.2-1301 through 28.2-1320) and the Department of Environmental Quality through the Virginia Water Protection Permit program (tidal and non-tidal wetlands) (Virginia Code §62.1-44.15:20 and Water Quality Certification pursuant to Section 401 of the Clean Water Act).

3(b) Agency Findings.

(i) Virginia Marine Resources Commission

VMRC finds that a wetlands permit from the Newport News Wetlands Board will be required for any fill placed in tidal wetlands. VMRC has no objection to the consistency finding provided by the applicant.

(ii) Department of Environmental Quality

The Virginia Water Protection (VWP) Permit program at the DEQ Tidewater Regional Office (TRO) finds that the Proposed Action will result in impacts to tidal wetland and waters and will require the submittal of a JPA.

3(c) Requirements. Permanent or temporary impacts to surface waters and wetlands may require a permit pursuant to §401 of the Clean Water Act, Virginia Code §62.1-44.15:20, and Virginia Administrative Code 9 VAC 25-210-10 *et seq.* If the project qualifies for a Corps Regional Permit 19 or other regional or nationwide permit which meets any associated DEQ 401 Water Quality Certification conditions, no permit will be required from the VWP Permit program. If the project requires issuance of a Corps Individual Permit, then a VWP Permit or permit waiver will be required. Provided that any and all necessary permits are obtained and complied with, the project will be consistent with DEQ program requirements.

3(d) Recommendations. In general, DEQ recommends that stream and wetland impacts be avoided to the maximum extent practicable. To minimize unavoidable impacts to wetlands and waterways, DEQ recommends the following practices:

- Operate machinery and construction vehicles outside of stream-beds and wetlands; use synthetic mats when in-stream work is unavoidable.
- Preserve the top 12 inches of trench material removed from wetlands for use as wetland seed and root-stock in the excavated area.
- Erosion and sediment controls should be in place prior to clearing and grading, and maintained in good working order to minimize impacts to state waters. The controls should remain in place until the area is stabilized.
- Place heavy equipment, located in temporarily impacted wetland areas, on mats, geotextile fabric, or use other suitable measures to minimize soil disturbance, to the maximum extent practicable.
- Restore all temporarily disturbed wetland areas to pre-construction conditions and plant or seed with appropriate wetlands vegetation in accordance with the cover type (emergent, scrub-shrub, or forested). The applicant should take all appropriate measures to promote revegetation of these areas. Stabilization and restoration efforts should occur immediately after the temporary disturbance of each wetland area instead of waiting until the entire project has been completed.
- Place all materials which are temporarily stockpiled in wetlands, designated for use for the immediate stabilization of wetlands, on mats, geotextile fabric in order to prevent entry in state waters. These materials should be managed in a manner that prevents leachates from entering state waters and must be entirely removed within thirty days following completion of that construction activity. The disturbed areas should be returned to their original contours, stabilized within thirty days following removal of the stockpile, and restored to the original vegetated state.
- Flag or clearly mark all non-impacted surface waters within the project or right-of-way limits that are within 50 feet of any clearing, grading, or filling activities for

the life of the construction activity within that area. The project proponent should notify all contractors that these marked areas are surface waters where no activities are to occur.

- Employ measures to prevent spills of fuels or lubricants into state waters.

3(e) Conclusion. The Proposed Action is consistent to the maximum extent practicable with the wetlands management enforceable policy of the Virginia CZM Program, provided the Air Force obtains and complies with any necessary permitting from the DEQ and Newport News Wetlands Board for impacts to surface waters and wetlands.

4. Nonpoint Source Pollution Control. According to the FCD (page 7), the Proposed Action would involve more than 2,500 square feet of land disturbance. Therefore, the Air Force would prepare an erosion and sediment control plan in accordance with 9 VAC 25-840-40 and a stormwater management plan in accordance with 9 VAC 25-870-55. Under Alternatives B and C, the Proposed Action could result in up to 1 acre of land disturbance. If an alternative is implemented that would result in one acre or more of land disturbance, a Construction General Permit for the Discharge of Stormwater from Construction Activities would be obtained and a site-specific Stormwater Pollution Prevention Plan would be implemented

4(a) Agency Jurisdiction. The DEQ Office of Stormwater Management (OSWM) administers the nonpoint source pollution control enforceable policy of the Virginia CZM Program through Virginia Erosion and Sediment Control Law and *Regulations* (*VESCL&R*) and Virginia Stormwater Management Law and *Regulations* (*VSWML&R*). In addition, DEQ is responsible for the issuance, denial, revocation, termination and enforcement of the Virginia Stormwater Management Program (VSMP) General Permit for Stormwater Discharges from Construction Activities related to municipal separate storm sewer systems (MS4s) and construction activities for the control of stormwater discharges from MS4s and land disturbing activities under the Virginia Stormwater Management Program.

4(b) Requirements.

(i) Erosion and Sediment Control and Stormwater Management Plans

The Air Force and its authorized agents conducting regulated land-disturbing activities on private and public lands in the state must comply with *VESCL&R* and *VSWML&R,* including coverage under the general permit for stormwater discharge from construction activities, and other applicable federal nonpoint source pollution mandates (e.g. Clean Water Act-Section 313, federal consistency under the Coastal Zone Management Act). Clearing and grading activities, installation of staging areas, parking lots, roads, buildings, utilities, borrow areas, soil stockpiles, and related land-disturbing activities that result in the total land disturbance of equal to or greater than 2,500 square feet in a Chesapeake Bay Preservation Area would be regulated by *VESCL&R.* Accordingly, DEQ-OSWM concurs that the Air Force must prepare and implement an erosion and sediment control (ESC) plan to ensure compliance with state law and regulations.

Land-disturbing activities that result in the total land disturbance of equal to or greater than 2,500 square feet in Chesapeake Bay Preservation Area would be regulated by *VSWML&R.* Accordingly, DEQ-OSWM concurs that the Air Force must prepare and implement a Stormwater Management (SWM) plan to ensure compliance with state law and regulations. The ESC/SWM plan is submitted to DEQ-TRO, which serves the area where the project is located, for review for compliance. The Air Force is ultimately responsible for achieving project compliance through oversight of on-site contractors, regular field inspection, prompt action against non-compliant sites, and other mechanisms consistent with agency policy. [Reference: VESCL 62.1-44.15 *et seq*.]

(ii) General Permit for Discharges of Stormwater from Construction Activities (VAR10)

The owner or operator of projects involving land-disturbing activities of equal to or greater than one acre is required to apply for registration coverage under the General Permit for Discharges of Stormwater from Construction Activities and develop a project-specific stormwater pollution prevention plan (SWPPP). Construction activities requiring registration also include land disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan of development will collectively disturb equal to or greater than one acre

- The SWPPP must be prepared prior to submission of the registration statement for coverage under the General Permit.
- The SWPPP must address water quality and quantity in accordance with the VSMP Permit Regulations.

General information and registration forms for the general permit are available at http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPermits/ConstructionGeneralPermit.aspx. [Reference: Virginia Stormwater Management Act 62.1-44.15 *et seq*.; VSMP Permit Regulations 9 VAC 25-880 *et seq.*].

4(c) Conclusion. The Proposed Action is consistent to the maximum extent practicable with the nonpoint source pollution control enforceable policy of the Virginia CZM Program, provided the Air Force complies with the requirements described above.

5. Air Pollution Control. According to the FCD (pages 7-8), use of construction equipment and vehicles across all Alternatives would temporarily increase air emissions. Fugitive dust would also increase as a result of land disturbing activities. However, construction-related emissions would remain below regulatory thresholds for General Conformity Applicability. The Proposed Action would not create a new source of emissions and thus, would not exceed applicable *de minimis* limits for criteria pollutants regulated under the Clean Air Act.

5(a) Agency Jurisdiction. The DEQ air program implements the federal Clean Air Act to provide a legally enforceable State Implementation Plan for the attainment and

maintenance of the National Ambient Air Quality Standards. This program is administered by the State Air Pollution Control Board at DEQ (Virginia Code §10-1.1300 through §10.1-1320).

5(b) Agency Findings. The DEQ Air Division concurs that project is located in an ozone (O_3) attainment area and emission control area for volatile organic compounds (VOCs) and oxides of nitrogen (NO_x).

5(c) Recommendation. All precautions should be taken to restrict the emissions of VOCs and NO_x during construction principally by controlling or limiting the burning of fossil fuels.

5(d) Requirements.

(i) Fugitive Dust

During construction, fugitive dust must be kept to a minimum by using control methods outlined in 9 VAC 5-50-60 *et seq.* of the *Regulations for the Control and Abatement of Air Pollution*. These precautions include, but are not limited to, the following:

- Use, where possible, of water or chemicals for dust control;
- Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials;
- Covering of open equipment for conveying materials; and
- Prompt removal of spilled or tracked dirt or other materials from paved streets and removal of dried sediments resulting from soil erosion.

(ii) Open Burning

Should activities include the open-burning of vegetation waste or the use of special incineration devices, these activities must meet the requirements under 9 VAC 5-130 *et seq.* of the *Regulations* for open burning, and may require a permit. The *Regulations* provide for, but do not require, the local adoption of a model ordinance concerning open burning. The Air Force should contact local fire officials to determine what local requirements, if any, exist.

5(e) Conclusion. The Proposed Action is consistent to the maximum extent practicable with the air pollution control enforceable policy of the Virginia CZM Program, provided the Air Force obtains all applicable approvals prior to construction.

6. Coastal Lands Management. The FCD (page 8) states that under the Proposed Action, Resource Protection Area (RPA) disturbance would result from vegetation clearing, and soil excavation, fill, and compaction. Vegetation clearing and soil disturbance would be temporary and limited to the extent needed to complete the proposed shoreline stabilization activities. All disturbance of the RPA would be limited to the portion of the RPA within the Proposed Action area. In the long term, shoreline

stabilization and re-vegetation of the site would have favorable effects on RPA and aid in restoration and growth of healthy habitats.

6(a) Agency Jurisdiction. The DEQ Office of Watersheds and Local Government Assistance Programs (OWLGAP) administers the coastal lands management enforceable policy of the Virginia CZM Program which is governed by the Chesapeake Bay Preservation Act (Bay Act) (Virginia Code §62.1-44.15 *et seq*.) and *Chesapeake Bay Preservation Area Designation and Management Regulations* (*Regulations*) (9 VAC 25-830-10 *et seq*.).

6(b) Chesapeake Bay Preservation Areas. In the City of Newport News, the areas protected by the Bay Act, as locally implemented, require conformance with performance criteria. These areas include RPAs and Resource Management Areas (RMAs). RPAs include:

- tidal wetlands,
- certain non-tidal wetlands,
- tidal shores, and
- a 100-foot vegetated buffer area located adjacent to and landward of these features and along both sides of any water body with perennial flow.

RMAs in Newport News include:

- floodplains,
- highly erodible soils, and
- all lands adjacent to and 100 feet landward of the RPA.

Newport News also designated Intensely Developed Areas (IDAs) as redevelopment areas of the city, which incorporates both the RPA and RMA.

6(c) Requirements. Federal activities on installations located within Virginia's designated coastal zone must be consistent with the performance criteria of the *Regulations* on lands analogous to locally designated RPAs and RMAs, as provided in 9 VAC 25-830-130 and 140 of the *Regulations*, including the requirements to:

- minimize land disturbance (including access and staging areas),
- retain existing vegetation,
- minimize impervious cover,
- comply with the requirements of the *Virginia Erosion and Sediment Control Handbook,* and
- satisfy stormwater management criteria consistent with water quality protection provisions of the *Virginia Stormwater Management Regulations.*

6(d) Conclusion. The proposed project is consistent to the maximum extent practicable with the coastal lands management enforceable policy of the Virginia CZM

Program, provided the Air Force adheres to the above requirements as administered by DEQ-OWLGAP.

ADDITIONAL ENVIRONMENTAL CONSIDERATIONS

In addition to the enforceable policies of the Virginia CZM Program, comments were provided with respect to other applicable requirements and recommendations. The applicant must ensure that this project is constructed and operated in accordance with all applicable federal, state, and local laws and regulations.

1. Solid and Hazardous Waste Management.

1(a) Agency Jurisdiction. On behalf of the Virginia Waste Management Board, the DEQ Division of Land Protection and Revitalization (DLPR) is responsible for carrying out the mandates of the Virginia Waste Management Act (Virginia Code §10.1-1400 et seq.), as well as meeting Virginia's federal obligations under the Resource Conservation and Recovery Act and the Comprehensive Environmental Response Compensation Liability Act, commonly known as Superfund.

Virginia:

- Virginia Waste Management Act, Virginia Code § 10.1-1400 *et seq.*
- *Virginia Solid Waste Management Regulations*, 9 VAC 20-81
  - (9 VAC 20-81-620 applies to asbestos-containing materials)
- *Virginia Hazardous Waste Management Regulations*, 9 VAC 20-60
  - (9 VAC 20-60-261 applies to lead-based paints)
- *Virginia Regulations for the Transportation of Hazardous Materials*, 9 VAC 20-110.

Federal:

- Resource Conservation and Recovery Act (RCRA), 42 U.S. Code sections 6901 *et seq.*
- U.S. Department of Transportation *Rules for Transportation of Hazardous Materials*, 49 *Code of Federal Regulations*, Part 107
- Applicable rules contained in Title 40, *Code of Federal Regulations*.

