Continuing Authorities Program, Section 14, Emergency Streambank or Shoreline Protection, James River Shoreline, Newport News, Virginia

Final Integrated Feasibility Report/ Environmental Assessment

US Army Corps of Engineers ®
Norfolk District

October 10, 2021

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FINDING OF NO SIGNIFICANT IMPACT

CONTINUING AUTHORITIES PROGRAM, SECTION 14, EMERGENCY STREAMBANK AND SHORELINE PROTECTION, JAMES RIVER SHORELINE, NEWPORT NEWS, VIRGINIA

The U.S. Army Corps of Engineers, Norfolk District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The Final Integrated Feasibility Report and Environmental Assessment (IFR/EA) dated August 25, 2021, for the Continuing Authorities Program, Section 14 Emergency Streambank and Shoreline Protection, James River Shoreline Feasibility Study, addresses shoreline stabilization opportunities and feasibility in Newport News, Virginia.

The Final IFR/EA, incorporated herein by reference, evaluated various alternatives that would stabilize the severely eroded shoreline along a 600-foot section of the James River which threatens existing public facilities and creates a public safety issue. The Recommended Plan is the National Economic Development (NED) Plan which includes:

- Stabilization of approximately 600 linear feet eroding riverbank along the James River with the construction of a longitudinal rock sill running the length of the project area at an elevation of 5-feet (NAVD88); earthen sloped berm graded on a 1 Vertical to 3 Horizontal (1V:3H) slope; approximately 2,900 tons of Virginia Department of Transportation (VDOT) Class III riprap and 800 tons of VDOT No. 1 stone; an estimated 4,300 cubic yards of fill; 1,600 square yards of geotextile filter fabric; approximately 35,000 square feet of seeding; and 700 cubic yards of debris removal.

In addition to a No Action/Future Without Project Alternative, four alternatives were evaluated. The alternatives included a rock sill with vegetated slope, a full rock revetment, a partial rock revetment with a vegetated slope, and a living shoreline with a vegetated slope. Only those alternative plans that provide the best protection with the least amount of disruption to the environment for the longest life span and for a reasonable budget were carried forward. The final alternatives for evaluation and consideration included the “no action” alternative and the rock sill with a vegetated slope.

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the Recommended Plan are listed in Table 1:

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Aesthetics	☒	☐	☐
Air quality	☒	☐	☐
Aquatic resources/wetlands	☒	☐	☐
Invasive species	☒	☐	☐
Fish and wildlife habitat	☒	☐	☐
Threatened/Endangered species/critical habitat	☒	☐	☐
Historic properties	☒	☐	☐
Other cultural resources	☒	☐	☐
Floodplains	☒	☐	☐
Hazardous, toxic & radioactive waste	☒	☐	☐
Hydrology	☒	☐	☐
Land use	☐	☐	☒
Navigation	☐	☐	☒
Noise levels	☒	☐	☐
Public infrastructure	☐	☐	☒
Socio-economics	☒	☐	☐
Environmental justice	☐	☐	☒

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Geology, Topography, and Bathymetry	☒	☐	☐
Tribal trust resources	☐	☐	☒
Water quality	☒	☐	☐
Climate change	☒	☐	☐
Transportation	☒	☐	☐

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the Recommended Plan. Best management practices (BMPs) as detailed in the IFR/EA will be implemented, if appropriate, to minimize impacts. If determined operationally feasible, a turbidity curtain would be used to minimize turbidity impacts during construction. Tree removal would occur outside of April 15 – September 15, which includes the pupping season of June 1 - July 30 for the northern long-eared bat (Myotis septentrionalis) if determined to be practical. Erosion and sediment control measures would be maintained during the duration of the project including a wire-supported silt fence, until final stabilization has been achieved on all applicable portions of the site. No compensatory mitigation is required as part of the Recommended Plan.

Public review of the draft IFR/EA and FONSI was completed on December 7, 2020. All comments submitted during the public review period were responded to in the Final IFR/EA.

Pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended, the U.S. Army Corps of Engineers determined that the Recommended Plan may affect and i s likely to adversely affect the northern long-eared bat if present. The U.S. Fish and Wildlife Service (FWS) indicated in their letter verification dated 21 August 2020 that this project 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. The FWS verified that the January 5, 2016 Programmatic Biological Opinion concludes the USACE's consultation responsibilities under ESA Section 7(a)(2) with respect to the northern long-eared bat in their letter dated 21 August 2020. Pursuant to the ESA of 1973, as amended, the U.S. Army Corps of Engineers also determined that the Recommended Plan may affect

but is not likely to adversely affect the following federally listed species or their designated critical habitat: the Atlantic sturgeon (Acipenser oxyrinchus), shortnose sturgeon (Acipenser brevirostrum), leatherback sea turtle (Dermochelys coriacea), Kemp's ridley sea turtle (Lepidochelys kempii), hawksbill sea turtle (Eretmochelys imbricata), and loggerhead sea turtle (Caretta caretta). The National Marine Fisheries Service (NMFS) concurred with the Corps' determination on 21 September 2020.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the Corps of Engineers determined that historic properties would not be adversely affected by the Recommended Plan. The Virginia Department of Historic Resources concurred with the determination on September 29, 2020.

Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the Recommended Plan has been found to be compliant with section 404(b)(1) Guidelines (40 CFR 230). The Clean Water Act Section 404(b)(1) Guidelines evaluation is found in the Environmental Appendix of the IFR/EA.

The State Water Control Board issued conditional §401 Water Quality Certification for Regional Permit (RP) 19 (effective date 5 September 2018) as meeting the requirements of the Virginia Water Protection Permit Regulation. A copy of the RP-19 including terms and conditions is provided in the Integrated Report/EA Environmental Appendix. The Recommended Plan appears to meet the requirements of the RP-19 and its associated Water Quality Certification, pending confirmation based on information to be developed during the Design and Implementation Phase. Therefore, this provides reasonable assurance that a Water Quality Certification pursuant to Section 401 of the Clean Water Act could be issued for the Recommended Plan from the Virginia Department of Environmental Quality (VDEQ). A Water Quality Certification pursuant to Section 401 of the Clean Water Act would be obtained from the VDEQ prior to construction. All conditions of the Water Quality Certification would be implemented in order to minimize adverse impacts to water quality.

A determination of consistency with the Virginia Coastal Zone Management program pursuant to the Coastal Zone Management Act of 1972 was submitted to the VDEQ on September 29, 2020. Virginia DEQ provided their concurrence on November 20, 2020. All requirements of the consistency determination concurrence response received from the VDEQ shall be implemented in order to minimize adverse impacts to the coastal zone.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed. Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, coordination has occurred with NMFS regarding potential the potential for minor, adverse effects to Essential Fish Habitat for various life stages of twelve fish species that may be present in the vicinity of the project site in the James River. The NMFS concurred with the Corps' determination on September 29, 2020. Pursuant to the Fish and Wildlife Coordination Act (FWCA),

coordination has occurred with FWS regarding potential effects on fish and wildlife resources. The FWCA documentation is located in the Environmental Appendix of the IFR/EA. In their letter dated April 12, 2021, the USFWS acknowledges Alternative 1 as a reasonable compromise between cost and ecological benefit.

Technical, environmental, and cost effectiveness criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the Recommended Plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

Brian P. Hallberg HALLBERG.BRIAN.PHILIP.1131232582 2021.10.18 16:49:08 -04'00'

Date

Brian P. Hallberg, PMP
Colonel, U.S. Army
Commanding

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE), Norfolk District initiated this study in May 2015 at the request of the non-federal sponsor, the City of Newport News, Virginia. The study authority is Section 14 of the Flood Control Act of 1946 as amended, for Emergency Streambank Restoration under the Continuing Authorities Program (CAP).

An approximate 600-foot section of the riverbank along the James River is severely eroded by the combined effects of natural erosion processes; river flow, relative sea level rise, and tidal, storm, and wind driven wave action. The resulting 25-foot high receding sandy bluff results in a continuing loss of land and is an imminent threat to existing public facilities and utilities, including River Road, electric, gas, communications, public water and sewer lines, as well as creating dangerous conditions associated with the steep eroding slope.

CAP Section 14 feasibility studies must evaluate whether it would be more cost effective to relocate the public facilities so that they would no longer be at risk from the streambank erosion or stabilize the shoreline to reduce the risk to the facilities where they are currently located. This report identifies the alternatives that were considered to address this problem and recommends bank stabilization by rock sill with vegetated slope as the plan that would best meet the study objectives and protect the public facilities at risk. During the feasibility phase, there were four action alternatives considered, including rock sill with vegetative slope, full rock revetment, partial rock revetment with vegetative slope, and living shoreline with vegetative slope.

Alternative 1 (the Recommended Plan) is the least cost option at an estimated July 2021 project first cost of $3,481,000 and would stabilize the streambank with a rock sill and vegetated slope. This plan includes a longitudinal rock sill running the length of the project area, earthen slope berm graded on a 1 Vertical to 3 Horizontal (1V:3H), 2900 tons of VDOT class III riprap, 800 tons of VDOT number 1 stone, 4300 cubic yards of fill, 1600 square yards of geotextile filter fabric, 35,000 square feet of seeding, and 700 cubic yards of debris removal. At the estimated project first cost of $3,481,000, the estimated federal cost- share (65%) is $2,262,650 and the estimated non-federal cost-share (35%) is $1,218,350. This report provides the basis for preparing plans and specifications for the subsequent construction of the Recommended Plan.