DEQ-DLPR also administers laws and regulations on behalf of the State Water Control Board governing Petroleum Storage Tanks (Virginia Code § 62.1-44.34:8 *et seq*.), including Aboveground Storage Tanks (9 VAC 25-91 *et seq*.) and Underground Storage Tanks (9 VAC 25-580 *et seq*. and 9 VAC 25-580-370 *et seq*.), also known as 'Virginia Tank Regulations' and § 62.1-44.34:14 *et seq*. which covers oil spills.

1(b) Agency Findings. DEQ-DLPR staff conducted a search of solid and hazardous waste databases (including petroleum releases) to identify waste sites in close proximity

(500-foot radius) to the project area. The search did not identify any waste sites within the project area which might impact the project.

1(c) Requirements.

(i) Waste Management

Any soil, sediment or groundwater that is suspected of contamination or wastes that are generated must be tested and disposed of in accordance with applicable federal, state, and local laws and regulations. All construction waste must be characterized in accordance with the *Virginia Hazardous Waste Management Regulations* prior to management at an appropriate facility.

(ii) Petroleum Contamination

If evidence of a petroleum release is discovered during construction, it must be reported to DEQ-TRO in accordance with Virginia Code § 62.1-44.34.8 through 9 and 9 VAC 25-580-10 *et seq*. The disposal of contaminated soils and groundwater must be done in accordance with DEQ regulatory guidelines.

(iii) Petroleum Storage Tanks

The use of above-ground storage tanks (ASTs) with a capacity of greater than 660 gallons for temporary fuel storage (>120 days) during construction must follow the requirements in 9 VAC 25-91-10 *et seq*.

1(d) Recommendation. DEQ encourages all construction projects and facilities to implement pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately.

For additional questions or further information regarding waste comments, contact DEQ-DLPR, Carlos Martinez at (804) 698-4575 or carlos.martinez@deq.virginia.gov.

2. Pesticides and Herbicides. DEQ recommends that the use of herbicides or pesticides for construction or landscape maintenance should be in accordance with the principles of integrated pest management. The least toxic pesticides that are effective in controlling the target species should be used to the extent feasible. Contact the Department of Agriculture and Consumer Services at (804) 786-3501 for more information.

3. Natural Heritage Resources.

3(a) Agency Jurisdiction.

(i) The Virginia Department of Conservation and Recreation (DCR) Division of Natural Heritage (DNH)

DNH's mission is conserving Virginia's biodiversity through inventory, protection and stewardship. The Virginia Natural Area Preserves Act (Virginia Code §10.1-209 through 217), authorizes DCR to maintain a statewide database for conservation planning and project review, protect land for the conservation of biodiversity, and the protect and ecologically manage the natural heritage resources of Virginia (the habitats of rare, threatened and endangered species, significant natural communities, geologic sites, and other natural features).

(ii) Virginia Department of Agriculture and Consumer Services (VDACS)

The Endangered Plant and Insect Species Act of 1979 (Virginia Code Chapter 39 §3.1-1020 through 1030) authorizes VDACS to conserve, protect and manage endangered and threatened species of plants and insects. Under a Memorandum of Agreement established between VDACS and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species.

3(b) Agency Findings.

(i) Natural Heritage Resources

According to information currently in DCR's Biotics Data System (Biotics), natural heritage resources have not been documented within the project boundary including a 100 foot buffer. The absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources. In addition, the project boundary does not intersect any of the predictive models identifying potential habitat for natural heritage resources.

(ii) Ecological Cores

DCR-DNH finds that the proposed project may fragment an Ecological Core C4 as identified in the Virginia Natural Landscape Assessment, if tree clearing is proposed in the northeastern corner of the project site. The Virginia Natural Landscape Assessment (https://www.dcr.virginia.gov/natural-heritage/vaconvisvnla) is one of a suite of tools in Virginia ConservationVision that identify and prioritize lands for conservation and protection.

Fragmentation occurs when a large, contiguous block of natural cover is dissected by development, and other forms of permanent conversion, into one or more smaller

patches. Habitat fragmentation results in biogeographic changes that disrupt species interactions and ecosystem processes, reducing biodiversity and habitat quality due to limited recolonization, increased predation and egg parasitism, and increased invasion by weedy species. Mapped cores in the project area can be viewed via the Virginia Natural Heritage Data Explorer at http://vanhde.org/content/map. See detailed DCR-DNH comments attached for additional information.

(iii) State-listed Plant and Insect Species

DCR-DNH finds that the activity will not affect any documented state-listed plants or insects at the site.

(iv) State Natural Area Preserves

DCR files do not indicate the presence of any State Natural Area Preserves under the agency's jurisdiction in the project vicinity.

3(c) Recommendations.

(i) Natural Heritage Resources

Contact DCR-DNH to secure updated information on natural heritage resources if the scope of the project changes or six months pass before the project is implemented, since new and updated information is continually added to the Biotics Data System.

(ii) Ecological Cores

Minimizing fragmentation is a key mitigation measure that will reduce deleterious effects and preserve the natural patterns and connectivity of habitats that are key components of biodiversity. DCR-DNH recommends the implementation of measures to minimize edge in remaining fragments, retain natural corridors that allow movement between fragments, and designing the intervening landscape to minimize its hostility to native wildlife (natural cover versus lawns). For additional information and coordination, contact the DCR Natural Heritage Information Manager, Joe Weber at joseph.weber@dcr.virginia.gov.

4. Floodplain Management.

4(a) Agency Jurisdiction. The DCR Division of Dam Safety and Floodplain Management (DSFM) is the lead coordinating agency for the Commonwealth's floodplain management program and the National Flood Insurance Program (Executive Oder 45). The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA), and communities who elect to participate in this voluntary program manage and enforce the program on the local level through that community's local floodplain ordinance. Each local floodplain ordinance must comply with the minimum standards of the NFIP, outlined in 44 CFR 60.3; however, local

communities may adopt more restrictive requirements in their local floodplain ordinance, such as regulating the 0.2% annual chance flood zone (shaded Zone X).

4(b) Requirements. All development within a Special Flood Hazard Area (SFHA) or floodplain, as shown on the locality's Flood Insurance Rate Map (FIRM), must be permitted and comply with the requirements of the local floodplain ordinance. Projects conducted by federal agencies within the SFHA must comply with federal Executive Order 11988: Floodplain Management.

DCR's Floodplain Management Program does not have regulatory authority for projects in the SFHA. The applicant/developer must contact the local floodplain administrator for an official floodplain determination and comply with the community's local floodplain ordinance, including receiving a local permit. Failure to comply with the local floodplain ordinance could result in enforcement action from the locality. The Air Force is encouraged reach out to the local floodplain administrator to ensure compliance with the local floodplain ordinance.

4(c) Recommendations. DCR recommends the Air Force access the Virginia Flood Risk Information System (VFRIS) at www.dcr.virginia.gov/vfris to find flood zone information. Local floodplain administrator contact information may be found on DCR's Local Floodplain Management Directory at www.dcr.virginia.gov/dam-safety-and-floodplains/floodplain-directory.

5. Public Water Supply.

5(a) Agency Jurisdiction. Virginia Department of Health (VDH) Office of Drinking Water (ODW) reviews projects for the potential to impact public drinking water sources (groundwater wells, springs and surface water intakes). VDH administers both federal and state laws governing waterworks operation.

5(b) Agency Findings. VDH-ODW finds that the Newport News (PWS ID 3700500) public groundwater wells 1A and 1B are located is within a 1-mile radius of the project site, and its Lee Hall and Skiffes Creek surface water intakes are located within a 5 mile radius of the project site. The project site is not within the watershed of any public surface water intakes.

5(c) Requirements. Potential impacts to public water distribution systems must be verified by the local utility.

5(d) Recommendations. VDH-ODW recommends the following measures for the protection of water supply sources:

- Best Management Practices should be employed on the project site, including erosion and sediment control and Spill Prevention Controls and Countermeasures.

- Materials should be managed while on-site and during transport to prevent impacts to nearby surface water.

For additional information, contact VDH-ODW, Arlene Fields Warren at (804) 864-7781 or arlene.warren@vdh.virginia.gov.

6. Historic and Archaeological Resources.

6(a) Agency Jurisdiction. The Virginia Department of Historic Resources (DHR) conducts reviews of both federal and state projects to determine their effect on historic properties. Under the federal process, DHR is the State Historic Preservation Office (SHPO), and ensures that federal undertakings-including licenses, permits, or funding-comply with Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulation at 36 CFR Part 800. Section 106 requires federal agencies to consider the effects of federal projects on properties that are listed or eligible for listing on the National Register of Historic Places. Please see DHR's website for more information about applicable federal laws and how to submit an application for review: http://www.dhr.virginia.gov/StateStewardship/Index.htm.

6(b) Agency Findings. According to DHR, the Air Force is currently consulting with DHR staff on the undertaking pursuant to Section 106 of the National Historic Preservation Act and its implementing regulation 36 CFR Part 800. DHR anticipates the consultation to continue and will copy DEQ on the result.

7. Virginia Institute of Marine Science.

7(a) Agency Jurisdiction. The Virginia Institute of Marine Science (VIMS) Office of Research and Advisory Services (ORAS) is the central administrative office charged with coordinating VIMS' state-mandated research and outreach activities. As part of VIMS' broad legislative mission, the Institute serves as the Commonwealth's center of expertise in the marine environment, bringing together governmental, economic, regulatory, and scientific communities. VIMS is a central partner in the state's environmental management infrastructure working with the Virginia Marine Resources Commission, the Department of Environmental Quality, the Department of Conservation and Recreation, and the Virginia Department of Health. VIMS works with local governments and management agencies such as Soil and Water Districts and Planning District Commissions, and researchers participate in and represent the state's interests on regional commissions such as the Potomac River Fisheries Commission, the Atlantic States Marine Fisheries Commission, and the New England Fisheries Management Council.

7(b) Agency Findings. VIMS-ORAS finds that the proposed alternatives have the potential to impact Virginia's coastal zone. Without both the selection of a single preferred alternative and project designs (including drawings), VINS-ORAS is unable to determine if or to what extent the project may negatively impact the coastal zone.

Contact VIMS-ORAS, Emily Hein at (804) 684-7482 or eahein@vims.edu with any questions or if additional information becomes available.

8. Pollution Prevention. DEQ advocates that principles of pollution prevention and sustainability be used in all construction projects as well as in facility operations. Effective siting, planning, and on-site BMPs will help to ensure that environmental impacts are minimized. However, pollution prevention and sustainability techniques also include decisions related to construction materials, design, and operational procedures that will facilitate the reduction of wastes at the source.

8(a) Recommendations. We have several pollution prevention recommendations that may be helpful in construction projects and operational activities at Fort Eustis:

- Consider development of an effective Environmental Management System (EMS). An effective EMS will ensure that the proposed facility is committed to minimizing its environmental impacts, setting environmental goals, and achieving improvements in its environmental performance. DEQ offers EMS development assistance and it recognizes facilities with effective Environmental Management Systems through its Virginia Environmental Excellence Program (VEEP). VEEP provides recognition, annual permit fee discounts, and the possibility for alternative compliance methods.
- Consider environmental attributes when purchasing materials. For example, the extent of recycled material content, toxicity level, and amount of packaging should be considered and can be specified in purchasing contracts.
- Consider contractors' commitment to the environment (such as an EMS) when choosing contractors. Specifications regarding raw materials and construction practices can be included in contract documents and requests for proposals.
- Choose sustainable materials and practices for construction and design. These could include asphalt and concrete containing recycled materials, and integrated pest management in landscaping, among other things.
- Integrate pollution prevention techniques into the project's maintenance and operation. Maintenance facilities should be designed with sufficient and suitable space to allow for effective inventory control and preventative maintenance.

DEQ's Office of Pollution Prevention provides information and technical assistance relating to pollution prevention techniques and EMS. For more information, contact DEQ's Office of Pollution Prevention, Meghann Quinn at (804) 698-4021 or meghann.quinn@deq.virginia.gov.

REGULATORY AND COORDINATION NEEDS

1. Subaqueous Lands Management. Coordinate with VMRC pursuant to Virginia Code §28.2-1200 through 1400, to obtain a permit for structures placed channelward of mean low water. This requires the submission of a JPA to VMRC. For additional information and coordination, contact VMRC, Allison Lay at (757) 247-2254 or allison.lay@mrc.virginia.gov.

2. Wetlands Management. Impacts to surface waters and wetlands may require review and permitting under the Virginia Water Protection Permit program pursuant to Virginia Code §62.1-44.15:20 *et seq*., should the project not qualify for a Regional or Nationwide permit issued by the Corps. In addition, review by the Newport News Wetlands Board is required for fill placed in tidal wetlands. The submission of a JPA to VMRC initiates the review process. For additional information and coordination, contact the VWP Permit program at DEQ-TRO, Jeff Hannah at (757) 518-2146 or jeff.hannah@deq.virginia.gov. Coordination with the Newport News Wetlands Board may be accomplished by contacting the Office of City Clerk, Sharon Neal at (757) 933-2352 or sneal@nnva.gov.