LIST OF ACRONYMS AND ABBREVIATIONS

AAB	Average Annual Benefits
AAC	Average Annual Costs
ACQR	Air Quality Control Region
ADCIRC	Advanced Circulation Model
APE	Area of Potential Effect
APP	Accident Prevention Plan
ASTM	American Society for Testing and Materials
BMP	Best Management Practice
CAA	Clean Air Act
CAP	Continuing Authorities Program
CCB	Center for Conservation and Biological Diversity
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHS	Coastal Hazards Study
CO	Carbon Monoxide
CO2	Carbon Dioxide
CWA	Clean Water Act
dBA	A-weighted decibels
DEQ	Department of Environmental Quality
DHR	Department of Historic Resources
DoD	Department of Defense
EA	Environmental Assessment
EFH	Essential Fish Habitat
ERDC	Engineering, Research and Development Center (USACE)
ESA	Endangered Species Act
EO	Executive Order
FEMA	Federal Emergency Management Act

FID	Federal Interest Determination
FUDS	Formerly Used Defense Site
FWIS	Fish and Wildlife Information System
GARFO	Greater Atlantic Region Fisheries Office
GHGs	Greenhouse Gases
Hz	Hertz
LERR	Lands, Easements, rights-of-way and relocation
LERRDs	Lands, easements, right-of-way, relocations, and disposal areas
MHW	Mean High Water
MHHW	Mean Higher High Water
MLW	Mean Low Water
MLLW	Mean Lower Low Water
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NAAQS	National Ambient Air Quality Standards
NACCS	North Atlantic Coast Comprehensive Study
NAD	North Atlantic Division
NAVD 88	North American Vertical Datum of 1988
NED	National Economic Development
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOx	Nitrogen Oxides
NPL	National Priorities List
NRHP	National Register of Historic Places
NTDE	National Tidal Datum Epoch (NTDE)
OHS	Occupational Health and Safety
03	Ozone
P&G	Principles and Guidelines (USACE)

PM2.5	Particulate Matter measured as equal to or less than 2.5 microns in diameter
PM10	Particulate Matter measured as equal to or less than 10 microns in diameter
PPA	Project Partnership Agreement
PPE	Personal Protective Equipment
Ppt	Parts Per Thousand
RCRA	Resource Conservation and Recovery Act
ROI	Region of Influence
SAV	Submerged Aquatic Vegetation
SLR	Sea Level Rise
SO2	Sulfur Dioxide
SPT	Standard Penetration Testing
STWAVE	Steady State Special Wave
TSP	Tentatively Selected Plan
TMDL	Total Maximum Daily Load
TRI	Toxic Release Inventory
TRIS	Toxic Chemical Release Inventory System
TSS	Total Suspended Solids
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VDGIF	Virginia Department of Game and Inland Fisheries
VIMS	Virginia Institute of Marine Science
VMRC	Virginia Marine Resources Commission
VOCs	Volatile Organic Compounds
WRDA	Water Resources Development Act

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1 INTRODUCTION

1.1 STUDY AUTHORITY

The James River Shoreline, Newport News, Virginia study is authorized by the Continuing Authorities Program (CAP), Section 14 of the Flood Control Act of 1946, as amended (P.L.79-526), Emergency Streambank and Shore Protection. The purpose of the Section 14 program is to construct emergency streambank and shore protection to prevent natural erosion processes from damaging highways, bridge approaches, public works, churches, public and private non-profit hospitals, schools, water and sewer lines, and other public or non-profit facilities that offer public services to all, and known historic properties eligible or listed on the National Register of Historic Places. The term “Shore Protection” is now referred to as Coastal Storm Risk Management; however, the “Shore Protection” will be used within this report as it is included in the existing CAP, Section 14 Language.

If an eligible facility is in imminent danger of failure due to streambank or shoreline erosion, and after a request for a project has been received from a potential non-federal sponsor stating its desire to participate in a solution, the Corps will conduct a feasibility study to analyze the problem and determine if there is a feasible solution. In the feasibility phase, the first $100,000 is 100 percent federally funded. Any additional feasibility study costs require an executed Feasibility Cost Sharing Agreement (FCSA), stating that all costs above the initial $100,000 are cost-shared 50 percent federal and 50 percent non-federal.

1.2 PURPOSE AND SCOPE

On May 15, 2015 the City of Newport News requested USACE, Norfolk District to evaluate structural and nonstructural measures that could be implemented as part of a Federal project under CAP Section 14, Emergency Streambank and Shoreline Protection. The City requested this study to address the erosion along the James River in the vicinity of River Road, adjacent to the Government Ditch, which is threatening River Road and various public utilities. Facilities at risk include the roadway, water, sanitary sewer, electric, and communication lines. The north bank of the James River within the project area is subject to natural erosion processes including river flow, relative sea level rise, and tidal, storm, and wind driven wave action. The first step in the evaluation process, which is fully federally funded, is to determine if there is Federal Interest in pursuing a feasibility study for this area. This task has already been completed; a favorable Federal Interest Determination (FID) for a shoreline erosion protection study along the James River was approved on March 14, 2017. From this determination and approval, USACE, North Atlantic Division (NAD) sanctioned the development of the FCSA and the Project Management Plan (PMP) for the feasibility phase.

The purpose of this study is to determine if constructing emergency streambank protection to prevent bank erosion from damaging River Road and other public works

utilities on River Road is feasible and economically justified. The study identifies the least cost alternative, and the Recommended Plan is justified if total project costs are less than costs of relocating the threatened road and public utilities. Federal costs are limited to $5,000,000 for CAP Section 14. The cost of lands, easements, right-of-way, relocations of utilities, disposal areas (LERRDs), and the operation and maintenance of the project, once completed, are a non-federal responsibility.

The purpose of the proposed action is to stabilize the existing shoreline along the 600-foot section of the James River and prevent future erosion resulting from the combined effects of storm surge, sea level rise, and stormwater runoff. The project is needed to provide long-term protection to existing public utilities on the adjacent upland, including River Road, and to eliminate unsafe conditions associated with the steep slope.

1.3 STUDY AREA

The City of Newport News is located on the Lower Peninsula in eastern Virginia, adjacent to the Chesapeake Bay, approximately 65 miles southeast of Richmond. The study area is located entirely within the City along the north bank of the James River, west of the James River Bridge (US-17/US-258). It is bound on the south by the Government Ditch, to the north by North Avenue, and extends eastward to River Road. A map of the study area is provided below in Figure 1-1.

Figure 1-1. Location of Study Area

1.4 BACKGROUND

An approximate 600-foot section of the riverbank along the James River is severely eroded by the combined effects of natural erosion processes; river flow, relative sea level rise, and tidal, storm, and wind driven wave action. The resulting 25-foot high receding sandy bluff is an imminent threat to existing public facilities, causing continual loss of land threatening existing public utilities, including River Road, electric, gas, communications, public water and sewer lines, as well as creating dangerous conditions associated with the steep slope.

The tidal shorelines of the Chesapeake Bay are generally classified into six basic types depending on the height of the upland bank. The project area best fits into the High Bank type of shoreline, where upland elevations are greater than 10 feet above mean low water. Bank erosion takes place at the shoreline and higher up the bank, where wave and storm surge action during hurricanes cause bank erosion and slumping from wave undercutting and can threaten the high bank, or bluff. See below Figures 1-2, 1-3,1-4, and 1-5 showing erosion at the study area along the James River.

Figure 1-2. View facing southeast of eroding shoreline at project site along

Figure 1-3. View facing northwest of eroding shoreline at project site along James River

Figure 1-4. View facing southeast of project site and crack in ground surface along James River

Figure 1-5. View facing northwest of the debris.

At one location, confirmed on a December 6, 2019 site visit, the bank has encroached to within approximately 10 feet of the existing road (shown in Figure 1-4) and with a storm event that could potentially occur within the next two years indicate that “with out project” conditions are expected to damage public facilities is estimated to exceed $3 Million.

1.5 PRIOR REPORTS AND EXISTING PROJECTS

Over the years, the City of Newport News and USACE have completed studies and projects within a close vicinity of the study area along the James River to include:

1) Government Ditch, Newport News, Virginia, Section 205 was to improve the channel of Newmarket Creek from Dresden Drive in Newport News to U.S. Highway 258 and improvement of entire length. A dam across Newmarket Creek would divert floodwaters from the creek into Government Ditch and thence into the James River that was completed in 1967.

2) James River Bank Stabilization Alternative Analysis done by CH2MHILL, The objective of the study was to evaluate the site, identify options for bank stabilization measures, and recommend a preferred alternative for the project along River Road completed in 2013.

3) Bank Stabilization and Living Shoreline at the Mariners Museum (Kettle Pond), Newport News, Virginia completed in 2016.

2 PLAN FORMULATION

In general, the plan formulation process follows six major steps, as listed and summarized below. This procedure is in accordance with the USACE Principles and Guidelines (P&G) and related regulations. These six steps are:

- Step 1: Identification of problems and opportunities;
- Step 2: Inventory of forecasting conditions;
- Step 3: Formulation of alternative plans;
- Step 4: Evaluation of alternative plans;
- Step 5: Comparison of alternative plans; and
- Step 6: Selection of a plan.

Preliminary plans were formulated by combining management measures. Each plan was formulated in consideration of the following four criteria described in the P&G:

- Completeness: Extent to which the plan provides and accounts for all necessary investments or actions to ensure realization of the planning objectives;
- Effectiveness: Extent to which the plan contributes to achieving the planning objectives;
- Efficiency: Extent to which the plan is the most cost-effective means of addressing the specified problems and realizing the specified opportunities, consistent with protecting the nation's environment; and
- Acceptability: Workability and viability of the alternative plan with respect to acceptance by Federal and non-federal entities and the public, and compatibility with existing laws, regulations, and public policies.

The underlying rational of the Planning Process is described in ER 1105-2-100 as "Formulation of Alternative Plans."

- Alternative plans are formulated to identify ways of achieving planning objectives within the project constraints, in order to solve the problems and realize the opportunities listed in Step 1 of the Planning Processes, which is to "Identify Problems and Opportunities.";
- Structural and nonstructural management measures are identified and combined to form alternative plans;
- Planners will keep focus on complete plan(s) while doing individuals tasks, to ensure their plans address the problems of the planning area; and
- Section 904 of the Water Resources Development Act (WRDA) of 1986 requires USACE to address the following during the formulation and evaluation of alternative plan:
    - Enhancing national economic development (NED) – including benefits

to particular regions that are not transfers from other regions;
- Protecting and restoring the quality of the total environment;
- The wellbeing of the people of the United States; and
- Preservation of cultural as well as historical values.

Plan formulation was conducted with focus on achieving the federal objective of water and related land resources project planning, which is to contribute to NED consistent with protecting the Nation's environmental statutes, applicable executive orders, and other federal planning requirements. Alternative plan development considered study area problems, opportunities, and constraints.

Alternative plan evaluation includes all effects, beneficial or adverse, to each of the four evaluation accounts identified in the Principles and Guidance (1983), which are National Economic Development, Environmental Quality, Regional Economic Development, and Other Social Effects.

2.1 PROBLEMS AND OPPORTUNITIES

Problems in the study area include:

1) The river bank is severely eroded so that there is a significant risk that River Road and the various public utilities in the vicinity will be compromised if the erosion continues;
2) The existing federal project in the vicinity, Government Ditch, is at risk of being damaged if the structural integrity of the concrete structure is affected by continued erosion; and
3) The river bank is severely eroded and the resulting 25-foot bluff creates a public safety issue.

Opportunities in the study area include:

1) Create safe bank conditions;
2) Prevent damage to the Government Ditch federal project;
3) Develop passive community recreational area (green space);
4) Improve community cohesion/pride;
5) Improve environmental aesthetics;
6) Protect cultural resource sites;
7) Provide pedestrian access to public property; and
8) Improve near-shore habitat.