3. Erosion and Sediment Control and Stormwater Management.

3(a) Erosion and Sediment Control and Stormwater Management. The Proposed Action must comply with Virginia's *Erosion and Sediment Control Law* (Virginia Code § 62.1-44.15:61) and *Regulations* (9 VAC 25-840-30 *et seq*.) and *Stormwater Management Law* (Virginia Code § 62.1-44.15:31) and *Regulations* (9 VAC 25-870-210 *et seq*.) as administered by DEQ in Virginia. Activities that disturb 2,500 square feet or more in CBPAs would be regulated by *VESCL&R* and *VSWML&R*. Erosion and sediment control and stormwater management requirements should be coordinated with DEQ-TRO, Courtney Smith at (757) 493-1073 or courtney.smith@deq.virginia.gov.

3(b) General Permit for Stormwater Discharges from Construction Activities (VAR10). For land-disturbing activities of equal to or greater than one acre, the Air Force is required to apply for registration coverage under the Virginia Stormwater Management Program General Permit for Discharges of Stormwater from Construction Activities (9 VAC 25-880-1 *et seq.*). Specific questions regarding the Stormwater Management Program requirements should be directed to DEQ-TRO, Courtney Smith at (757) 493-1073 or courtney.smith@deq.virginia.gov.

4. Air Pollution Control. Guidance on minimizing the emission of volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) during construction may be obtained from DEQ-TRO. Activities associated with the Proposed Action may be subject to air regulations administered by DEQ. The state air pollution regulations that may apply to the construction of the Proposed Action are:

- fugitive dust and emissions control (9 VAC 5-50-60 *et seq*.); and
- open-burning restrictions (9 VAC 5-130).

The Air Force should contact the appropriate local fire officials for information on any local requirements pertaining to open burning. For more information, contact DEQ-TRO, John Brandt at (757) 518-2010 or john.brandt@deq.virginia.gov.

5. Coastal Lands Management. The Proposed Action must be consistent with the Bay Act (Virginia Code §§ 62.1-44.15:67 through 62.1-44.15:78) and *Regulations* (9 VAC

25-830-10 *et seq*.) as administered by DEQ. For additional information and coordination, contact the DEQ-OWLGP, Amber Foster at (804) 698-4086 or amber.foster@deq.virginia.gov.

6. Solid and Hazardous Wastes.

6(a) Solid and Hazardous Waste Management Regulations. All solid waste, hazardous waste, and hazardous materials must be managed in accordance with all applicable federal, state, and local environmental regulations. For additional information concerning location and availability of suitable waste management facilities in the project area or if free product, discolored soils, or other evidence of contaminated soils are encountered, contact DEQ-TRO, Melinda Woodruff at (757) 518-2174 or melinda.woodruff@deq.virginia.gov.

6(b) Petroleum Contamination. In accordance with Virginia Code §§ 62.1-44.34.8 through 9 and 9 VAC 25-580-10 *et seq*., contact DEQ-TRO, Tom Madigan at (757) 518-2115 or tom.madigan@deq.virginia.gov, if evidence of a petroleum release is discovered during construction of the Proposed Action.

6(c) Petroleum Storage Tanks. The use of above-ground ASTs with a capacity of greater than 660 gallons for temporary fuel storage (>120 days) must be conducted in accordance with 9 VAC 25-91-10 *et seq*. Contact DEQ-TRO, Tom Madigan at (757) 518-2115 or tom.madigan@deq.virginia.gov, for additional details.

7. Natural Heritage Resources.

7(a) Biotics Data System. Contact DCR-DNH, Rene Hypes at (804) 371-2708 or rene.hypes@dcr.virginia.gov, to secure updated information on natural heritage resources if the scope of the project changes and/or six months has passed before it is utilized, since new and updated information is continually added to the Biotics Data System.

7(b) Ecological Cores. A discussion of fragmentation impacts on ecological cores, including a fragmentation analysis to estimate direct impacts to cores and habitat fragments and indirect impacts to cores, may be initiated with the DCR Natural Heritage Information Manager, Joe Weber at joseph.weber@dcr.virginia.gov.

8. Historic and Archaeological Resources. In accordance with Section 106 of the National Historic Preservation Act, as amended, and its implementing regulation 36 CFR 800, the Air Force must continue to coordinate with DHR to ensure compliance with the Act. For additional information and coordination, contact DHR, Marc Holma at (804) 482-6090 or marc.holma@dhr.virginia.gov.

9. Floodplain Management. The Proposed Action must comply with the Newport News floodplain ordinance. For additional information and coordination, contact the City of Newport News, Hai Tran at (757) 926-8264 or htran@nnva.gov.

Thank you for the opportunity to review and respond to the FCD for the Training Area 1 Shoreline Stabilization and Shoreline Protection Project in the City of Newport News. The detailed comments submitted by reviewing agencies are attached. Please contact me at (804) 698-4204 or John Fisher at (804) 698-4339 for clarification of these comments.

Sincerely,

Bettina Rayfield, Program Manager
Environmental Impact Review and Long-Range Priorities

Enclosures

Ec: Amy Ewing, DGIF
Robbie Rhur, DCR
Allison Lay, VMRC
Roger Kirchen, DHR
Arlene Fields Warren, VDH
Emily Hein, VIMS
Everett Skipper, City of Newport News
Ben McFarlane, HRPDC

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR PROGRAM COORDINATION

ENVIRONMENTAL REVIEW COMMENTS APPLICABLE TO AIR QUALITY

TO: John Fisher

We thank **OEIR** for providing DEQ-AIR an opportunity to review the following project:

Document Type: **Federal Consistency Determination**
Project Sponsor: **DOD/U.S. Air Force**
Project Title: **Training Area 1 Shoreline Stabilization and Erosion Protection at JBLE Eustis**
Location: **City of Newport News**
Project Number: **DEQ #20-018F**

Accordingly, I am providing following comments for consideration.

PROJECT LOCATION: **X OZONE ATTAINMENT AND EMISSION CONTROL AREA FOR NOX & VOC**

REGULATORY REQUIREMENTSMAY BE APPLICABLE TO: **X CONSTRUCTION**
☐ OPERATION

STATE AIR POLLUTION CONTROL BOARD REGULATIONS THAT MAY APPLY:

1. ☐ 9 VAC 5-40-5200 C & 9 VAC 5-40-5220 E – STAGE I
2. ☐ 9 VAC 5-45-760 et seq. – Asphalt Paving operations
3. **X** **9 VAC 5-130 et seq. – Open Burning**
4. **X** **9 VAC 5-50-60 et seq. Fugitive Dust Emissions**
5. ☐ 9 VAC 5-50-130 et seq. - Odorous Emissions; Applicable to_____
6. ☐ 9 VAC 5-60-300 et seq. – Standards of Performance for Toxic Pollutants
7. ☐ 9 VAC 5-50-400 Subpart____, Standards of Performance for New Stationary Sources, designates standards of performance for the_____
8. ☐ 9 VAC 5-80-1100 et seq. of the regulations – Permits for Stationary Sources
9. ☐ 9 VAC 5-80-1605 et seq. Of the regulations – Major or Modified Sources located in PSD areas. This rule may be applicable to the _____
10. ☐ 9 VAC 5-80-2000 et seq. of the regulations – New and modified sources located in non-attainment areas
11. ☐ 9 VAC 5-80-800 et seq. Of the regulations – State Operating Permits. This rule may be applicable to _____

COMMENTS SPECIFIC TO THE PROJECT:

All precautions are necessary to restrict the emissions of volatile organic compounds (VOC) and oxides of nitrogen (NO_x).

(Kotur S. Narasimhan)
Office of Air Data Analysis **DATE: February 10, 2020**

MEMORANDUM

TO: John Fisher, DEQ/EIR Environmental Program Planner

FROM: Carlos A. Martinez, Division of Land Protection & Revitalization Review Coordinator

DATE: March 6, 2020

COPIES: Sanjay Thirunagari, Division of Land Protection & Revitalization Review Manager; file

SUBJECT: Environmental Impact Review: 20-018F Training Area 1 Shoreline Stabilization and Erosion Protection at JBLE Eustis in Newport News, Virginia.

The Division of Land Protection & Revitalization (DLPR) has completed its review of the DOD/U.S. Air Force's February 10, 2020 EIR for Training Area 1 Shoreline Stabilization and Erosion Protection at JBLE Eustis in Newport News, Virginia.

DLPR staff conducted a search (500 ft. radius) of the project area of solid and hazardous waste databases (including petroleum releases) to identify waste sites in close proximity to the project area. DLPR search did not identify any waste sites within the project area which might impact the project.

DLPR staff has reviewed the submittal and offers the following comments:

***Hazardous Waste/RCRA Facilities* – none in close proximity to the project areas.**

***CERCLA Sites* – none in close proximity to the project areas.**

***Formerly Used Defense Sites (FUDS)* – none in close proximity to the project areas.**

***Solid Waste* – none in close proximity to the project areas.**

***Virginia Remediation Program (VRP)* – none in close proximity to the project areas.**

***Petroleum Releases* – none in close proximity to the project areas.**

PROJECT SPECIFIC COMMENTS

None

GENERAL COMMENTS

Soil, Sediment, Groundwater, and Waste Management

Any soil, sediment or groundwater that is suspected of contamination or wastes that are generated must be tested and disposed of in accordance with applicable Federal, State, and local laws and regulations. Some of the applicable state laws and regulations are: Virginia Waste Management Act, Code of Virginia Section 10.1-1400 *et seq.*; Virginia Hazardous Waste Management Regulations (VHWMR) (9VAC 20-60); Virginia Solid Waste Management Regulations (VSWMR) (9VAC 20-81); Virginia Regulations for the Transportation of Hazardous Materials (9VAC 20-110). Some of the applicable Federal laws and regulations are: the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section 6901 *et seq.*, and the applicable regulations contained in Title 40 of the Code of Federal Regulations; and the U.S. Department of Transportation Rules for Transportation of Hazardous Materials, 49 CFR Part 107.

Pollution Prevention – Reuse - Recycling

Please note that DEQ encourages all construction projects and facilities to implement pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately.

If you have any questions or need further information, please contact Carlos A. Martinez by phone at (804) 698-4575 or email carlos.martinez@deq.virginia.gov.

Commonwealth of Virginia

Fisher, John <john.fisher@deq.virginia.gov>

Re: NEW PROJECT, AIR FORCE Training Area 1 Shoreline Stabilization (FCD), DEQ #20-018F

1 message

Gavan, Lawrence <larry.gavan@deq.virginia.gov> Mon, Feb 10, 2020 at 1:20 PM
To: "Fisher, John" <john.fisher@deq.virginia.gov>

(a) Agency Jurisdiction. The Department of Environmental Quality (DEQ) administers the *Virginia Erosion and Sediment Control Law and Regulations* (*VESCL&R*) and *Virginia Stormwater Management Law and Regulations* (*VSWML&R*).

(b) Erosion and Sediment Control and Stormwater Management Plans. The Applicant and its authorized agents conducting regulated land-disturbing activities on private and public lands in the state must comply with *VESCL&R* and *VSWML&R*, including coverage under the general permit for stormwater discharge from construction activities, and other applicable federal nonpoint source pollution mandates (e.g. Clean Water Act-Section 313, federal consistency under the Coastal Zone Management Act). Clearing and grading activities, installation of staging areas, parking lots, roads, buildings, utilities, borrow areas, soil stockpiles, and related land-disturbing activities that result in the total land disturbance of equal to or greater than 10,000 square feet (2,500 square feet in Chesapeake Bay Preservation Area) would be regulated by *VESCL&R*. Accordingly, the Applicant must prepare and implement an erosion and sediment control (ESC) plan to ensure compliance with state law and regulations. Land-disturbing activities that result in the total land disturbance of equal to or greater than 1 acre (2,500 square feet in Chesapeake Bay Preservation Area) would be regulated by *VSWML&R*. Accordingly, the Applicant must prepare and implement a Stormwater Management (SWM) plan to ensure compliance with state law and regulations. The ESC/SWM plan is submitted to the DEQ Regional Office that serves the area where the project is located for review for compliance. The Applicant is ultimately responsible for achieving project compliance through oversight of on-site contractors, regular field inspection, prompt action against non-compliant sites, and other mechanisms consistent with agency policy. [Reference: VESCL 62.1-44.15 et seq.]

(c) General Permit for Stormwater Discharges from Construction Activities (VAR10). DEQ is responsible for the issuance, denial, revocation, termination and enforcement of the Virginia Stormwater Management Program (VSMP) General Permit for Stormwater Discharges from Construction Activities related to municipal separate storm sewer systems (MS4s) and construction activities for the control of stormwater discharges from MS4s and land disturbing activities under the Virginia Stormwater Management Program.

The owner or operator of projects involving land-disturbing activities of equal to or greater than 1 acre is required to register for coverage under the General Permit for Discharges of Stormwater from Construction Activities and develop a project-specific Stormwater Pollution Prevention Plan. Construction activities requiring registration also include land disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan of development will collectively disturb equal to or greater than one acre The SWPPP must be prepared prior to submission of the registration statement for coverage under the general permit and the SWPPP must address water quality and quantity in accordance with the *VSMP Permit Regulations*. General information and registration forms for the General Permit are available at: http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPermits/ConstructionGeneralPermit.aspx

DEPARTMENT OF ENVIRONMENTAL QUALITY
TIDEWATER REGIONAL OFFICE
ENVIRONMENTAL IMPACT REVIEW COMMENTS

3/4/2020

PROJECT NUMBER: 20-018F

PROJECT TITLE: Training Area 1 Shoreline Stabilization and Erosion Protection at JBLE Eustis

As Requested, TRO staff has reviewed the supplied information and has the following comments:

Petroleum Storage Tank Cleanups:
No comments.
Petroleum Storage Tank Compliance/Inspections:
No comments.
Virginia Water Protection Permit Program (VWPP):
Potential adverse impacts to water quality and wetlands resulting from surface runoff due to construction activities must be minimized. This can be achieved by using Best Management Practices (BMPs). Permanent or temporary impacts to surface waters and wetlands may require a permit pursuant to §401 of the Clean Water Act, Virginia Code §62.1-44.15:20, and Virginia Administrative Code 9 VAC 25-210-10 *et seq*. Provided that any and all necessary permits are obtained and complied with, the project will be consistent with DEQ program requirements. The proposed project will result in impacts to tidal wetland and waters and will require submittal of a joint permit application. If the project qualifies for a U.S. Army Corps of Engineers (USACE) Regional Permit 19 or other regional or nationwide permit, and meets any associated DEQ 401 Water Quality Certification conditions, no permit will be required from the VWPP Program. If the project requires issuance of a Corps of Engineers individual permit, then a VWP permit or permit waiver will be required. For additional information, contact Jeff Hannah, DEQ-TRO at (757)518-2146.
Air Compliance Program :
The following air regulations of the Virginia Administrative Code may be applicable: 9VAC5-50-60 *et seq*. which addresses the abatement of visible emissions and fugitive dust emissions, and 9VAC5-130-10 et *seq*. which addresses open burning. For additional information, contact John Brandt at (757) 518-2010.
Water Permit Program :
No comment as there does not appear to be any point source discharges of wastewater, process water or industrial stormwater that will necessitate a VPDES permit. If there are any questions, please contact Loan Pham at (757) 518-2144.
Waste Permit Program :
No comments.
Storm Water Program:
Ensure ESCP and SWM plans receive approval prior to the start of land

DEPARTMENT OF ENVIRONMENTAL QUALITY
TIDEWATER REGIONAL OFFICE
ENVIRONMENTAL IMPACT REVIEW COMMENTS

3/4/2020

PROJECT NUMBER: 20-018F

PROJECT TITLE: Training Area 1 Shoreline Stabilization and Erosion Protection at JBLE Eustis

disturbance. If an alternative is chosen that will increase the site size to 1 acre or more, ensure the notice of coverage letter for the Construction General Permit is received prior to commencement of land disturbing activities. Ensure all controls are installed per the approved sequence and specifications. For further information, contact Courtney Smith at (757) 493-1072 or at Courtney.smith@deq.virginia.gov.

The staff from the Tidewater Regional Office thanks you for the opportunity to provide comments.

Sincerely,

Cindy Robinson
Environmental Specialist II
5636 Southern Blvd.
VA Beach, VA 23462
(757) 518-2167
Cindy.Robinson@deq.virginia.gov

Commonwealth of Virginia

Fisher, John <john.fisher@deq.virginia.gov>

ESSLog# 40368_20-018F_FtEustisShoreline_DGIF_AME20200313

1 message

Ewing, Amy <amy.ewing@dgif.virginia.gov> Fri, Mar 13, 2020 at 11:32 AM
To: John Fisher <john.fisher@deq.virginia.gov>

John,
We have reviewed the subject project that proposes to perform shoreline stabilization at Ft. Eustis in Newport News. Bailey Creek and Skiffes Creek have been designated Potential Anadromous Fish Use Areas. In addition, the James River, downstream of this area has been designated a Confirmed Anadromous Fish Use Area. To best protect these species from harm associated with instream work, we recommend that all such work adhere to a time of year restriction from February 15 through June 30 of any year. In addition, we recommend conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams or turbidity curtains to isolate the construction area, blocking no more than 50% of the streamflow at any given time (minimal overlap of construction footprint notwithstanding), stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures. We recommend that instream work be designed and performed in a manner that minimizes impacts upon natural streamflow and movement of resident aquatic species. To minimize potential wildlife entanglements resulting from use of synthetic/plastic erosion and sediment control matting, we recommend use of matting made from natural/organic materials such as coir fiber, jute, and/or burlap. To minimize harm to the aquatic environment and its residents resulting from use of the Tremie method to install concrete, installation of grout bags, and traditional pouring of concrete, we recommend that such activities occur only in the dry, allowing all concrete to harden and cure prior to contact with open water.

We also document federal Endangered Atlantic Sturgeon from the project area. The James River has been designated a Threatened and Endangered Species Water due to the presence of this species. However, based on the scope and location of the proposed work, we do not anticipate it to result in adverse impacts upon this species. We recommend coordination with NOAA Fisheries regarding potential impacts upon Atlantic Sturgeon.

We support implementation of either Options 1 or 2. Assuming adherence to erosion and sediment controls, we find this project consistent with the Fisheries Enforceable Policy of the CZMA.

Thanks, Amy

Amy Ewing
Environmental Services Biologist
Manager, Fish and Wildlife Information Services
P 804.367.2211
Virginia Department of Game & Inland Fisheries
CONSERVE. CONNECT. PROTECT.
A 7870 Villa Park Drive, P.O. Box 90778, Henrico, VA 23228
www.dgif.virginia.gov

Commonwealth of Virginia

Fisher, John <john.fisher@deq.virginia.gov>

stabalization shoreline of Training Area (TA) 1 at Fort Eustis (DHR 2016-1148; DEQ 20-018F)

1 message

Holma, Marc <marc.holma@dhr.virginia.gov> Fri, Feb 21, 2020 at 10:29 AM
To: John Fisher <john.fisher@deq.virginia.gov>

John,

The DHR and Air Force are currently in consultation on this undertaking pursuant to Section 106 of the National Historic Preservation Act and its implementing regulation 36 CFR Part 800. We anticipate this consultation to continue and will copy DEQ on the result.

Sincerely,
Marc

--
Marc Holma
Architectural Historian
Division of Review and Compliance
(804) 482-6090
marc.holma@dhr.virginia.gov

Commonwealth of Virginia

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

1111 E. Main Street, Suite 1400, Richmond, Virginia 23219
P.O. Box 1105, Richmond, Virginia 23218
(800) 592-5482
www.deq.virginia.gov

Matthew J. StricklerDavid K. Paylor
Secretary of Natural ResourcesDirector
(804) 698-4000

MEMORANDUM

TO: John Fisher, DEQ Office of Environmental Impact Review

FROM: Amber Foster, DEQ Principal Environmental Planner

DATE: February 19, 2020

SUBJECT: DEQ #20-018F – DOD / U.S. Air Force - Training Area 1(TA1) Shoreline Stabilization and Erosion Protection at JBLE Eustis

We have reviewed the Federal Consistency Certification submittal for the proposed project and offer the following comments regarding consistency with the provisions of the *Chesapeake Bay Preservation Area Designation and Management Regulations* (Regulations):

In the City of Newport News, the areas protected by the Chesapeake Bay Preservation Act, as locally implemented, require conformance with performance criteria. These areas include Resource Protection Areas (RPAs) and Resource Management Areas (RMAs). RPAs include tidal wetlands, certain non-tidal wetlands and tidal shores. RPAs also include a 100-foot vegetated buffer area located adjacent to and landward of these features and along both sides of any water body with perennial flow. RMA lands in Newport News include floodplains, highly erodible soils and all lands adjacent to and 100 feet landward of the RPA. The City of Newport News also designated Intensely Developed Areas (IDAs) as redevelopment areas of the City, which incorporates both the RPA and RMA.

The project proposes the implementation of appropriate stabilization techniques to protect 1,800 linear feet (LF) of contiguous shoreline along Bailey Creek and Skiffes Creek at Training Area 1 (TA1) at Joint Base Langley Eustis-Eustis (JBLE-Eustis). Construction would be conducted over the course of approximately one year, beginning with site preparation, including vegetation clearing and grubbing. After implementation of appropriate stabilization techniques, revegetation would occur and the appropriate marsh, shrub zones, and/or bank areas would be planted. As part of the vegetation management program, additional stabilization erosion control matting would protect the graded areas from erosion and the newly-planted vegetation from waterfowl until the vegetation can become established.

Under the Federal Consistency Regulations of the *Coastal Zone Management Act of 1972*, federal actions in Virginia must be conducted in a manner "consistent to the maximum extent practicable" with the enforceable policies of the Virginia Coastal Zone Management Program. Those enforceable policies are administered through the Chesapeake Bay Preservation Act and Regulations. Federal actions on installations located within Tidewater Virginia are required to be consistent with the performance criteria of the Regulations on lands analogous to locally designated RPAs and RMAs, as provided in §9VAC25-830-130 and 140 of the Regulations, including the requirement to minimize land disturbance (including access and staging areas), retain existing vegetation, and minimize impervious cover, as well as compliance with the requirements of the *Virginia Erosion and Sediment Control Handbook*, and stormwater management criteria consistent with water quality protection provisions of the *Virginia Stormwater Management Regulations*." For land disturbance over 2,500 square feet, the project must comply with the requirements of the *Virginia Erosion and Sediment Control Handbook*.

Provided adherence to the above requirements, particularly as it relates to the requirements to minimize land disturbance, retain existing vegetation and minimize impervious cover, the proposed activity would be consistent with the *Chesapeake Bay Preservation Act* and Regulations.

Commonwealth of Virginia

Fisher, John <john.fisher@deq.virginia.gov>

Re: NEW PROJECT, AIR FORCE Training Area 1 Shoreline Stabilization (FCD), DEQ #20-018F

1 message

Warren, Arlene <arlene.warren@vdh.virginia.gov> Mon, Feb 24, 2020 at 10:48 AM
To: John Fisher <john.fisher@deq.virginia.gov>
Cc: rr Environmental Impact Review <eir@deq.virginia.gov>

Project Name: Training Area 1 Shoreline Stabilization and Erosion Protection at JBLE Eustis
Project #: 20-018 F
UPC #: N/A
Location: City of Newport News

VDH – Office of Drinking Water has reviewed the above project. Below are our comments as they relate to proximity to **public drinking water sources** (groundwater wells, springs and surface water intakes). Potential impacts on public water distribution systems or sanitary sewage collection systems **must be verified by the local utility.**

The following public groundwater wells are located within a 1-mile radius of the project site:

PWS ID Number	City/County	System Name	Facility Name
3700500	NEWPORT NEWS	NEWPORT NEWS_ CITY OF	WELL 1B
3700500	NEWPORT NEWS	NEWPORT NEWS_ CITY OF	WELL 1A

The following surface water intakes are located within a 5 mile radius of the project site:

PWS ID Number	System Name	Facility Name
3700500	NEWPORT NEWS_ CITY OF	LEE HALL
3700500	NEWPORT NEWS_ CITY OF	SKIFFES CREEK

The project is not within the watershed of any public surface water intakes.

Best Management Practices should be employed, including Erosion & Sedimentation Controls and Spill Prevention Controls & Countermeasures on the project site.

Materials should be managed while on-site and during transport to prevent impacts to nearby surface water.

Virginia Department of Health – Office of Drinking Water appreciates the opportunity to provide comments. If you have any questions, please let me know.

Best Regards,

Arlene Fields Warren

GIS Program Support Technician

Office of Drinking Water

Virginia Department of Health

VIMS | William & Mary
Virginia Institute of Marine Science
Office of Research and Advisory Services

27 February 2020

John Fisher
Office of Environmental Impact Review
Department of Environmental Quality
P.O. Box 1105
Richmond, VA 23218

Dear Mr. Fisher:

We have reviewed the Federal Consistency Determination documentation for the shoreline stabilization and erosion protection project at Training Area 1 at Joint Base Langley Eustis-Eustis (DEQ #20-018F). The project shoreline is along approximately 1,800 linear feet of Bailey and Skiffes creeks in the City of Newport News.

Three alternatives are outlined within the document. The "marsh management" alternative (A) includes bank grading, installation of fiber logs at mean tide level, restoration of tidal wetland vegetation, and erosion control matting. The "living shoreline" alternative (B) includes bank grading, installation of a stone sill, tidal wetland vegetation planting, and rock or concrete oyster reef structures. The "concrete bulkhead" alternative (C) includes installation of a bulkhead along approximately 500 linear feet of shoreline and installation of a stone sill with associated planting along other sections of shoreline. Each of the proposed alternatives has the potential to impact Virginia's coastal zone. Without both the selection of a single preferred alternative and project designs (including drawings), we are unable to determine if or to what extent the project may negatively impact the coastal zone.

Please let me know if you have any questions or if additional information becomes available.

Sincerely,

Emily Hein
Assistant Director
for Advisory Services

COMMONWEALTH of VIRGINIA
Marine Resources Commission
380 Fenwick Road
Bldg 96
Fort Monroe, VA 23651-1064

Matthew J. Strickler
Secretary of Natural Resources

Steven G. Bowman
Commissioner

February 13, 2020

Department of Environmental Quality
Attbn: John Fisher
Office of Environmental Impact Review
P.O. Box 1105
Richmond, VA 23218

Re: Federal Consistency Determination
Training Area 1 Shoreline Stabilization and Erosion Protection at JBLE Eustis
DEQ #20-018F

Dear Mr. Fisher:

This will respond to Federal Consistency Determination regarding the Air Force Joint Base Langley-Eustis-Eustis Training Area 1 Project, prepared by the United States Air Force. Specifically, the Air Force has proposed to stabilize the shoreline in Training Area 1 in Newport News, Virginia.