2.2 PLANNING OBJECTIVES AND CONSTRAINTS

The study goal is to determine if the project would contribute to the NED account in a manner consistent with protecting the nation's environment in accordance with national environmental statues, applicable executive orders, and other federal planning requirements.

2.2.1 PLANNING OBJECTIVES

In general, the primary federal objective is to contribute planning objectives for this study take an integrated systematic approach to the stabilization of the eroding James River shoreline adjacent to River Road and to reduce the risk future erosion poses to that infrastructure. Based on the identified problems that the bank erosion causes within the study area; the following planning objective has been established to assist in the development and evaluation of alternative plans:

- Stabilize the eroding shoreline to reduce the risk that River Road and the various public utilities in the vicinity will be damaged and ultimately compromised by continued erosion over the period of analysis.

2.2.2 PLANNING CONSTRAINTS AND CONSIDERATIONS

Planning constraints are any policy, technical, environmental, economic, local, regional, social, and institutional factors that act to restrict the planning process. Constraints that will affect the plan formulation include:

1) Do not induce erosion to the left or right of the project area; and
2) Minimize environmental and cultural impacts.

In addition to constraints, there are also considerations such as state-of-the-art limitations, time, money, uncertainty of the future, policy, and the in accuracies inherent in design procedures on which alternative plans are based that are considered in the planning process. In this case, the project should not negatively affect federally threatened and endangered species and their critical habitats and should minimize environmental impacts. There is also a private boat dock and other privately owned real estate parcels in the study area that may affect the cost and/or implementation of a project.

2.3 AFFECTED ENVIRONMENT

The affected environment describes the existing environmental conditions found within the Region of Influence (ROI) and includes the area of potential impact of the project alternatives. This chapter has been prepared in accordance with the NEPA of 1969 (42 United States Code [U.S.C.] §§ 4321 et seq.) and the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [CFR] Parts 1500–1508 [the 1978 version of this rule was used because the NEPA process had been previously initiated prior to the 14 September 2020 implementation of the CEQ NEPA streamlining rule]). This section summarizes the existing (baseline) conditions, to provide a sound basis for plan formulation and the impact analysis. All resources areas described in Chapter 2 are further analyzed in Chapter 6, Environmental Consequences, where the No Action/Future Without Project Alternative and Future With Project Alternative are evaluated and compared.

Much of the ROI for this section of the report is focused on the immediate 600-foot stretch of shoreline and the adjacent nearshore areas of the James River in Newport News. However, the ROI is further defined as necessary based on the individual resource topic.

The following two resource areas, land use and environmental justice, were dismissed from further analysis. Land use in the existing project site would not change and there would be no disproportionate human health or environmental effects on environmental justice communities, including minority or low-income populations, resulting from the implementation of the Preferred Action Alternative. According to the U.S. Environmental Protection Agency's Environmental Justice Screening and Mapping Tool (EJScreen), the Region of Influence is Census Block Group 517000315002 (USEPA 2020a). The approximate population for this Census Block Group is 2,178 individuals with an approximate 4% minority population and 20% low-income population which defines household income as less than or equal to twice the federal poverty level (USEPA 2020). According to US Census Bureau Data, the City of Newport News has a population of 179,673 with an approximately 52% minority population and 15.3% poverty rate. The minority population percentage is less than the corresponding community of comparison, the City of Newport News with an approximately 52% minority population (Census Bureau 2020). Although the potentialfor a low-income population exists, given the nature of the site improvements which includes stabilizing a 600-ft section of shoreline along the James River, there would be no potential for disproportionate impacts on environmental justice populations, including low-income populations.

2.3.1 AESTHETICS

Visual resources are the natural and man-made features that comprise the visual qualities of a given area, or "viewshed." These features form the overall impression thatan observer receives of an area or its landscape character from a certain vantage point. Topography, water, vegetation, man-made features, and the degree of panoramic view available are examples of visual characteristics of an area. Visual resources can be subjective by nature, and therefore the level of the proposed project's visual impacts can be challenging to quantify. Generally, projects that create a high level of contrast tothe existing visual character of a project setting are more likely to generate adverse visual impacts due to visual incompatibility. Thus, it is important to assess project effects relative to the existing conditions of the area.

Within a discrete viewshed, an individual's visual perception is a function of the area's spatial properties, visual content, and an individual's previous experiences. The visual character of an area can be altered by actions that would modify the landscape. To provide a baseline for assessing potential visual impacts on a viewshed, the ROI must be described in terms of its visual characteristics and a description of the user groups (viewer groups) who would experience any changes in visual character.

The ROI is defined by the areas in which temporary or permanent visual changes could occur. For this project, the ROI includes the shoreline situated along the James River and adjacent to River Road in the City of Newport News and surrounding areas.

The project site is located in a residential neighborhood, with the general visual landscape characterized by mostly unobstructed, scenic views of the James River (Figure 2-1). Several trees are present along the top of the approximate 25-foot bluffs which transition steeply to a sandy intertidal shoreline comprised of large concrete and stone debris and other structures previously placed to halt erosion. Several deteriorating groins and pilings are present along the approximate 600-foot shoreline. An existing private pier and boathouse are also located within the ROI. The primary user groups of this area include the private property owners along River Road. Additional users who may frequent this area includes other neighborhood residents and members of the general public.

Figure 2-1. Viewscapes of the Region of Influence. Images taken 12/06/2019.

2.3.2 AIR QUALITY

Newport News is located within the Hampton Roads Intrastate Air Quality Control Region (ACQR) which is the ROI for the proposed project. Regulatory areas are identified for each ACQR and are designated as an attainment area or non-attainment area for each of the criteria pollutants based upon whether it achieves or fails to meet the following National Ambient Air Quality Standard (NAAQS) established by the U.S. Environmental Protection Agency (USEPA) for the following six criteria pollutants: ozone (O3), which is measured as nitrogen oxides (NOx) and volatile organic compounds (VOCs); carbon monoxide (CO); nitrogen dioxide (NO2); sulfur dioxide (SO2); particulate matter, measured as equal to or less than 2.5 microns in diameter (PM2.5) and equal to or less than 10 microns in diameter (PM10); and lead. Hampton Roads is in attainment for all criteria pollutants, including a designated ozone attainment and emission control area for volatile organic compounds (VOCs) and oxides of nitrogen (NOx). Only areas designated by EPA as nonattainment/ maintenance for a NAAQS are subject to conformity requirements. Therefore, the Hampton Roads area is not subject to conformity requirements. Nonattainment areas are Air Quality Control Regions that are in violation of one or more of the NAAQS. Maintenance areas are Air Quality Control Regions that the USEPA previously designated as nonattainment area but have been subsequently designated as attainment and are subject to a maintenance plan.

The Clean Air Act Section 176(c)(4) established the General Conformity Rule, which USEPA implemented through rulemaking in 1993 and most recently amended in 2010 (75 FR 17253). The General Conformity Rule implements the Clean Air Act's requirement that Federal actions occurring in nonattainment and maintenance areas shall not hinder local efforts to control air pollution. Potential impacts to air quality in theROI are evaluated with respect to the extent and intensity of the impacts.

2.3.3 BATHYMETRY, HYDROLOGY, AND TIDAL PROCESSES

The project site is situated along the James River which is the largest river in Virginia. The James River is approximately 340 miles long and encompasses a watershed of 10,000 square miles. The James River is a partially mixed estuary with surface salinity ranging from approximately 15 to 26 parts per thousand (ppt) at the mouth of the James (Shen and Lin 2006). The project site is approximately 15 miles from the confluence of the James River and Chesapeake Bay with an average surface salinity of 14.6 ppt (Figure 2-2).

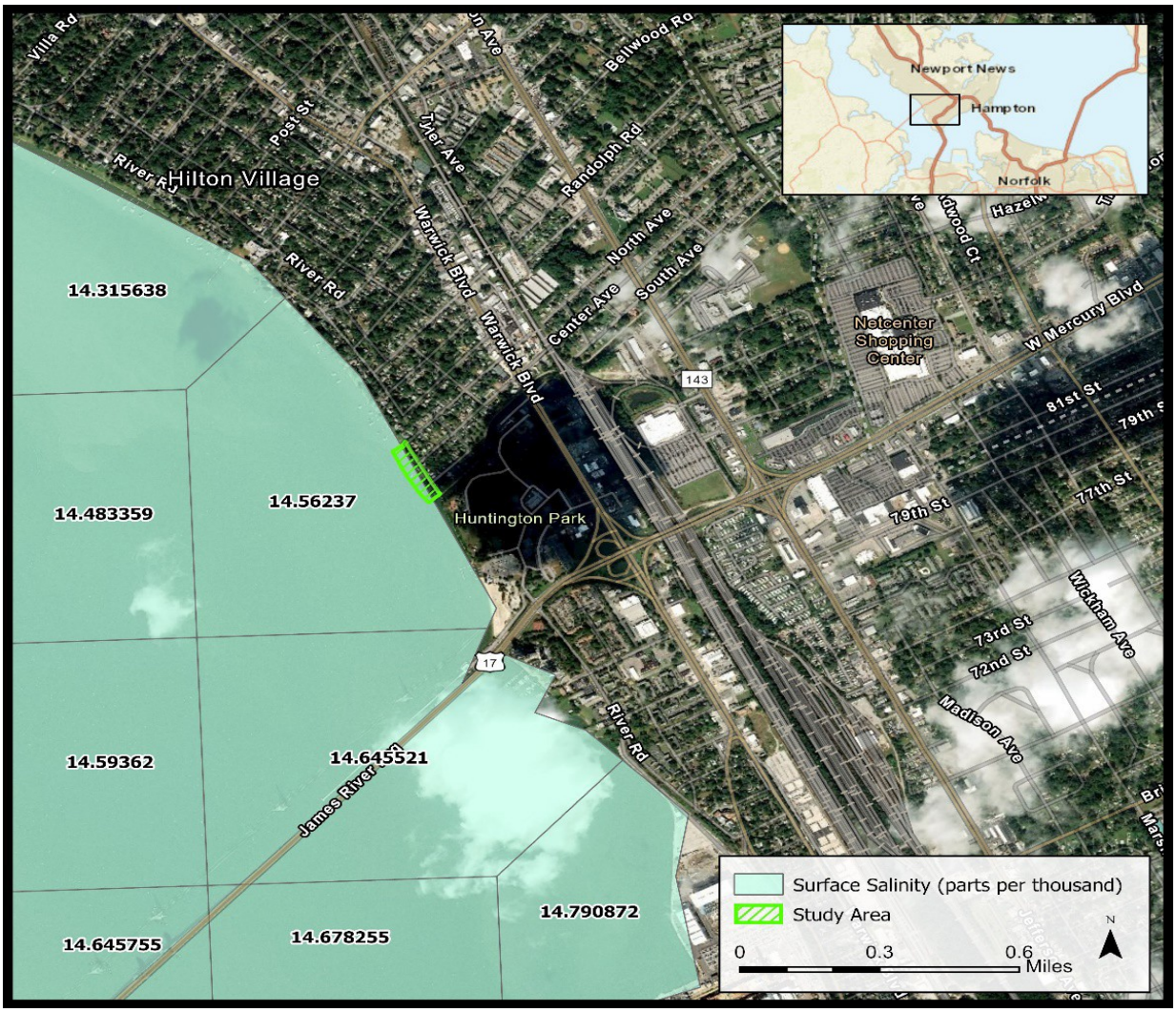

Figure 2-2. Average surface salinity in the vicinity of the Region of Influence.