Please be advised that the Virginia Marine Resources Commission (VMRC) pursuant to Chapter 12, 13, & 14 of Title 28.2 of the Code of Virginia administers permits required for submerged lands, tidal wetlands, and beaches and dunes. The VMRC administers the enforceable policies of fisheries management, subaqueous lands, tidal wetlands, and coastal primary sand dunes and beaches which comprise some of Virginia's Coastal Zone Management Program. VMRC staff has reviewed the submittal and offers the following comments:

Fisheries and Shellfish: Erosion and run-off controls should be in place to prevent impacts to marine fisheries.

State-owned Submerged Lands: A submerged bottom land permit will be required from the Marine Resources Commission (VMRC) if structures are placed channelward of mean low water. Per Section 104.1 of Title 28.2 of the Code of Virginia, living shorelines are the preferred alternative for stabilizing shorelines in the Commonwealth.

Tidal Wetlands: A wetlands permit from the Newport News Wetlands Board will be required for any fill in tidal wetlands.

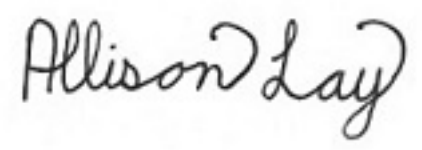
Beaches and Coastal Primary Sand Dunes: None in close proximity to the project area.

As proposed, we have no objection to the consistency findings provided by the applicant. Should the proposed project change, a new review by this agency may be required relative to these jurisdictional

areas.

If you have any questions please contact me at (757) 247-2254 or by email at allison.lay@mrc.virginia.gov. Thank you for the opportunity to comment.

Sincerely,



Allison Lay
Environmental Engineer, Habitat Management

AEL/keb
HM

Matthew J. Strickler
Secretary of Natural Resources

Clyde E. Cristman
Director

Rochelle Altholz
Deputy Director of Administration and Finance

Russell W. Baxter
Deputy Director of Dam Safety & Floodplain Management and Soil & Water Conservation

Thomas L. Smith
Deputy Director of Operations

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

MEMORANDUM

DATE: March 5, 2020

TO: John Fisher, DEQ

FROM: Roberta Rhur, Environmental Impact Review Coordinator

SUBJECT: DEQ 20-018F, JBLE-Eustis Training Area 1 Shoreline Stabilization and Erosion Protection

Division of Natural Heritage

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in Biotics, natural heritage resources have not been documented within the submitted project boundary including a 100 foot buffer. The absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources. In addition, the project boundary does not intersect any of the predictive models identifying potential habitat for natural heritage resources.

If tree clearing is proposed in the northeastern corner of the project site, the project may fragment an Ecological Core C4 as identified in the Virginia Natural Landscape Assessment (https://www.dcr.virginia.gov/natural-heritage/vaconvisvnla), one of a suite of tools in Virginia ConservationVision that identify and prioritize lands for conservation and protection.

Ecological Cores are areas of unfragmented natural cover with at least 100 acres of interior that provide habitat for a wide range of species, from interior-dependent forest species to habitat generalists, as well as species that utilize marsh, dune, and beach habitats. Cores also provide benefits in terms of open space, recreation, water quality (including drinking water protection and erosion prevention), and air quality (including carbon sequestration and oxygen production), along with the many associated economic benefits of these functions. The cores are ranked from C1 to C5 (C5 being the least ecologically relevant) using many prioritization criteria, such as the proportions of sensitive habitats of natural heritage resources they contain.

Fragmentation occurs when a large, contiguous block of natural cover is dissected by development, and other forms of permanent conversion, into one or more smaller patches. Habitat fragmentation results in biogeographic changes that disrupt species interactions and ecosystem processes, reducing biodiversity and habitat quality due to limited recolonization, increased predation and egg parasitism, and increased invasion by weedy species.

Therefore minimizing fragmentation is a key mitigation measure that will reduce deleterious effects and preserve the natural patterns and connectivity of habitats that are key components of biodiversity. DCR recommends efforts to minimize edge in remaining fragments, retain natural corridors that allow movement between fragments and designing the intervening landscape to minimize its hostility to native wildlife (natural cover versus lawns). Mapped cores in the project area can be viewed via the Virginia Natural Heritage Data Explorer, available here: http://vanhde.org/content/map.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please re-submit project information and map for an update on this natural heritage information if the scope of the project changes and/or six months has passed before it is utilized.

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Ernie Aschenbach at 804-367-2733 or Ernie.Aschenbach@dgif.virginia.gov.

Division of Dam Safety and Floodplain Management

Floodplain Management Program:
The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA), and communities who elect to participate in this voluntary program manage and enforce the program on the local level through that community's local floodplain ordinance. Each local floodplain ordinance must comply with the minimum standards of the NFIP, outlined in 44 CFR 60.3; however, local communities may adopt more restrictive requirements in their local floodplain ordinance, such as regulating the 0.2% annual chance flood zone (Shaded X Zone).

All development within a Special Flood Hazard Area (SFHA), as shown on the locality's Flood Insurance Rate Map (FIRM), must be permitted and comply with the requirements of the local floodplain ordinance.

State Agency Projects Only
Executive Order 45, signed by Governor Northam and effective on November 15, 2019, establishes mandatory standards for development of state-owned properties in Flood-Prone Areas, which include Special Flood Hazard Areas, Shaded X Zones, and the Sea Level Rise Inundation Area. These standards shall apply to all state agencies.

1. Development in Special Flood Hazard Areas and Shaded X Zones
    A. All development, including buildings, on state-owned property shall comply with the locally-adopted floodplain management ordinance of the community in which the state-owned property is located and any flood-related standards identified in the Virginia Uniform Statewide Building Code.
    B. If any state-owned property is located in a community that does not participate in the NFIP, all development, including buildings, on such state-owned property shall comply with the NFIP requirements as defined in 44 CFR §§ 60.3, 60.4, and 60.5 and any flood-related standards identified in the Virginia Uniform Statewide Building Code.

(1) These projects shall be submitted to the Department of General Services (DGS), for review and approval.
(2) DGS shall not approve any project until the State NFIP Coordinator has reviewed and approved the application for NFIP compliance.
(3) DGS shall provide a written determination on project requests to the applicant and the State NFIP Coordinator. The State NFIP Coordinator shall maintain all documentation associated with the project in perpetuity.

C. No new state-owned buildings, or buildings constructed on state-owned property, shall be constructed, reconstructed, purchased, or acquired by the Commonwealth within a Special Flood Hazard Area or Shaded X Zone in any community unless a variance is granted by the Director of DGS, as outlined in this Order.

The following definitions are from Executive Order 45:

Development for NFIP purposes is defined in 44 CFR § 59.1 as "Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials."

The Special Flood Hazard Area may also be referred to as the 1% annual chance floodplain or the 100-year floodplain, as identified on the effective Flood Insurance Rate Map and Flood Insurance Study. This includes the following flood zones: A, AO, AH, AE, A99, AR, AR/AE, AR/AO, AR/AH, AR/A, VO, VE, or V.

The Shaded X Zone may also be referred to as the 0.2% annual chance floodplain or the 500- year floodplain, as identified on the effective Flood Insurance Rate Map and Flood Insurance Study.

The Sea Level Rise Inundation Area referenced in this Order shall be mapped based on the National Oceanic and Atmospheric Administration Intermediate-High scenario curve for 2100, last updated in 2017, and is intended to denote the maximum inland boundary of anticipated sea level rise.

"State agency" shall mean all entities in the executive branch, including agencies, offices, authorities, commissions, departments, and all institutions of higher education.

"Reconstructed" means a building that has been substantially damaged or substantially improved, as defined by the NFIP and the Virginia Uniform Statewide Building Code.

Federal Agency Projects Only

Projects conducted by federal agencies within the SFHA must comply with federal Executive Order 11988: Floodplain Management.

DCR's Floodplain Management Program does not have regulatory authority for projects in the SFHA. The applicant/developer must contact the local floodplain administrator for an official floodplain determination and comply with the community's local floodplain ordinance, including receiving a local permit. Failure to comply with the local floodplain ordinance could result in enforcement action from the locality. For state projects, DCR recommends that compliance documentation be provided prior to the project being funded. For federal projects, the applicant/developer is encouraged reach out to the local floodplain administrator and comply with the community's local floodplain ordinance.

To find flood zone information, use the Virginia Flood Risk Information System (VFRIS): www.dcr.virginia.gov/vfris

To find community NFIP participation and local floodplain administrator contact information, use DCR's Local Floodplain Management Directory: www.dcr.virginia.gov/dam-safety-and-floodplains/floodplain-directory

APPENDIX E

RECORD OF AIR ANALYSIS AND ACAM DETAILED REPORTS

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APPENDIX E - Record of Air Analysis and ACAM Detailed Reports

Alternative A – Marsh Management

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:

Base: LANGLEY AFB
State: Virginia
County(s): York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

b. Action Title: Training Area 1 Shoreline Stabilization and Erosion Protection - Alternative A: Marsh Management

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2020

e. Action Description:

Utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. This alternative would be implemented in areas higher than the Mean-Tide Level (MTL) where there is minimal wave action and boat wake. This alternative includes proposed adjacent bank grading, a fiber log, vegetation restoration, and long-term vegetation management, as detailed below:

• Place approximately 875 LF of fiber (a coconut fiber, or coir) log to protect existing and enhanced marsh. The 20-inch coir log would be installed at MTL.
• Grade slopes behind the coir log to between 8:1 and 10:1. Use coarse-grained sand fill to achieve the desired slope, as needed.
• Enhance existing marsh areas and plant new marsh areas upgradient of the coir log, including a low-marsh between the coir log and mean high water (MHW) and a high-marsh between the MHW and approximately 3 to 4 feet above mean low water (MLW).
• Plant 4-foot wide tidal shrub zone upgradient of the high-marsh to help stabilize the toe of the slope.
• Where necessary, grade banks to a slope of 2:1 to repair the steep, unstable banks and prevent future erosion of those banks from impacting enhanced and newly-planted marshes, and install 4,480 LF of erosion control matting for permanent stabilization.
• Implement a long-term vegetation management and maintenance program, including selective tree pruning and clearing, the removal of shoreline debris (particularly after storm events), visual inspections of the restoration status, maintenance of the coir log as needed, and future, supplemental plantings as deemed necessary.

Projects analyzed within this alternative:
A1 - Install Fiber Log
A2 - Low Marsh
A3 - High Marsh
A4 - Tidal Shrub Zone
A5 - 2:1 Slope Grading
A6 - Clear Site Access Roads

f. Point of Contact:

Name: Paul Sanford
Title: Aviation Environmental Planner
Organization: AECOM
Email: paul.sanford@aecom.com
Phone Number: 813-675-1711

2. Analysis: Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

Conformity Analysis Summary:

2020

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Norfolk-Virginia Beach-Newport News (Hampton Roads), VA			
VOC	0.045	100	No
NOx	0.294	100	No
CO	0.266		
SOx	0.001		
PM 10	0.161		
PM 2.5	0.012		
Pb	0.000		
NH3	0.000		
CO2e	69.1		

2021 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Norfolk-Virginia Beach-Newport News (Hampton Roads), VA			
VOC	0.000	100	No
NOx	0.000	100	No
CO	0.000		
SOx	0.000		
PM 10	0.000		
PM 2.5	0.000		
Pb	0.000		
NH3	0.000		
CO2e	0.0		

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

Paul Sanford, Aviation Environmental Planner _____ DATE

1. General Information

- Action Location

Base: LANGLEY AFB
State: Virginia
County(s): York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Action Title: Training Area 1 Shoreline Stabilization and Erosion Protection - Alternative A: Marsh Management

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2020

- Action Purpose and Need:

Purpose:
Stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land at the Training Area 1 (TA1) site located at JBLE - Eustis. The loss of land includes associated resources, such as plants and substrate.

Need:
Protect available training land in order to maintain the quality of the training necessary to meet JBLE - Eustis mission and national defense requirements.

The primary mission at JBLE - Eustis is to provide mission-ready soldiers, civilians, and leaders to combatant commanders in support of joint and combined operations worldwide. JBLE - Eustis requires appropriate and suitable operational space to host the Army and Air Force to train service members in transportation, aviation maintenance, logistics and deployment doctrine, and applicable DoD, State, and Federal requirements. TA1 was approximately 50 acres at inception; however, the long-term shoreline erosion loss along Skiffes Creek is estimated to be 0.6 feet per year (though localized erosion rates may be greater).

Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE - Eustis.

- Action Description:

Utilize a non-structural stabilization approach focused on enhancing, planting, and protecting existing marshes to maximize the natural erosion protection of the existing ecosystem. This alternative would be implemented in areas higher than the Mean-Tide Level (MTL) where there is minimal wave action and boat wake. This alternative includes proposed adjacent bank grading, a fiber log, vegetation restoration, and long-term vegetation management, as detailed below:

• Place approximately 875 LF of fiber (a coconut fiber, or coir) log to protect existing and enhanced marsh. The 20-inch coir log would be installed at MTL.
• Grade slopes behind the coir log to between 8:1 and 10:1. Use coarse-grained sand fill to achieve the desired slope, as needed.
• Enhance existing marsh areas and plant new marsh areas upgradient of the coir log, including a low-marsh between the coir log and mean high water (MHW) and a high-marsh between the MHW and approximately 3 to 4 feet above mean low water (MLW).
• Plant 4-foot wide tidal shrub zone upgradient of the high-marsh to help stabilize the toe of the slope.
• Where necessary, grade banks to a slope of 2:1 to repair the steep, unstable banks and prevent future erosion of those banks from impacting enhanced and newly-planted marshes, and install 4,480 LF of erosion control matting for permanent stabilization.
• Implement a long-term vegetation management and maintenance program, including selective tree pruning and clearing, the removal of shoreline debris (particularly after storm events), visual inspections of the

restoration status, maintenance of the coir log as needed, and future, supplemental plantings as deemed necessary.
Projects analyzed within this alternative:
A1 - Install Fiber Log
A2 - Low Marsh
A3 - High Marsh
A4 - Tidal Shrub Zone
A5 - 2:1 Slope Grading
A6 - Clear Site Access Roads

- Point of Contact

Name: Paul Sanford
Title: Aviation Environmental Planner
Organization: AECOM
Email: paul.sanford@aecom.com
Phone Number: 813-675-1711

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	A1 - Install Fiber Log
3.	Construction / Demolition	A2 - Low Marsh
4.	Construction / Demolition	A3 - High Marsh
5.	Construction / Demolition	A4 - Tidal Shrub Zone
6.	Construction / Demolition	A5 - 2:1 Slope Grading
7.	Construction / Demolition	A6 - Clear Site Access Roads

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: A1 - Install Fiber Log

- Activity Description:

Place approximately 875 LF of fiber (a coconut fiber, or coir) log to protect existing and enhanced marsh. The 20-inch coir log would be installed at MTL.

- Activity Start Date

Start Month: 1
Start Month: 2020

- Activity End Date

Indefinite: False
End Month: 1
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.003576
SO_x	0.000059
NO_x	0.021365
CO	0.023626
PM 10	0.002258

Pollutant	Total Emissions (TONs)
PM 2.5	0.000918
Pb	0.000000
NH_3	0.000012
CO_2e	5.7

2.1 Trenching/Excavating Phase

2.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 2

2.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 1458
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 22.5

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.634	000.007	000.676	005.626	000.017	000.015		000.033	00364.981
LDGT	000.819	000.010	001.163	008.688	000.019	000.017		000.034	00487.852
HDGV	001.292	000.015	002.999	025.303	000.045	000.040		000.045	00760.330
LDDV	000.265	000.003	000.321	003.488	000.007	000.006		000.008	00370.175
LDDT	000.567	000.005	000.859	007.093	000.008	000.008		000.008	00577.145
HDDV	000.970	000.014	009.604	003.036	000.373	000.343		000.031	01589.614
MC	002.482	000.008	000.828	015.260	000.029	000.026		000.051	00398.308

2.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.2 Building Construction Phase

2.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 2

2.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 1448
Height of Building (ft): 2
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

2.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0898	0.0013	0.6610	0.3917	0.0256	0.0256	0.0081	128.83
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0320	0.0006	0.1690	0.2160	0.0070	0.0070	0.0028	54.467
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

2.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: A2 - Low Marsh

- Activity Description:
• Grade slopes behind the coir log to between 8:1 and 10:1. Use coarse-grained sand fill to achieve the desired slope, as needed.

• Enhance existing marsh areas and plant new marsh areas upgradient of the coir log, including a low-marsh between the coir log and mean high water (MHW).

- Activity Start Date
Start Month: 2
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 2
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.012943
SO_x	0.000204
NO_x	0.083385
CO	0.076465
PM 10	0.032769

Pollutant	Total Emissions (TONs)
PM 2.5	0.003528
Pb	0.000000
NH_3	0.000048
CO_2e	20.0

3.1 Site Grading Phase

3.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 5

3.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 6366
Amount of Material to be Hauled On-Site (yd^3): 472
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

3.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)

20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3.2 Trenching/Excavating Phase

3.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration

Number of Month: 0
Number of Days: 5

3.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft^2): 6366
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 236

- Trenching Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56

Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

3.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: A3 - High Marsh

- Activity Description:
• Grade slopes behind the coir log to between 8:1 and 10:1. Use coarse-grained sand fill to achieve the desired slope, as needed.
• Enhance existing marsh areas and plant new marsh areas upgradient of the coir log, including a high-marsh between the MHW and approximately 3 to 4 feet above mean low water (MLW).

- Activity Start Date
Start Month: 2
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 2
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.007642
SO_x	0.000119
NO_x	0.048800
CO	0.045443
PM 10	0.005773

Pollutant	Total Emissions (TONs)
PM 2.5	0.002078
Pb	0.000000
NH_3	0.000022
CO_2e	11.6

4.1 Site Grading Phase

4.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 3

4.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 1340
Amount of Material to be Hauled On-Site (yd^3): 99
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62

Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

4.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4.2 Trenching/Excavating Phase

4.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration

Number of Month: 0
Number of Days: 3

4.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft^2): 1340
Amount of Material to be Hauled On-Site (yd^3): 99
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

4.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

5. Construction / Demolition

5.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: A4 - Tidal Shrub Zone

- Activity Description:
Plant 4-foot wide tidal shrub zone upgradient of the high-marsh to help stabilize the toe of the slope.

- Activity Start Date
Start Month: 2
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 2
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.004818
SO_x	0.000081
NO_x	0.028771
CO	0.031380
PM 10	0.007269

Pollutant	Total Emissions (TONs)
PM 2.5	0.001243
Pb	0.000000
NH_3	0.000014
CO_2e	7.7

5.1 Trenching/Excavating Phase

5.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 4

5.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 3280
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 121

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

5.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.634	000.007	000.676	005.626	000.017	000.015		000.033	00364.981
LDGT	000.819	000.010	001.163	008.688	000.019	000.017		000.034	00487.852
HDGV	001.292	000.015	002.999	025.303	000.045	000.040		000.045	00760.330
LDDV	000.265	000.003	000.321	003.488	000.007	000.006		000.008	00370.175
LDDT	000.567	000.005	000.859	007.093	000.008	000.008		000.008	00577.145
HDDV	000.970	000.014	009.604	003.036	000.373	000.343		000.031	01589.614
MC	002.482	000.008	000.828	015.260	000.029	000.026		000.051	00398.308

5.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: A5 - 2:1 Slope Grading

- Activity Description:
Where necessary, grade banks to a slope of 2:1 to repair the steep, unstable banks and prevent future erosion of those banks from impacting enhanced and newly-planted marshes, and install 4,480 LF of erosion control matting for permanent stabilization.

- Activity Start Date
Start Month: 3
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 3
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.009886
SO_x	0.000147
NO_x	0.067747

Pollutant	Total Emissions (TONs)
PM 2.5	0.002821
Pb	0.000000
NH_3	0.000043

CO	0.053202	CO_2e	14.8
PM 10	0.038073		

6.1 Site Grading Phase

6.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 3
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 10

6.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 10745
Amount of Material to be Hauled On-Site (yd^3): 796
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

6.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

6.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: A6 - Clear Site Access Roads

- Activity Description:
Clear and grade access roads into site. Road dimensions assumed to be 12 feet wide, and a total of 1/2 mile length.

- Activity Start Date
Start Month: 1
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.006617
SO_x	0.000095
NO_x	0.044400
CO	0.036171

Pollutant	Total Emissions (TONs)
PM 2.5	0.001879
Pb	0.000000
NH_3	0.000013
CO_2e	9.4

PM 10	0.074607		

7.1 Site Grading Phase

7.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 5

7.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 31680
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e

Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

7.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

APPENDIX E - Record of Air Analysis and ACAM Detailed Reports

Alternative B – Living Shoreline

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:

Base: LANGLEY AFB
State: Virginia
County(s): York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

b. Action Title: Training Area 1 Shoreline Stabilization and Erosion Protection - Alternative B: Living Shoreline

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2020

e. Action Description:

Create a structural solution that maintains the natural functionality and connectivity of the existing ecosystem. When compared to Alternative A, Alternative B would be suitable for areas that have increased tidal ranges and boat wake. This alternative includes proposed adjacent bank grading, a stone structure, an oyster reef, vegetation restoration, and long-term vegetation management, as detailed below:
• Construct approximately 1,150 LF of a stone structure called a "sill" to contain sand fill placed to support a newly-planted marsh area. The sill would be placed seaward from the existing shoreline in an attempt to balance the cut/fill required as part of the adjacent grading, and would be located at an elevation near MLW, with a height between 0 and 1 foot above MHW to allow for regular wave overtopping.
• Strategically place gaps along the sill to allow for the draining of the land areas behind the sill, as well as providing connectivity between ecosystems.
• Grade banks behind the sill to slopes ranging from 8:1 to 10:1.
• Plant new marsh areas upgradient of the sill, including a low-marsh between the sill and mean high water (MHW) and a high-marsh between the MHW and approximately 3 to 4 feet above mean low water (MLW).
• Plant 4-foot wide tidal shrub zone upgradient of the high-marsh to help stabilize the toe of the slope.
• Apply a native upland seed mix to be blended with the existing vegetation, creating a connected ecosystem.
• Construct structural, man-made concrete/granite oyster reefs within shallow, near-shore water adjacent to the shoreline. To serve as a barrier between the near- and far-shore, thereby aiding in the protection of the shoreline. The oyster reefs would be installed such that they provide appropriate substrate and habitat for the eastern oyster.
• Implement a long-term vegetation management and maintenance program, including selective tree pruning and clearing, the removal of shoreline debris (particularly after storm events), visual inspections of the restoration status, maintenance of the coir log as needed, and future, supplemental plantings as deemed necessary.
• Implement a long-term oyster reef management and maintenance program, including monitoring reef performance and integrity over time; monitoring the rehabilitation of the eastern oyster, blue crab, and other natural resources; training personnel to perform such assessments; and communicating and recording the successes and challenges of the oyster reefs for potential future implementation at other coastal military installations.
Projects analyzed within this alternative:
B1 - Install Sill
B2 - Low Marsh
B3 - High Marsh
B4 - Tidal Shrub Zone
B5 - 4:1 Slope Grading
B6 - Clear Site Access Roads

f. Point of Contact:

Name:	Paul Sanford
Title:	Avitation Environmental Planner
Organization:	AECOM
Email:	paul.sanford@aecom.com
Phone Number:	813-286-1711

2. Analysis: Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

Conformity Analysis Summary:

2020

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Norfolk-Virginia Beach-Newport News (Hampton Roads), VA			
VOC	0.083	100	No
NOx	0.549	100	No
CO	0.476		
SOx	0.001		
PM 10	0.573		
PM 2.5	0.023		
Pb	0.000		
NH3	0.000		
CO2e	129.1		

2021 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Norfolk-Virginia Beach-Newport News (Hampton Roads), VA			
VOC	0.000	100	No
NOx	0.000	100	No
CO	0.000		
SOx	0.000		
PM 10	0.000		
PM 2.5	0.000		
Pb	0.000		
NH3	0.000		
CO2e	0.0		

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

Paul Sanford, Avitation Environmental Planner DATE

1. General Information

- Action Location

Base: LANGLEY AFB
State: Virginia
County(s): York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Action Title: Training Area 1 Shoreline Stabilization and Erosion Protection - Alternative B: Living Shoreline

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2020

- Action Purpose and Need:

Purpose:
Stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land at the Training Area 1 (TA1) site located at JBLE - Eustis. The loss of land includes associated resources, such as plants and substrate.

Need:
Protect available training land in order to maintain the quality of the training necessary to meet JBLE - Eustis mission and national defense requirements.

The primary mission at JBLE - Eustis is to provide mission-ready soldiers, civilians, and leaders to combatant commanders in support of joint and combined operations worldwide. JBLE - Eustis requires appropriate and suitable operational space to host the Army and Air Force to train service members in transportation, aviation maintenance, logistics and deployment doctrine, and applicable DoD, State, and Federal requirements. TA1 was approximately 50 acres at inception; however, the long-term shoreline erosion loss along Skiffes Creek is estimated to be 0.6 feet per year (though localized erosion rates may be greater).

Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE - Eustis.