The project site is approximately 12 miles from the nearest National Oceanic and Atmospheric Administration (NOAA) Tidal Benchmark Station located at Sewells Point, Virginia (Latitude: 36°56.8'N, Longitude: 76°19.8'W) which records daily hydrologic and oceanographic conditions including hourly water level data. The mean tidal range for the site is approximately 2.43 feet (Schnabel Engineering 2013). In 2017, the City of Newport News installed a tidewatch station at Leeward Marina, located less than one mile from the project site. The site has a fetch, or distance of water across which wind travels, of approximately 8 miles to the south, and approximately 4.5 miles southwest to Ragged Island Wildlife Refuge located on the southern bank of the James River in Isle of White County. The bathymetry adjacent to the project site is characterized by a shallow, nearshore environment as shown in Figure 2-3.

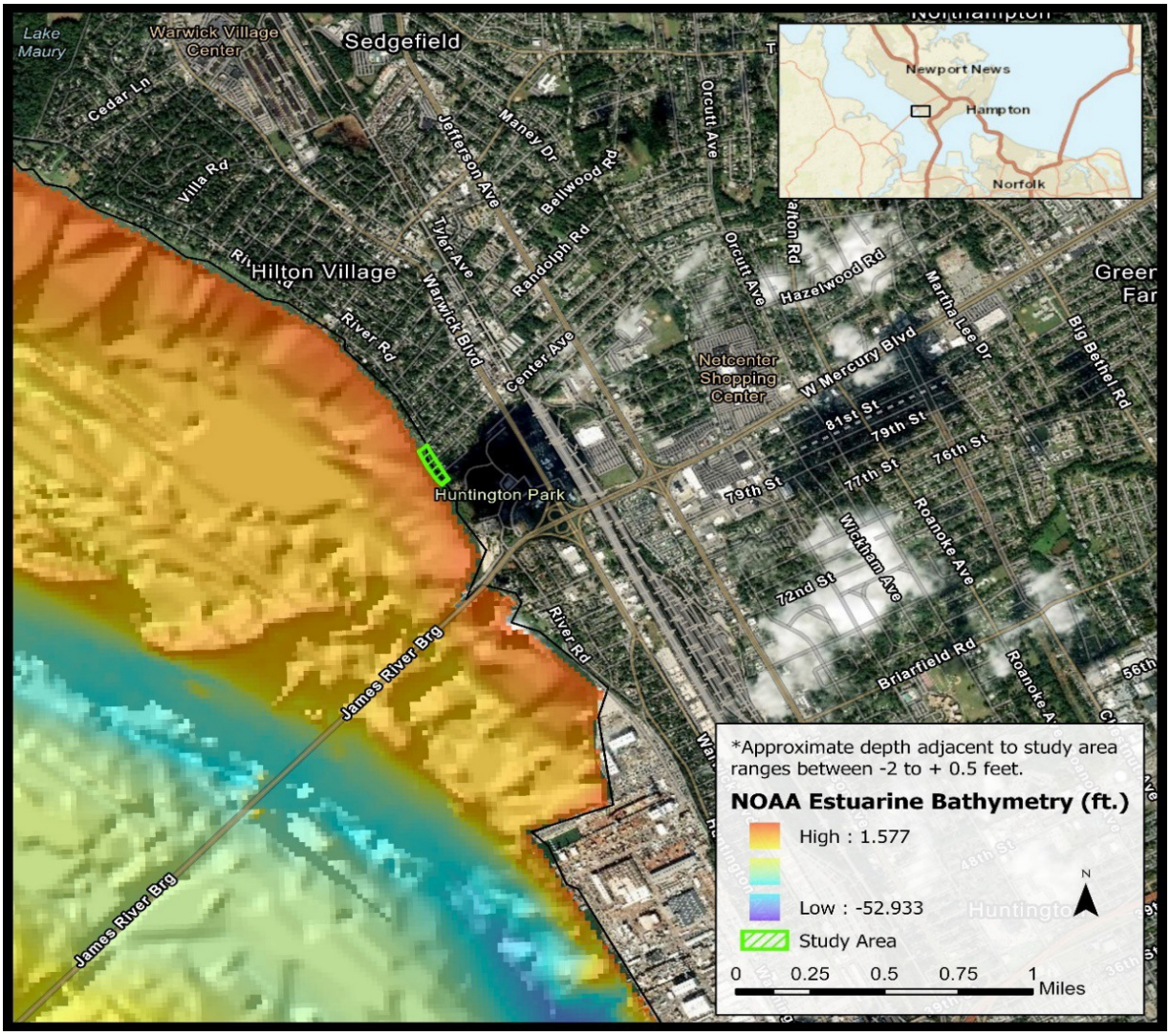

Figure 2-3. Bathymetry of the James River near the Project Site.

Subsurface explorations of the site conducted in 2013 identified groundwater at depths ranging 19.0 to 28.0 feet below the ground surface (Schnabel Engineering 2013). The following factors may contribute to fluctuations in groundwater levels:

precipitation, surface runoff patterns, pumping, tidal action,and river levels (Schnabel Engineering 2013).

2.3.4 CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. Major greenhouse gases include carbon dioxide, methane, nitrous oxide, and various synthetic chemicals. These emissions occur from natural processes and human

activities. The accumulation of GHGs in the atmosphere can influence the earth's temperature. Predictions of long-term environmental impacts due to global climate change include sea level rise (SLR), changing weather patterns with increases in the severity of storms and droughts, and changes to local and regional ecosystems including the potential loss of species.

Sea level rise is anticipated to accelerate due to global climate change. Scientists estimate sea level has risen approximately two times faster in the last two decades as compared to the 20th century (Strauss et al. 2014). Coastal flooding is anticipated to increase with SLR as higher sea level increases the potential for more severe storm surge. Storm surge is the increase in water level above the mean water level due to wind-driven water moving shoreward during a storm event.

Table 2-1 shows the computed SLC rates (relative to 1992) from the present year and the years that follow (through 2122). For further information, please refer to Section 5.5 in the Engineering Appendix, Appendix C.

Table 2-1. Estimated Increase in Relative Sea Level Rise Rates (in feet).

NACCS MEAN (50%) WATER LEVELS ADJUSTED FOR SLR (USACE INTERMEDIATE CURVE) TO YEAR 2022,2042, 2072, and 2122					
		Year 2022	Year 2042	Year 2072	Year 2122
Recurrance (Yrs)	ACE %	ft	ft	ft	ft
1	100%	3.9	4.3	5.1	6.8
2	50%	4.6	5.0	5.8	7.6
5	20%	5.7	6.1	6.9	8.6
10	10%	6.5	7.0	7.8	9.5
20	5%	7.5	7.9	8.7	10.4
50	2%	8.9	9.3	10.1	11.8
100	1%	10.0	10.4	11.2	12.9
200	0.5%	11.1	11.5	12.3	14.0
500	0.2%	12.4	12.9	13.7	15.4
1000	0.1%	13.4	13.8	14.6	16.3
2000	0.05%	14.2	14.7	15.5	17.2
5000	0.02%	15.2	15.7	16.5	18.2
10000	0.01%	15.9	16.3	17.1	18.9

*Estimated Relative Sea Level Change from 1992 to 2122. 8638610, Sewells Point, Virginia. User Defined Rate: 0.0154 feet/yr. All values are expressed in feet relative to LMSL.

2.3.5 CULTURAL RESOURCES

CAP, Section 14, Emergency Streambank and Shoreline Protection, Newport News, Virginia

Several Federal laws and regulations have been established to manage cultural resources, including the National Historic Preservation Act (NHPA) of 1966, the Archaeological and Historic Preservation Act of 1974, the American Indian Religious Freedom Act of 1978, the Archaeological Resource Protection Act of 1979, and the Native American Graves Protection and Repatriation Act of 1990. In addition, Department of Defense (DoD) Instruction 4710.02, Department of Defense Interactions with Federally Recognized Tribes (2006), governs DoD interactions with Federally recognized tribes and Executive Order (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 must meet one or more of the following criteria for inclusion on the NationalRegister of Historic Places (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 toyield, information important in prehistory or history” (36 CFR 60.4).

The Area of Potential Effect (APE) includes the approximate 600-foot stretch of shoreline where the project would be constructed and includes the immediate nearshore environment where disturbance during construction may occur. The Virginia Departmentof Historic Resources (DHR) has nine historic resources on record within a 1-mile radius of the project area (Table 2-2) and one recorded archaeological site which includes a shell midden from the Woodland Period (1200 B.C. – 1606 A.D.), located approximately 0.9 miles from the project site. There are no known archaeological resources within the APE, however, no Phase I Archaeological Survey has been conducted in this area.

Table 2-2. Historic Resources identified by the Department of Historic Resources within one mile of Project Site.

DHR Identification Number	Site Name	Evaluation Status
121-0009	Hilton Village Historic District	NRHP Listing, VLR Listing
121-5134	CSX Railroad	NRHP Eligible
121-0079	Merci Box Car	Not Evaluated
121-5005	Blue Star Diner	NRHP Eligible
121-5455	Hause Building	Not Evaluated
046-5002	Bridge #1901, Route 17, James River Bridge	Not Evaluated
121-5116	Marine Corps Reserve Center Newport News	Not Eligible

2.3.6 FISHERY RESOURCES AND ESSENTIAL FISH HABITAT

Fishery Resources

Approximately 350 species of fish are known to inhabit the Chesapeake Bay region, with only 32 species considered to be year-round residents of the Chesapeake Bay (Chesapeake Bay Program 2020). Resident fishes tend to be smaller than migratory species and are often found in shallow water, where they feed on a variety of invertebrates. Migratory fishes include both anadromous and catadromous species. According to the Virginia Department of Wildlife Resource's online database, Fish and Wildlife Information Service (VaFWIS), six species of anadromous fish may occur in the vicinity of the proposed project site. This includes the Federally listed Atlantic sturgeon (*Acipenser oxyrhynchus*)

described in further detail in Section 2.3.14 (Special Status Species), alewife herring (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*),American shad (*Alosa sapidissima*), striped bass (*Morone saxatilis*), yellow perch (*Perca flavescens*) and hickory shad (*Alosa mediocris*).