- Action Description:

Create a structural solution that maintains the natural functionality and connectivity of the existing ecosystem. When compared to Alternative A, Alternative B would be suitable for areas that have increased tidal ranges and boat wake. This alternative includes proposed adjacent bank grading, a stone structure, an oyster reef, vegetation restoration, and long-term vegetation management, as detailed below:

• Construct approximately 1,150 LF of a stone structure called a "sill" to contain sand fill placed to support a newly-planted marsh area. The sill would be placed seaward from the existing shoreline in an attempt to balance the cut/fill required as part of the adjacent grading, and would be located at an elevation near MLW, with a height between 0 and 1 foot above MHW to allow for regular wave overtopping.
• Strategically place gaps along the sill to allow for the draining of the land areas behind the sill, as well as providing connectivity between ecosystems.
• Grade banks behind the sill to slopes ranging from 8:1 to 10:1.
• Plant new marsh areas upgradient of the sill, including a low-marsh between the sill and mean high water (MHW) and a high-marsh between the MHW and approximately 3 to 4 feet above mean low water (MLW).
• Plant 4-foot wide tidal shrub zone upgradient of the high-marsh to help stabilize the toe of the slope.
• Apply a native upland seed mix to be blended with the existing vegetation, creating a connected ecosystem.
• Construct structural, man-made concrete/granite oyster reefs within shallow, near-shore water adjacent to the shoreline. To serve as a barrier between the near- and far-shore, thereby aiding in the protection of the shoreline. The oyster reefs would be installed such that they provide appropriate substrate and habitat for the eastern oyster.

• Implement a long-term vegetation management and maintenance program, including selective tree pruning and clearing, the removal of shoreline debris (particularly after storm events), visual inspections of the restoration status, maintenance of the coir log as needed, and future, supplemental plantings as deemed necessary.
• Implement a long-term oyster reef management and maintenance program, including monitoring reef performance and integrity over time; monitoring the rehabilitation of the eastern oyster, blue crab, and other natural resources; training personnel to perform such assessments; and communicating and recording the successes and challenges of the oyster reefs for potential future implementation at other coastal military installations.
Projects analyzed within this alternative:
B1 - Install Sill
B2 - Low Marsh
B3 - High Marsh
B4 - Tidal Shrub Zone
B5 - 4:1 Slope Grading
B6 - Clear Site Access Roads

- Point of Contact

Name: Paul Sanford
Title: Avitation Environmental Planner
Organization: AECOM
Email: paul.sanford@aecom.com
Phone Number: 813-286-1711

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	B1 - Install Sill
3.	Construction / Demolition	B2 - Low Marsh
4.	Construction / Demolition	B3 - High Marsh
5.	Construction / Demolition	B4 - Tidal Shrub Zone
6.	Construction / Demolition	B5 - 4:1 Slope Grading
7.	Construction / Demolition	B6 - Clear Site Access Roads

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: B1 - Install Sill

- Activity Description:

• Construct approximately 1,150 LF of a stone structure called a "sill" to contain sand fill placed to support a newly-planted marsh area. The sill would be placed seaward from the existing shoreline in an attempt to balance the cut/fill required as part of the adjacent grading, and would be located at an elevation near MLW, with a height between 0 and 1 foot above MHW to allow for regular wave overtopping.

• Strategically place gaps along the sill to allow for the draining of the land areas behind the sill, as well as providing connectivity between ecosystems.

- Activity Start Date
Start Month: 1
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.008588
SO_x	0.000157
NO_x	0.056902
CO	0.052105
PM 10	0.032615

Pollutant	Total Emissions (TONs)
PM 2.5	0.002290
Pb	0.000000
NH_3	0.000102
CO_2e	15.7

2.1 Trenching/Excavating Phase

2.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 7

2.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 13191
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 1466

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.634	000.007	000.676	005.626	000.017	000.015		000.033	00364.981
LDGT	000.819	000.010	001.163	008.688	000.019	000.017		000.034	00487.852
HDGV	001.292	000.015	002.999	025.303	000.045	000.040		000.045	00760.330
LDDV	000.265	000.003	000.321	003.488	000.007	000.006		000.008	00370.175
LDDT	000.567	000.005	000.859	007.093	000.008	000.008		000.008	00577.145
HDDV	000.970	000.014	009.604	003.036	000.373	000.343		000.031	01589.614
MC	002.482	000.008	000.828	015.260	000.029	000.026		000.051	00398.308

2.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)

(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.2 Building Construction Phase

2.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 2

2.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 13191
Height of Building (ft): 6
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

2.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0898	0.0013	0.6610	0.3917	0.0256	0.0256	0.0081	128.83
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0320	0.0006	0.1690	0.2160	0.0070	0.0070	0.0028	54.467
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

2.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: B2 - Low Marsh

- Activity Description:
• Grade banks behind the sill to slopes ranging from 8:1 to 10:1.

• Plant new marsh areas upgradient of the sill, including a low-marsh between the sill and mean high water (MHW).

- Activity Start Date
Start Month: 2
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 2
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.018738
SO_x	0.000298
NO_x	0.121604
CO	0.110116
PM 10	0.091847

Pollutant	Total Emissions (TONs)
PM 2.5	0.005118
Pb	0.000000
NH_3	0.000082
CO_2e	29.3

3.1 Site Grading Phase

3.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0

Number of Days: 10

3.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft^2): 13219
Amount of Material to be Hauled On-Site (yd^3): 979
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e

LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

3.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3.2 Trenching/Excavating Phase

3.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 10

3.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 13219
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 490

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC

POVs	50.00	50.00	0	0	0	0	0

3.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_X**	**NO_X**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

3.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)

$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: B3 - High Marsh

- Activity Description:
• Grade banks behind the sill to slopes ranging from 8:1 to 10:1.
• Plant new marsh areas upgradient of the sill, including a -marsh between the MHW and approximately 3 to 4 feet above mean low water (MLW).

- Activity Start Date
Start Month: 2
Start Month: 2020

- Activity End Date
Indefinite: False

End Month: 2
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.013027
SO_x	0.000206
NO_x	0.084231
CO	0.076765
PM 10	0.023216

Pollutant	Total Emissions (TONs)
PM 2.5	0.003555
Pb	0.000000
NH_3	0.000053
CO_2e	20.2

4.1 Site Grading Phase

4.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 6

4.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 7779
Amount of Material to be Hauled On-Site (yd^3): 576
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

4.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4.2 Trenching/Excavating Phase

4.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 6

4.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 779
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 288

- Trenching Default Settings
Default Settings Used: Yes

Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

4.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

5. Construction / Demolition

5.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: B4 - Tidal Shrub Zone

- Activity Description:
Plant 4-foot wide tidal shrub zone upgradient of the high-marsh to help stabilize the toe of the slope.

- Activity Start Date
Start Month: 2
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 2
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.006025
SO_x	0.000102
NO_x	0.035985
CO	0.039232
PM 10	0.011151

Pollutant	Total Emissions (TONs)
PM 2.5	0.001554
Pb	0.000000
NH_3	0.000018
CO_2e	9.6

5.1 Trenching/Excavating Phase

5.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 5

5.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 4179
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 155

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

5.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.634	000.007	000.676	005.626	000.017	000.015		000.033	00364.981
LDGT	000.819	000.010	001.163	008.688	000.019	000.017		000.034	00487.852
HDGV	001.292	000.015	002.999	025.303	000.045	000.040		000.045	00760.330
LDDV	000.265	000.003	000.321	003.488	000.007	000.006		000.008	00370.175
LDDT	000.567	000.005	000.859	007.093	000.008	000.008		000.008	00577.145
HDDV	000.970	000.014	009.604	003.036	000.373	000.343		000.031	01589.614
MC	002.482	000.008	000.828	015.260	000.029	000.026		000.051	00398.308

5.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

- Activity Location

County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: B5 - 4:1 Slope Grading

- Activity Description:

Where necessary, grade banks generally to a slope of 4:1 to repair the steep, unstable banks and prevent future erosion of those banks from impacting enhanced and newly-planted marshes.

- Activity Start Date

Start Month: 3
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 3
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.030017
SO_x	0.000445
NO_x	0.205790
CO	0.161483
PM 10	0.340003

Pollutant	Total Emissions (TONs)
PM 2.5	0.008566
Pb	0.000000
NH_3	0.000132
CO_2e	44.9

6.1 Site Grading Phase

6.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 3
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 1
Number of Days: 0

6.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 33313
Amount of Material to be Hauled On-Site (yd^3): 2468
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

6.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

6.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

- Activity Location

County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: B6 - Clear Site Access Roads

- Activity Description:

Clear and grade access roads into site. Road dimensions assumed to be 12 feet wide, and a total of 1/2 mile length.

- Activity Start Date

Start Month: 1

Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.006617
SO_x	0.000095
NO_x	0.044400
CO	0.036171
PM 10	0.074607

Pollutant	Total Emissions (TONs)
PM 2.5	0.001879
Pb	0.000000
NH_3	0.000013
CO_2e	9.4

7.1 Site Grading Phase

7.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 5

7.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 31680
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

7.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

APPENDIX E - Record of Air Analysis and ACAM Detailed Reports

Alternative C – Concrete Bulkhead

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Instruction 32-7040, Air Quality Compliance And Resource Management; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:

Base: LANGLEY AFB
State: Virginia
County(s): York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

b. Action Title: Training Area 1 Shoreline Stabilization and Erosion Protection - Alternative C: Concrete Bulkhead

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2020

e. Action Description:

Construct 500 LF of precast concrete walls, called "bulkheads," for the purposes of stabilizing sections of eroded shoreline, and focusing on bluff areas that have eroded into steep and unstable banks, as well as areas where there is frequent.
• Place bulkheads in an excavated trench before compacted soil backfill is placed in the trench on top of the rear anchor to hold the bulkhead in place.
• Grade banks adjacent to the bulkhead. Banks with slope ranges between 6:1 and 3:1 would be the target of the grading; existing, natural topography, adjacent land uses, and potential design combinations with other shoreline protection measures would also be considered when targeting banks for grading.
• Construct a stone sill on 200 LF of eroded shoreline adjacent to a pedestrian bridge and grade the upgradient areas to slopes ranging from 8:1 to 10:1. The sill would protect the foundation of the existing pedestrian bridge without requiring modifications to the bridge.
• Plant new marsh areas upgradient of the sill, including a low-marsh between the sill and mean high water (MHW) and a high-marsh between the MHW and approximately 3 to 4 feet above mean low water (MLW).
• Plant 4-foot wide tidal shrub zone upgradient of the high-marsh to help stabilize the toe of the slope.
• Apply a native upland seed mix to be blended with the existing vegetation, creating a connected ecosystem.
• Implement a long-term vegetation management and maintenance program, including selective tree pruning and clearing, the removal of shoreline debris (particularly after storm events), visual inspections of the restoration status, maintenance of the coir log as needed, and future, supplemental plantings as deemed necessary.

Projects analyzed within this alternative:
C1 - Place Concrete Bulkhead
C2 - Low Marsh
C3 - High Marsh
C4 - Tidal Shrub Zone
C5 - 3:1 Slope Grading
C6 - Install Sill
C7 - 4:1 Slope Grading Behind Sill
C8 - Clear Site Access Roads

f. Point of Contact:

Name: Paul Sanford
Title: Avitation Environmental Planner

Organization: AECOM
Email: paul.sanford@aecom.com
Phone Number: 813-286-1711

2. Analysis: Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

Conformity Analysis Summary:

2020

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Norfolk-Virginia Beach-Newport News (Hampton Roads), VA			
VOC	0.063	100	No
NOx	0.413	100	No
CO	0.365		
SOx	0.001		
PM 10	0.192		
PM 2.5	0.017		
Pb	0.000		
NH3	0.000		
CO2e	95.4		

2021 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Norfolk-Virginia Beach-Newport News (Hampton Roads), VA			
VOC	0.000	100	No
NOx	0.000	100	No
CO	0.000		
SOx	0.000		
PM 10	0.000		
PM 2.5	0.000		
Pb	0.000		
NH3	0.000		
CO2e	0.0		

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

Paul Sanford, Avitation Environmental Planner DATE

1. General Information

- Action Location

Base: LANGLEY AFB
State: Virginia
County(s): York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Action Title: Training Area 1 Shoreline Stabilization and Erosion Protection - Alternative C: Concrete Bulkhead

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2020

- Action Purpose and Need:

Purpose:
Stabilize the existing erosion-affected shoreline and protect from future bluff failure and loss of land at the Training Area 1 (TA1) site located at JBLE - Eustis. The loss of land includes associated resources, such as plants and substrate.

Need:
Protect available training land in order to maintain the quality of the training necessary to meet JBLE - Eustis mission and national defense requirements.

The primary mission at JBLE - Eustis is to provide mission-ready soldiers, civilians, and leaders to combatant commanders in support of joint and combined operations worldwide. JBLE - Eustis requires appropriate and suitable operational space to host the Army and Air Force to train service members in transportation, aviation maintenance, logistics and deployment doctrine, and applicable DoD, State, and Federal requirements. TA1 was approximately 50 acres at inception; however, the long-term shoreline erosion loss along Skiffes Creek is estimated to be 0.6 feet per year (though localized erosion rates may be greater).

Failure to implement an appropriate corrective action would result in further erosion and land loss, subsequently impacting the availability and quality of training at JBLE - Eustis.