At the southern extent of the project site and immediately adjacent to Government Ditch, there are existing shellfish resources, including the Eastern oyster (*Crassostrea virginica*), and Atlantic ribbed mussels (*Geukensia demissa*) established on the existing concrete debris in the intertidal zone (Figures 2-4 and 2-5).

Figure 2-4 and Figure 2-5. Eastern oyster and Atlantic ribbed mussels observed at the Proposed Project Site. Images taken 12/06/2019.

Public shellfish grounds managed by the Virginia Marine Resources Commission (VMRC) are located less than 0.75 miles from the project site and include an open harvest area for oysters in the Lower James River (Figure 2-6). Private leased oyster grounds are located in close proximity to the project site and are located approximately 0.1 mile offshore. The James River is the top producing tributary in the Chesapeake Bay for oyster harvesting including public, private, seed and market (personal communication A. Button 2020). The James River commercial industry landed 6.1 million pounds of seafood in 2018 with a total dockside value of $21.4 million (JamesRiver Association 2019).

Figure 2-6. Public and Private Oyster Grounds in the vicinity of the Study Area.

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended October 11, 1996, requires all Federal agencies to consult with the National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration on all actions, or proposed actions, permitted, funded, or undertaken bythe agency, that may adversely affect Essential Fish Habitat (EFH). EFH is defined under the MSFCMA as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" and has been designated in the James River for eleven fish species. Only specific life stages occur within the river and would therefore be impacted by a project located within the system. The table below lists fishspecies and the specific life stage that might be impacted by the proposed project (NOAA 2020). The "NMFS Essential Fish Habitat Designations" section in the Environmental Appendix (Appendix A) also lists these species and their associated EFH.

Table 2-3. National Marine Fisheries Service Listed Fish Species with Essential Fish Habitat in the James River.

Common Name	Scientific Name	Egg	Larvae	Juveniles	Adult
Atlantic butterfish	*Peprilus triacanthus*			X	X
Black sea bass	*Centropristis striata*			X	X
Sandbar shark	*Carcharhinus plumbeus*			X	
Sand tiger shark	*Carcharias taurus*				X
Bluefish	*Pomatomus saltatrix*			X	X
Summer flounder	*Paralicthys dentatus*		X	X	X
Windowpane flounder	*Scopthamus aquosus*			X	
Atlantic sea herring	*Clupea harengus*			X	X
Red hake	*Urophycis chuss*	X	X	X	X
Winter skate	*Leucoraja ocellata*				X
Little skate	*Leucoraja erinacea*				X
Clearnose skate	*Raja eglanteria*			X	X

2.3.7 FLOODPLAINS AND FLOOD RISK MANAGEMENT

For the purpose of the following discussion, floodplains is defined as any land area susceptible to being inundated by floodwaters from any source. The ROI is the project location floodplain areas along the James River where flooding has occurred in the pastor there is a potential for flooding, including tidal and/or rainfall events.

Through Executive Order (EO) 11988, Floodplain Management, federal agencies are required to evaluate all proposed actions within the 1-percent-annual-chance floodplain or Base Floodplain as defined by the Federal Emergency Management Agency (FEMA). Actions include any Federal activity involving 1) acquiring, managing, and disposing of Federal land and facilities, 2) providing Federally undertaken, financed, or assisted construction and improvements, and 3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, and licensing activities. In addition, the FEMA 0.2-percent-annual-chance floodplain should be evaluated for critical actions or facilities, such as storage of hazardous materials or construction of a hospital.

USACE Engineering Regulation (ER) 1165-2-26 - Implementation of EO 11988 on Flood Plain Management. This regulation sets forth general policy and guidance for USACE implementation of EO 11988 as it pertains to the planning, design, and construction of Civil Works projects and activities under the Operation and Maintenanceand Real Estate Programs. As shown in ER 1165-2-26 and in accordance with EO 11988, USACE uses an eight-step process as part of the decision-making for projects that have potential impacts to or are within the Base Flood Plain. The eight steps and project-specific responses for EO 11988 are discussed further in Chapter 9 (Environmental Compliance).

The project area is subject to tidal flooding and rainfall events. The City of Newport News can experience nuisance type or minor tidal flooding during an astronomical high tide, particularly when the tide is highest during a Spring tide cycle, sometimes referred to as a King Tide. Severe or major tidal flooding usually occurs during tropical systems and nor'easters. Flooding can be short term in duration or long term. For tropical events,peak tidal flooding from storm surge will typically last during one tide cycle. When tropical events reach the mid-Atlantic latitude, they start to move faster in forward speed. On the other hand, nor'easters are usually slow moving and large in size, produce large amounts of rainfall, and high-water levels from storm surge can stay elevated above normal tide cycles for long periods of time. In addition to high tide levels and storm surge, persistent wave action and onshore winds can greatly impact shoreline and bank erosion.

Rainfall events can also cause erosion problems to the project area. Impervious surface areas from roads and development can produce increased runoff and overland flow that may cause bank erosion, also considering the high embankment and side-slope. Steady rainfall that occurs over a multi-day/week period or from back-to-back weather events can cause the ground to become over saturated and unable to absorb water, thus increasing the amount of rainfall runoff and possible bank erosion. Being located near the mouth of the James River, upstream river inflows will have minimal impact for shoreline and bank erosion as compared to storm surge and wave action from tropical and nor'easter events.

The NOAA Sewells Point tide gage went into service in 1927, located near the mouth of the James River and Hampton Roads Harbor, at the Norfolk Naval Base, Norfolk, Virginia. Since 1927, historical high-water tidal flood events have mainly been from tropical storms, weak Category 1 hurricanes, or nor'easters; the area has not experienced a major hurricane on official record. At the Sewells Point gage, before Hurricane Isabel in 2003, the 1933 August Hurricane and 1962 Ash Wednesday Nor'easter were the highest tidal flood events on record, 6.4 and 5.6 feet (stillwater), respectively, referenced to the North American Vertical Datum of 1988 (NAVD88). Whilethe 1933 Hurricane is still the flood of record at Sewells Point, Hurricane Isabel produced a near equal storm tide at 6.3 feet, NAVD88. Note, considering sea level rise, if the 1933 Hurricane would have occurred today, the maximum water level would be about a foot higher. Other more recent notable tidal events and their maximum stillwater levels, from highest to lowest, recorded at Sewells Point include Nor'easter Ida in November 2009 at 6.1 feet, Hurricane Irene in August 2011 at 5.9 feet, Hurricane Sandyin October 2012 at 5.2 feet, and a nor'easter in November 2006 at 5.0 feet, all referenced to NAVD88. Similarly, for all the events mentioned above, the following also had rainfall amounts at approximately 10 inches: Nor'easter Ida, Hurricane Irene, and Hurricane Sandy. The last major costal event was October 16, 2016,

Hurricane Mathew, where the maximum storm tide elevation at Sewells Point was 4.3 feet, NAVD88 and rainfall at approximately 10 inches, with some locations in nearby communities receiving up to 15 inches or more of rainfall (NOAA 2020a,b).

Executive Order 11988 references the FEMA 1- and 0.2-percent-annual-chance floodplains. The 1-percent-annual-chance floodplain is also referred to by FEMA as the Base Floodplain. The City of Newport News effective FEMA Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRM) are dated December 9, 2014. The project area is located within the effective Base Floodplain and 0.2-percent-annual-chance floodplain. From the figure below, using FEMA's National Flood Hazard Layers (FEMA 2014), the Base Floodplain is shown in blue color and the 0.2-percent-annual-chance flood plain is orange color. The Base Flood Elevation is shown at elevation 12 feet, NAVD88, which is Flood Zone VE and includes wave action. From Coastal Transect number 10 shown in the lower right of the figure, as shown in the FIS report, the Base Floodplain and 0.2-percent-annual-chance stillwater (no wave action) elevations are 7.3feet and 8.5 feet, NAVD88, respectively.

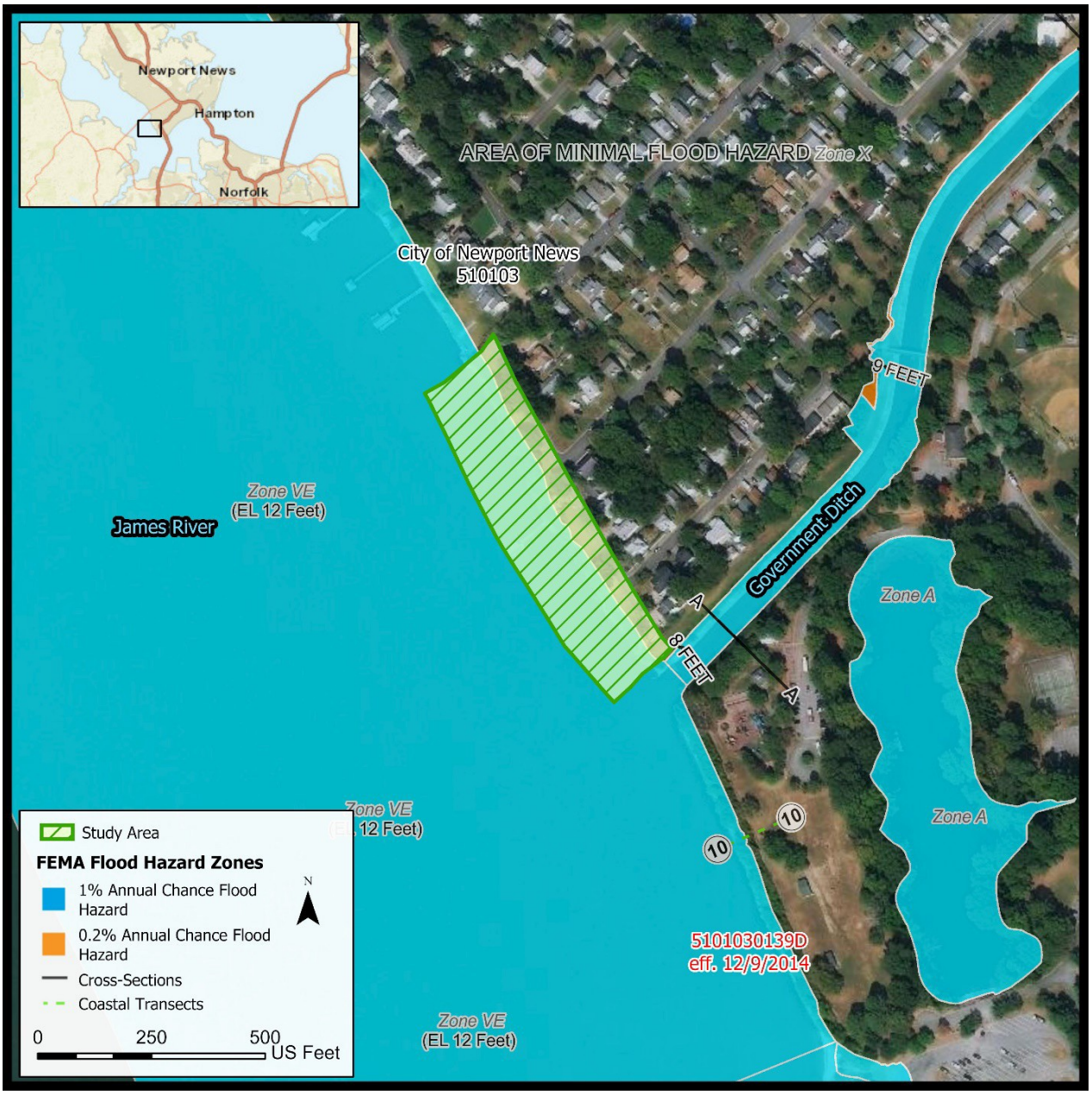

Figure 2-7. Effective 2014 FEMA 1- and 0.2-Percent-Annual-Chance Floodplains.

2.3.8 GEOLOGY, PHYSIOGRAPHY, AND TOPOGRAPHY

The project site is located within in the Virginia Coastal Plain Physiographic Province (Figure 2-8). The topography of the Coastal Plain is a terraced landscape that stair- steps down to the coast and to the major rivers. The coastal lowland sub-province is alow-relief region along the major rivers and surrounding the Chesapeake Bay, at topographic elevations between zero and 60 feet above mean sea level.

The ROI includes the approximate 600-foot section of James River Shoreline that consists of an approximate 25-foot eroding bluff. The regional geology of the project site

consists of the Norfolk Formation characterized by the following: fluvial and estuarine beach and nearshore marine sand, clayey sand, organic silt, peat, and clay (Schnabel Engineering 2013). Beneath the Norfolk Formation is the Miocene Age deposits of the Yorktown Formation which are characterized by silty and clayey sands mixed with shell fragments (Schnabel Engineering 2013).

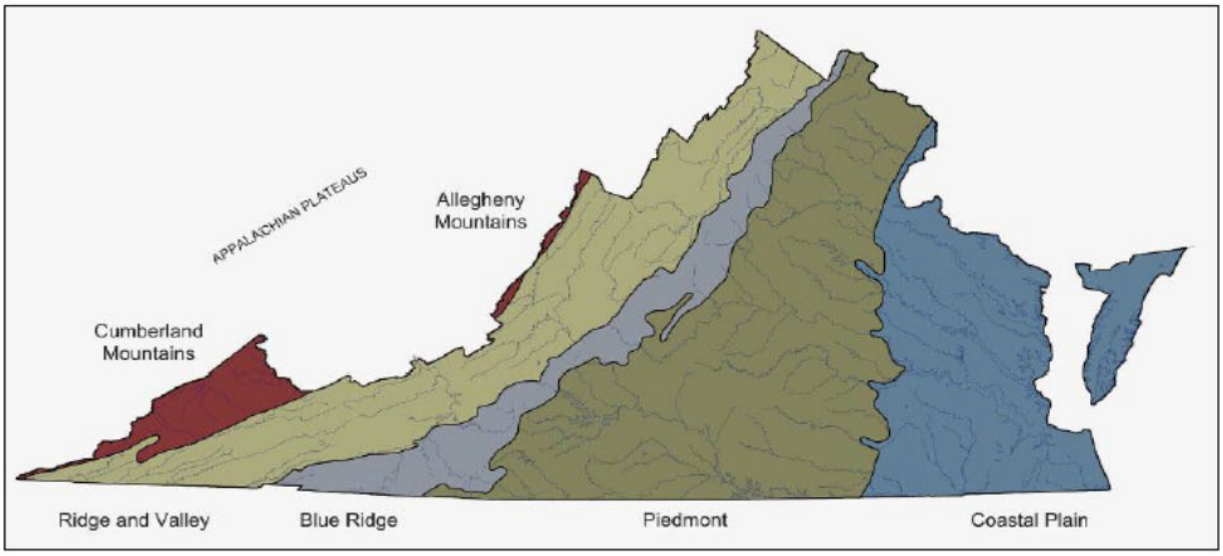

Figure 2-8. Physiographic Provinces of Virginia (Virginia Department of Conservation and Recreation 2016).

Subsurface exploration of the site in 2013 indicate the following general strata types: Stratum A (depths of 0.2 to 12.8 feet) consisting of sand and gravelly sand mixtures with varying amounts of gravel, silt and clay, Stratum B (depths, of 13.8 feet to 15.6 feet) consisting of silt mixtures with varying amounts of clay, gravel, sand and organics, and Stratum C (15.6 feet to 28.1 feet) consisting of clays with varying amounts of sand, gravel, and silt.

The 600-foot stretch of shoreline would be considered a high bank type of shoreline, one of the six basic types of tidal shorelines characteristic of the Chesapeake Bay (Hardaway and Byrne 1999). High bank shorelines are identified where upland elevationis greater than 10 feet above mean low water. Erosion occurs at the shoreline as well as higher on the bank as a result of the combined effects of wave and storm surge action during storm events in which wave undercutting can threaten the higher bank (Schnabel Engineering 2013). The northern banks of the James River may experience an erosion rate of approximately 0.45 feet per year along the northern banks of the James River (Hardaway and Anderson 1980).

Topographic surveys of the site were conducted in 2013 and included six cross-sections beginning 20 feet landward from the top of the bank extending seaward to five feet below mean low water. The cross-shore profiles identified a slope ranging from 1:3 to 1:4 with a berm crest at approximately +25 feet NAVD88 (Schnabel Engineering 2013). Substrate types for the James River are identified in Figure 2-9. Benthic substrate types in the James River in the vicinity of the Study Area.

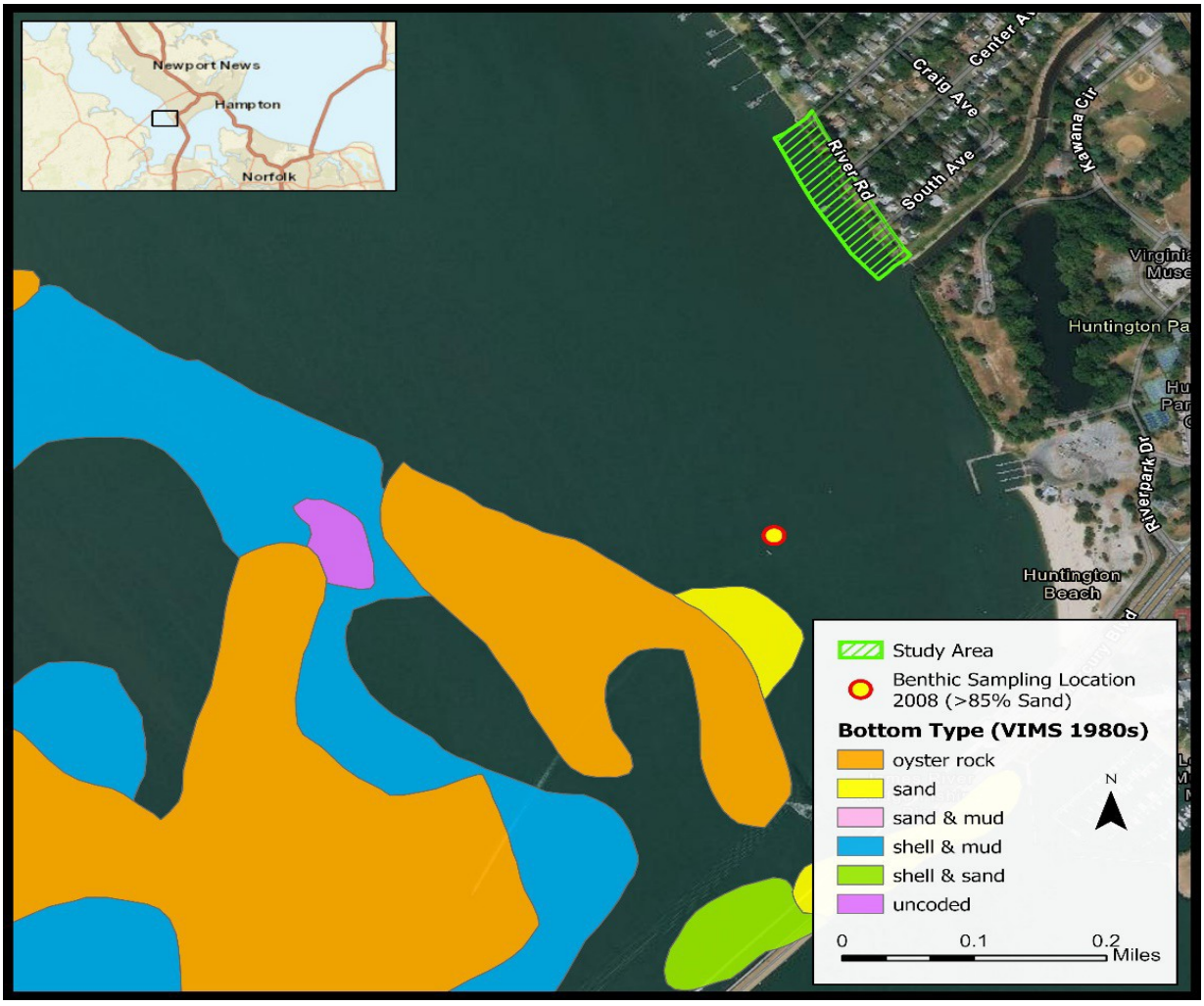

Figure 2-9. Benthic substrate types in the James River in the vicinity of the Study Area.

2.3.9 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

Hazardous and/or toxic wastes, classified by the Resource Conservation and Recovery Act (RCRA) are materials that may pose a potential hazard to human health or the environment due to quantity, concentration, chemical characteristics, or physical characteristics. Radioactive waste is the radioactive by-products from the operation of a nuclear reactor from the reprocessing of depleted nuclear fuel; however, there is no history of radioactive waste occurring in or near the project site; therefore, it is dismissed from further evaluation.

The ROI includes an approximate 3-mile radius from the proposed project. The National Priorities List (NPL) established by Section 105(a)(8(B) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended, establishes a list of national priority waste sites known to release or threaten to release hazardous substances, pollutants, or contaminants. According to the NPL, there are no NPL locations within the ROI.