- Action Description:

Construct 500 LF of precast concrete walls, called "bulkheads," for the purposes of stabilizing sections of eroded shoreline, and focusing on bluff areas that have eroded into steep and unstable banks, as well as areas where there is frequent.
• Place bulkheads in an excavated trench before compacted soil backfill is placed in the trench on top of the rear anchor to hold the bulkhead in place.
• Grade banks adjacent to the bulkhead. Banks with slope ranges between 6:1 and 3:1 would be the target of the grading; existing, natural topography, adjacent land uses, and potential design combinations with other shoreline protection measures would also be considered when targeting banks for grading.
• Construct a stone sill on 200 LF of eroded shoreline adjacent to a pedestrian bridge and grade the upgradient areas to slopes ranging from 8:1 to 10:1. The sill would protect the foundation of the existing pedestrian bridge without requiring modifications to the bridge.
• Plant new marsh areas upgradient of the sill, including a low-marsh between the sill and mean high water (MHW) and a high-marsh between the MHW and approximately 3 to 4 feet above mean low water (MLW).
• Plant 4-foot wide tidal shrub zone upgradient of the high-marsh to help stabilize the toe of the slope.
• Apply a native upland seed mix to be blended with the existing vegetation, creating a connected ecosystem.
• Implement a long-term vegetation management and maintenance program, including selective tree pruning and clearing, the removal of shoreline debris (particularly after storm events), visual inspections of the restoration status, maintenance of the coir log as needed, and future, supplemental plantings as deemed necessary.

Projects analyzed within this alternative:
C1 - Place Concrete Bulkhead
C2 - Low Marsh
C3 - High Marsh
C4 - Tidal Shrub Zone
C5 - 3:1 Slope Grading
C6 - Install Sill
C7 - 4:1 Slope Grading Behind Sill
C8 - Clear Site Access Roads

- Point of Contact

Name: Paul Sanford
Title: Avitation Environmental Planner
Organization: AECOM
Email: paul.sanford@aecom.com
Phone Number: 813-286-1711

- Activity List:

	Activity Type	Activity Title
2.	Construction / Demolition	C1 - Place Concrete Bulkhead
3.	Construction / Demolition	C2 - Low Marsh
4.	Construction / Demolition	C3 - High Marsh
5.	Construction / Demolition	C4 - Tidal Shrub Zone
6.	Construction / Demolition	C5 - 3:1 Slope Grading
7.	Construction / Demolition	C6 - Install Sill
8.	Construction / Demolition	C7 - 4:1 Slope Grading Behind Sill
9.	Construction / Demolition	C8 - Clear Site Access Roads

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: C1 - Place Concrete Bulkhead

- Activity Description:

• Place bulkheads in an excavated trench before compacted soil backfill is placed in the trench on top of the rear anchor to hold the bulkhead in place.

- Activity Start Date

Start Month: 1
Start Month: 2020

- Activity End Date

Indefinite: False
End Month: 1
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.007415
SO_x	0.000126
NO_x	0.045353
CO	0.048181
PM 10	0.007439

Pollutant	Total Emissions (TONs)
PM 2.5	0.001919
Pb	0.000000
NH_3	0.000040
CO_2e	12.1

2.1 Trenching/Excavating Phase

2.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2020

- Phase Duration

Number of Month: 0
Number of Days: 4

2.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft^2): 3000
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 333

- Trenching Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.634	000.007	000.676	005.626	000.017	000.015		000.033	00364.981
LDGT	000.819	000.010	001.163	008.688	000.019	000.017		000.034	00487.852
HDGV	001.292	000.015	002.999	025.303	000.045	000.040		000.045	00760.330
LDDV	000.265	000.003	000.321	003.488	000.007	000.006		000.008	00370.175
LDDT	000.567	000.005	000.859	007.093	000.008	000.008		000.008	00577.145
HDDV	000.970	000.014	009.604	003.036	000.373	000.343		000.031	01589.614
MC	002.482	000.008	000.828	015.260	000.029	000.026		000.051	00398.308

2.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

2.2 Building Construction Phase

2.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2020

- Phase Duration

Number of Month: 0
Number of Days: 4

2.2.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft^2): 3000
Height of Building (ft): 6
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

2.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0898	0.0013	0.6610	0.3917	0.0256	0.0256	0.0081	128.83
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0320	0.0006	0.1690	0.2160	0.0070	0.0070	0.0028	54.467
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

2.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: C2 - Low Marsh

- Activity Description:
Plant new marsh areas upgradient of the sill, including a low-marsh between the sill and mean high water (MHW).

- Activity Start Date
Start Month: 2
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 2
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.007708
SO_x	0.000121
NO_x	0.049451
CO	0.045674
PM 10	0.009980

Pollutant	Total Emissions (TONs)
PM 2.5	0.002099
Pb	0.000000
NH_3	0.000025
CO_2e	11.8

3.1 Site Grading Phase

3.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 3

3.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 2859
Amount of Material to be Hauled On-Site (yd^3): 212
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes

Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

3.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3.2 Trenching/Excavating Phase

3.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 3

3.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 2859
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 106

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e

Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_X**	**NO_X**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

3.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: C3 - High Marsh

- Activity Description:
Plant new marsh areas upgradient of the sill, including a high-marsh between the MHW and approximately 3 to 4 feet above mean low water (MLW).

- Activity Start Date
Start Month: 2
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 2
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.005049
SO_x	0.000078
NO_x	0.032072
CO	0.030132
PM 10	0.002151

Pollutant	Total Emissions (TONs)
PM 2.5	0.001371
Pb	0.000000
NH_3	0.000012
CO_2e	7.6

4.1 Site Grading Phase

4.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 2

4.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 424
Amount of Material to be Hauled On-Site (yd^3): 31
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e

Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	**SO_X**	**NO_X**	**CO**	**PM 10**	**PM 2.5**	**Pb**	**NH_3**	**CO_2e**
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

4.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4.2 Trenching/Excavating Phase

4.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration

Number of Month: 0
Number of Days: 2

4.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft^2): 424
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 16

- Trenching Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

4.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment

WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

5. Construction / Demolition

5.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: C4 - Tidal Shrub Zone

- Activity Description:
Plant 4-foot wide tidal shrub zone upgradient of the high-marsh to help stabilize the toe of the slope.

- Activity Start Date
Start Month: 2
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 2
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.002391
SO_x	0.000040
NO_x	0.014204
CO	0.015625
PM 10	0.001276

Pollutant	Total Emissions (TONs)
PM 2.5	0.000616
Pb	0.000000
NH_3	0.000006
CO_2e	3.8

5.1 Trenching/Excavating Phase

5.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 2
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 2

5.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 718
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 27

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC

POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

5.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.634	000.007	000.676	005.626	000.017	000.015		000.033	00364.981
LDGT	000.819	000.010	001.163	008.688	000.019	000.017		000.034	00487.852
HDGV	001.292	000.015	002.999	025.303	000.045	000.040		000.045	00760.330
LDDV	000.265	000.003	000.321	003.488	000.007	000.006		000.008	00370.175
LDDT	000.567	000.005	000.859	007.093	000.008	000.008		000.008	00577.145
HDDV	000.970	000.014	009.604	003.036	000.373	000.343		000.031	01589.614
MC	002.482	000.008	000.828	015.260	000.029	000.026		000.051	00398.308

5.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

6. Construction / Demolition

6.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: C5 - 3:1 Slope Grading

- Activity Description:
Grade banks adjacent to the bulkhead. Banks with slope ranges between 6:1 and 3:1 would be the target of the grading; existing, natural topography, adjacent land uses, and potential design combinations with other shoreline protection measures would also be considered when targeting banks for grading.

- Activity Start Date
Start Month: 3
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 3
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.014659
SO_x	0.000215

Pollutant	Total Emissions (TONs)
PM 2.5	0.004178
Pb	0.000000

NO_x	0.099923
CO	0.079202
PM 10	0.062728

NH_3	0.000055
CO_2e	21.6

6.1 Site Grading Phase

6.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 3
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 15

6.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 11899
Amount of Material to be Hauled On-Site (yd^3): 881
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

6.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CH_4	CO_2e
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

6.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7. Construction / Demolition

7.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: C6 - Install Sill

- Activity Description:
Construct a stone sill on 200 LF of eroded shoreline adjacent to a pedestrian bridge and grade the upgradient areas to slopes ranging from 8:1 to 10:1. The sill would protect the foundation of the existing pedestrian bridge without requiring modifications to the bridge.

- Activity Start Date
Start Month: 1
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 1
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.004993
SO_x	0.000085

Pollutant	Total Emissions (TONs)
PM 2.5	0.001296
Pb	0.000000

NO_x	0.030681
CO	0.032223
PM 10	0.004565

NH_3	0.000028
CO_2e	8.2

7.1 Trenching/Excavating Phase

7.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 3

7.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 2368
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 263

- Trenching Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

7.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.634	000.007	000.676	005.626	000.017	000.015		000.033	00364.981
LDGT	000.819	000.010	001.163	008.688	000.019	000.017		000.034	00487.852
HDGV	001.292	000.015	002.999	025.303	000.045	000.040		000.045	00760.330
LDDV	000.265	000.003	000.321	003.488	000.007	000.006		000.008	00370.175
LDDT	000.567	000.005	000.859	007.093	000.008	000.008		000.008	00577.145
HDDV	000.970	000.014	009.604	003.036	000.373	000.343		000.031	01589.614
MC	002.482	000.008	000.828	015.260	000.029	000.026		000.051	00398.308

7.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

7.2 Building Construction Phase

7.2.1 Building Construction Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 2

7.2.2 Building Construction Phase Assumptions

- General Building Construction Information
Building Category: Office or Industrial
Area of Building (ft^2): 2368
Height of Building (ft): 6
Number of Units: N/A

- Building Construction Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Cranes Composite	1	4
Forklifts Composite	2	6
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40 (default)

- Vendor Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

7.2.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Cranes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0898	0.0013	0.6610	0.3917	0.0256	0.0256	0.0081	128.83
Forklifts Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0320	0.0006	0.1690	0.2160	0.0070	0.0070	0.0028	54.467
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

7.2.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor ft^3 to trips (0.42 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase
$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building (ft^2)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor ft^3 to trips (0.38 trip / 1000 ft^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

8. Construction / Demolition

8.1 General Information & Timeline Assumptions

- Activity Location
County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: C7 - 4:1 Slope Grading Behind Sill

- Activity Description:
Bank grading upgradient of sill and tidal shrub zone, to a slope of approximately 4:1.

- Activity Start Date
Start Month: 3
Start Month: 2020

- Activity End Date
Indefinite: False
End Month: 3
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.014385
SO_x	0.000208
NO_x	0.097183
CO	0.078232
PM 10	0.029069

Pollutant	Total Emissions (TONs)
PM 2.5	0.004091
Pb	0.000000
NH_3	0.000039
CO_2e	20.8

8.1 Site Grading Phase

8.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date
Start Month: 3
Start Quarter: 1
Start Year: 2020

- Phase Duration
Number of Month: 0
Number of Days: 15

8.1.2 Site Grading Phase Assumptions

- General Site Grading Information
Area of Site to be Graded (ft^2): 5076
Amount of Material to be Hauled On-Site (yd^3): 376
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings
Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)
Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

8.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

8.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

9. Construction / Demolition

9.1 General Information & Timeline Assumptions

- Activity Location

County: York
Regulatory Area(s): Norfolk-Virginia Beach-Newport News (Hampton Roads), VA

- Activity Title: C8 - Clear Site Access Roads

- Activity Description:

Clear and grade access roads into site. Road dimensions assumed to be 12 feet wide, and a total of 1/2 mile length.

- Activity Start Date

Start Month: 1
Start Month: 2020

- Activity End Date

Indefinite: False
End Month: 1
End Month: 2020

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.006617
SO_x	0.000095
NO_x	0.044400
CO	0.036171
PM 10	0.074607

Pollutant	Total Emissions (TONs)
PM 2.5	0.001879
Pb	0.000000
NH_3	0.000013
CO_2e	9.4

9.1 Site Grading Phase

9.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2020

- Phase Duration

Number of Month: 0
Number of Days: 5

9.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft^2): 31680
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Site Grading Default Settings

Default Settings Used: Yes
Average Day(s) worked per week: 5 (default)

- Construction Exhaust (default)

Equipment Name	Number Of Equipment	Hours Per Day
Graders Composite	1	6
Other Construction Equipment Composite	1	8
Rubber Tired Dozers Composite	1	6
Tractors/Loaders/Backhoes Composite	1	7

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20 (default)

Average Hauling Truck Round Trip Commute (mile): 20 (default)

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

9.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Emission Factors (lb/hour) (default)

Graders Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0919	0.0014	0.5823	0.5765	0.0280	0.0280	0.0082	132.95
Other Construction Equipment Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0562	0.0012	0.3519	0.3508	0.0138	0.0138	0.0050	122.62
Rubber Tired Dozers Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.2117	0.0024	1.5772	0.8005	0.0630	0.0630	0.0191	239.56
Tractors/Loaders/Backhoes Composite								
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**	**CH_4**	**CO_2e**
Emission Factors	0.0436	0.0007	0.2744	0.3616	0.0134	0.0134	0.0039	66.897

- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)

	VOC	SO_X	NO_X	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
LDGV	000.282	000.002	000.220	003.283	000.007	000.006		000.023	00323.276
LDGT	000.358	000.003	000.388	004.597	000.009	000.008		000.024	00417.298
HDGV	000.706	000.005	001.021	015.119	000.022	000.019		000.045	00770.239
LDDV	000.112	000.003	000.133	002.524	000.004	000.004		000.008	00313.527
LDDT	000.253	000.004	000.380	004.330	000.007	000.006		000.008	00445.483
HDDV	000.493	000.013	004.921	001.743	000.169	000.155		000.028	01496.485
MC	002.436	000.003	000.747	012.951	000.027	000.024		000.054	00397.607

9.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

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