The Toxic Chemical Release Inventory System (TRIS) identifies facilities that release toxic chemicals to the air, water, and land and provides information and trends in releases, waste management practices, and pollution prevention activities. Near the ROI, Huntington Ingalls Incorporated, a ship and boat building facility, located at 4101 Washington Avenue in Newport News, is the closest facility Toxic Release Inventory (TRI) facility located approximately 2.5 miles downstream of the proposed project site. There are two other land-based TRI facilities occurring within a 3-mile radius including: Marva Maid Dairy located at 5500 Chestnut Ave and Tidewater Wood Products LLC located at 5064 City Line Road in Hampton. A review of the Virginia DEQ's Interactive Mapper Tool, which includes the identification of reported petroleum release sites in Virginia, indicated there have been no recent petroleum releases reported in the JamesRiver within 3 miles of the project site. The closest solid waste facility is Bay Disposal LLC located approximately 3 miles inland of the project site at 310 East Street in Hampton. Camp Hill (FUDS Identification Number: C03VA0069) is located in close proximity to the project site and adjacent to Huntington Park. This site eligible for inclusion in the Formerly Used Defense Site (FUDS) Cleanup Program.

2.3.10 NOISE AND VIBRATION

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium and are sensed by the human ear. Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities of humans and wildlife. The human environment is generally characterized by a certain consistent noise level referred to as ambient, or background noise. The response of individuals to noise events is diverse and influenced by the type of noise; perceived importance of the noiseand its appropriateness in the setting; time of day and type of activity during which the noise occurs; and sensitivity of the individual. Noise impacts result from perceptible changes in the overall noise environment that increase "annoyance" or affect human health. Human health effects such as hearing loss, sleep disruption, disruption of daily activities, changes in cognition and mood can all result from noise impacts, often referred to as "noise annoyance" (Basner 2013).

Noise can be intermittent or continuous, steady or impulsive, and it may be generated by either mobile of stationary sources, and changes in noise are typically measured andreported using a weighted sound intensity (or level), which represents sound heard by the human ear and is measured in units called decibels. The normal human ear can detect sounds that range in frequency from about 20 Hz to 20,000 Hz. However, all sounds in this wide range of frequencies are not heard equally well by the human ear, which is most sensitive to frequencies in the range of 1,000 Hz to 4,000 Hz. In humans, noise levels can range from about 10 dBA for normal breathing, to 120 dBA for anambulance siren, and as much as 150 dBA for a jet engine taking off.

The USEPA's Noise Control Act of 1972 (42 U.S.C. 4901 to 4918) as amended by the Quiet Communities Act of 1978, states that the policy of the United States is to promotean environment for all Americans free from noise that jeopardizes their health or welfare (USEPA 1996). The USEPA generally recognizes an average day-night noise level of less than 50 A-weighted decibels (dBA) (USEPA 1978) for rural areas and between 55 and 60 dBA for urban areas.

The ambient noise environment in the ROI is characteristic of a residential community. Noise events are associated with motor vehicles, utility work in the vicinity of River Road, and vessels and small boat traffic, including commercial traffic, transiting the James River. The James River Bridge is approximately 0.5 miles downstream of the project site and the distant sound of vehicular traffic, which may vary depending on wind conditions, contributes to the existing ambient noise environment.

2.3.11 OCCUPATIONAL HEALTH AND SAFETY

The existing project site conditions are characterized by an eroding shoreline with a steep embankment that could potentially pose a threat to public safety. There is no public access to the shoreline. Risk factors associated with the occupational health and safety (OHS) environment are primarily associated with the future construction of the project and would include operation of heavy equipment, placement of materials, and potential exposure to environmental elements. Given the existing site constraints which include a steep shoreline and limited access points, potential hazards would involve the mobilization and demobilization of equipment, land disturbance, and construction of the project.

2.3.12 RECREATION

The project site is situated in a Newport News residential neighborhood. Recreational activities that may occur in the ROI on the landward portion of the project may including include walking and cycling. Recreational activities occurring in nearshore portions of the ROI may include walking, cycling, fishing, boating, or kayaking.

Huntington Park is located across from the project site on the opposite side of Government Ditch and includes a scenic park, playground and is also the location of theVirginia War Museum. The Huntington Park Municipal Boat Ramp and Beach are located approximately 0.25 miles south of the project site.

2.3.13 SOCIOECONOMICS

The ROI for socioeconomics is the City of Newport News which covers approximately 120 square miles. Newport News has a population of 180,145 individuals with a povertyrate of 15.5%, a median household income of $51,884, a minority population of 56%, and 12% of the population over 64 years of age (U.S. Census Bureau 2020). The project site is located within census block group 517000315002 which has a population of approximately 2,178 individuals of which approximately 20% are low income, 4% areminority, and 7% are over age 64. Major employers in the City of Newport News includeHuntington Ingalls Industries, Riverside Health System, Army and Air Force Exchange Service, Canon Virginia, Jefferson

Lab, Continental, United Parcel Service, and Ferguson Enterprises/Wolseley North America, and High Liner Foods, Inc.

2.3.14 SPECIAL STATUS SPECIES

Animals and plants listed as endangered or threatened are protected under the Endangered Species Act of 1973, as amended (ESA). According to the ESA, “endangered species” is defined as any plant or animal species in danger of extinction throughout all or a substantial portion of its range. A “threatened species” is any specieslikely to become an endangered species in the foreseeable future throughout all or a substantial part of its range. “Proposed Species” are animal or plant species proposed in the Federal Register to be listed under Section 4 of the ESA. “Candidate Species” are species for which the U.S. Fish and Wildlife Service (USFWS) and NMFS have sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA. Critical habitat is designated per 50 CFR parts 17 or 226 and defines those habitats that are essential for the conservation of a federally threatened or endangered species and that may require special management and protection. The project site is located in critical habitat designated for the Atlantic sturgeon.

According to search results from the VaFWIS, 39 species, including the afore mentioned federal species, with a Tier I or Tier II status are known or likely to occur within a 3-mile radius of the ROI (VDGIF 2020). Tier I species are considered by VDGIF of critical conservation need while Tier II are considered species that are of very high conservation need.

The section of the James River which includes the ROI supports the following species protect under the Endangered Species Act: the northern long-eared bat (*Myotis septentrionalis*) under the jurisdiction of the USFWS, and the Atlantic sturgeon (*Acipenser oxyrinchus*), shortnose sturgeon (*Acipenser brevirostrum*), leatherback sea turtle (*Dermochelys coriacea*), Kemp’s ridley sea turtle (*Lepidochelys kempii*), hawksbill sea turtle (*Eretmochelys imbricata*), and loggerhead sea turtle (*Caretta caretta*) under the jurisdiction of the NMFS.

Northern long-eared bats roost underneath bark, in cavities, or in crevices of live and dead trees in the summer and spend winters hibernating in large caves or mines known as hibernacula. Suitable habitat for this species includes trees with trunk diameters of three inches or more with shag bark and crevices. No site surveys for the northern long-eared bat have been conducted at the project site; however, given the sparseness of trees within the project site, northern long-eared bats are not anticipated to be present.

Atlantic sturgeon spawn in the James River, and this portion of the lower river may serve as a staging area for spawning adults. Although Atlantic sturgeon early life stages are not expected to be present in the brackish conditions of the project site, juveniles,sub-adults and adults may be present. Sea turtles are transient to the area and may occur seasonally in warmer weather months to forage. There is no suitable nesting habitat for sea turtles in the vicinity of the project site. For a discussion of potential impacts to special status species, please refer to Appendix A.

2.3.15 VEGETATION, WETLANDS, AND SUBMERGED VEGETATION

The ROI includes the nearshore estuarine environment adjacent to the project site and the adjacent uplands areas bordering River Road. Existing trees on the upland are primarily black locust trees (*Robinia pseudoacacia*). The invasive, common reed (*Phragmites australis*) is present onsite in small patches at mid-bank height indicative of potential groundwater seepage. The amount of woody vegetation observed from the top to bottom of the high bank indicates relative bank stability and not active bank face erosion. (Figure 2-10).

Figure 2-10. Upland vegetation present at the project site. Image taken 12/06/2019.

No tidal marsh vegetation has been mapped for the existing area based on the Virginia Institute of Marine Science (VIMS) tidal marsh inventory. Additionally, the project site is characterized by large quantities of various materials including concrete slabs, rubble, and brick foundation pieces which are present along the intertidal shoreline for the entire stretch of the project area (Figure 2-11). Based on a review of the VMRC's online Chesapeake Bay Map, there is no Submerged Aquatic Vegetation present in the vicinity of the project site.

Figure 2-11. Existing material present along shoreline in the project area. Image taken 12/06/2019.

2.3.16 WATER QUALITY

More than 150 major rivers and streams flow into the Chesapeake Bay's 64,299 square mile drainage basin. The watershed covers parts of six states from New York, Pennsylvania, Delaware, Maryland, Virginia and West Virginia, as well as the District of Columbia. The ROI includes the shoreline of the James River and its tributaries that discharge near the project site in Newport News, Virginia. The ROI includes areas outside of the project where water quality impacts such as increased levels of Total Suspended Solids (TSS), turbidity, and potentially nutrient fluctuations may occur. The geographic extent of water quality impacts is dependent upon factors such as the type of project and equipment used, and environmental conditions such as wind and currents (USACE 1983). The Chesapeake Bay is a slightly stratified estuary which forms where tidal activity is strong and river volume is moderate.

Impaired Waterways

The USEPA established a Total Maximum Daily Load (TMDL) for the Chesapeake Bay watershed on December 29, 2010. The TMDL identified the nitrogen, phosphorus, and sediment reductions that each Bay jurisdiction needs to achieve in order for the Chesapeake Bay to meet water quality standards. The determination whether the Commonwealth's waters support their applicable designated uses as mandated by Section 305(b) of the Clean Water Act is made by DEQ and reported annually to EPA based on monitoring data. There are six designated uses that may be applied to surface waters: aquatic life, fish consumption, shellfish, recreation, public water supply, and wildlife.

Virginia's water quality standards define the water quality needed to support each of these uses by establishing the numeric criteria for comparison of physical and chemical data. If a waterbody contains more of a pollutant than is allowed by the water quality standards, it will not support one or more of its designated uses. Such waters are considered to have an "impaired" quality. An "impairment" refers to an individual parameter or characteristic that violates a water quality standard. The quality of the surface waters in the ROI is dependent upon the water quality of the tributaries draining into the watershed.

The Warwick River is 14.4 miles long within the City of Newport News and empties into the James River approximately seven miles north of the project site and is impaired for fecal bacteria. The Warwick River can be divided into three sections in regard to water quality; the upper and middle tidal portions are impaired for fecal coliform and the lower tidal portion is impaired for Enterococcus. The lower portion is within the ROI. Newmarket Creek drains into the James River north of the project site after running 3.96 miles through the cities of Newport News and Hampton. Newmarket Creek listed as impaired in 2006 for aquatic use due to low dissolved oxygen levels. The upper 2.01 miles of the river, prior to tidal influence, tested for high pollution loads of E. coli (DEQ 2018).

The portion of James River in the ROI is listed as an impaired area for the lack of submerged aquatic vegetation and benthic community use. Figure 2-12 indicates the locations and descriptions of these impairments for 2018.

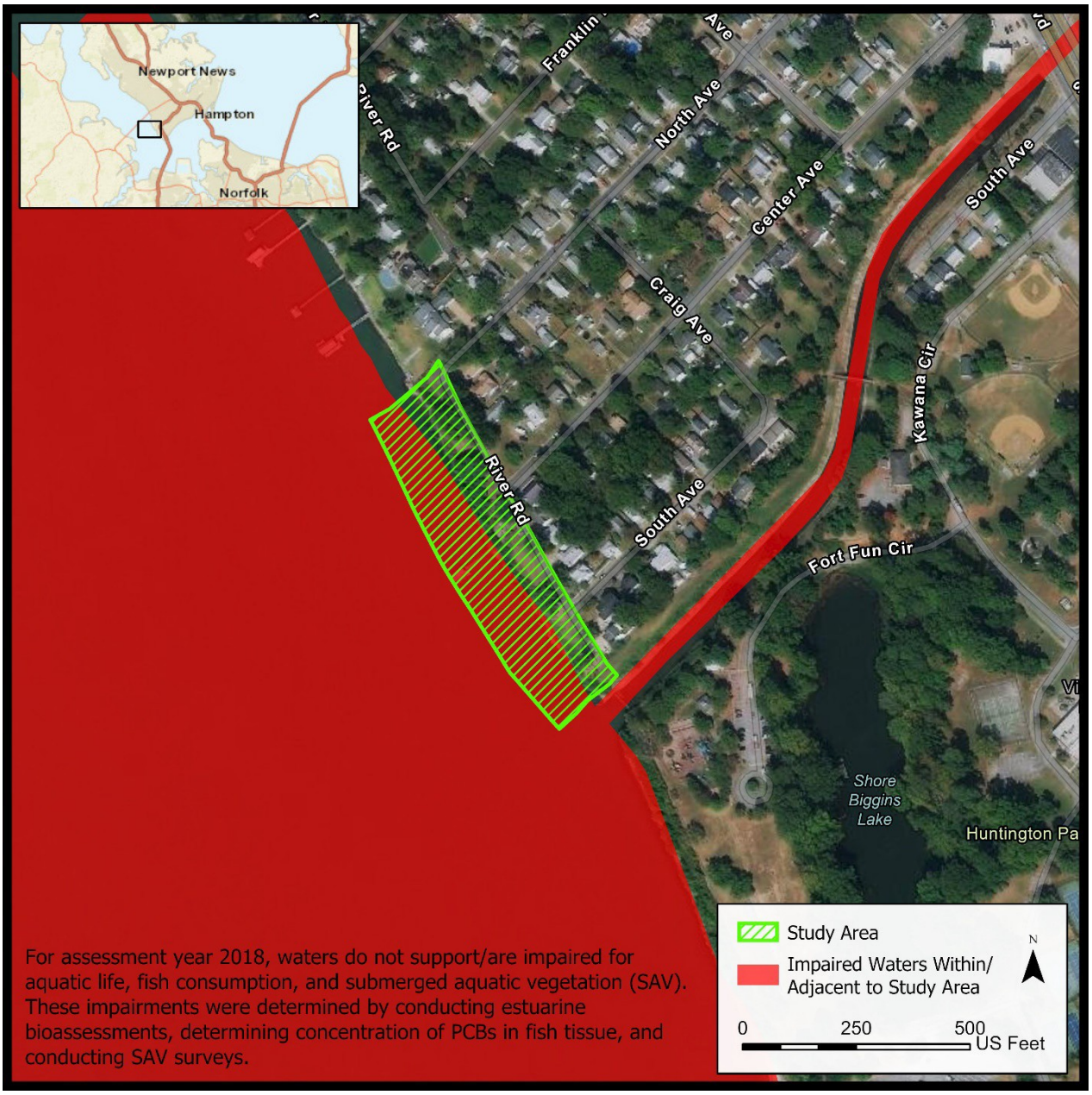

Figure 2-12. Location of Impaired Waters Adjacent to Study Area.

2.3.17 WILDLIFE

Avian wildlife including migratory birds, raptors, ducks, geese, and songbirds, may be present within the ROI. Although not a Bird of Conservation Concern, the Bald Eagle (*Haliaeetus leucocephalus*) also has the potential to be present in the area and is protected under the Bald and Golden Eagle Protection Act. According to the Center for Conservation and Biological Diversity, no known active bald eagle nests have been reported in the Study Area (Figure 2-13). The closest reported bald eagle nest is approximately 2 miles to the northwest of the project site (CCB Mapping Portal 2020;

Watts and Byrd 2013). Small mammals, amphibians, and reptiles may also be present in the ROI.

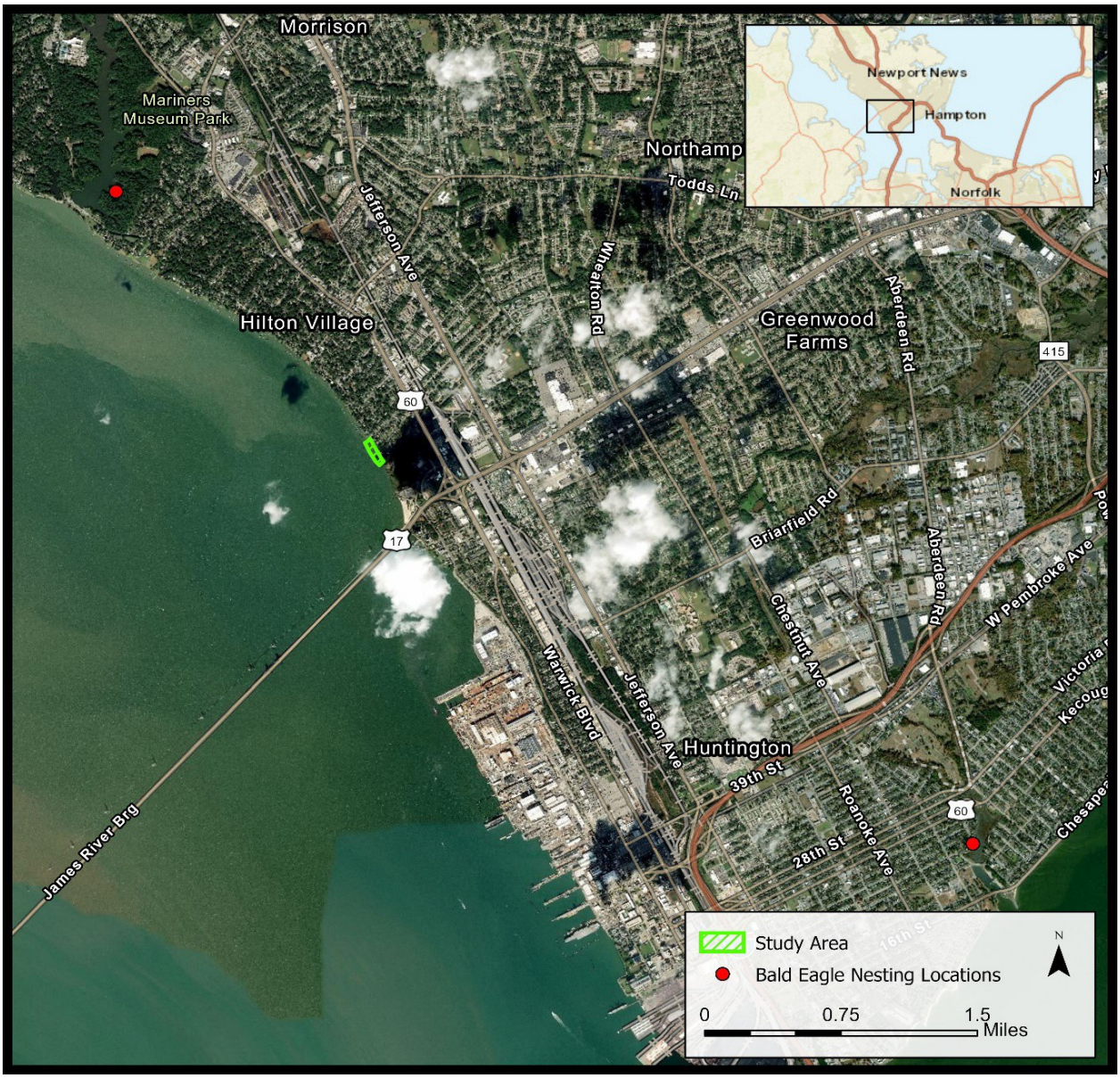

Figure 2-13. Bald Eagle Nesting Locations in vicinity of Study Area. (CCB Mapping Portal 2020; Watts and Byrd 2013).

In addition to the bald eagle, the following migratory bird species protected under the Migratory Bird Treaty Act have the potential to occur in the vicinity of the project site: American Oystercatcher (*Haematopus palliates*), black skimmer (*Rynchops niger*), cerulean warbler (*Dendroica cerulea*), least tern (*Sterna antillarum*), prothonotary warbler (*Protonotaria citrea*), red-headed woodpecker (*Melanerpes erythrocephalus*), red-throated loon (*Gavia stellata*), ruddy turnstone (*Arenaria interpres morinella*), andrusty blackbird (*Euphagus carolinus*).

2.3.18 TRANSPORTATION

The proposed project site is located at the terminus of a residential neighborhood along the James River. Existing roadway uses include residential vehicular traffic and pedestrian/bike access. Given the location, vehicular traffic is anticipated to be sporadic throughout the day and likely attributed primarily to the residents along River Road entering and exiting the neighborhood; however, utility vehicles and City of Newport News public works vehicles may also utilize the existing roadway on an occasional basis.

2.4 DEVELOPMENT OF ALTERNATIVE PLANS

Per ER 1105-2-100, the formulation and evaluation of plans in CAP Section 14 studies should focus on the least cost alternative solution. The least cost alternative plan is considered to be justified if the total cost of the proposed alternative is less than the cost to relocate the threatened facility.

2.4.1 INITIAL MEASURES

Nine shoreline stabilization measures were considered in this study to reduce the risk to River Road and the utilities in the vicinity caused by bank erosion:

1. Vertical steel sheet piling, which are long structural sections with a vertical interlocking system that create a continuous wall to retain soil or water.

2. Rock sill to stabilize the slope base, which consists of a sill that is a rock structure that is placed parallel to the shore so that a marsh can be contained.

3. Vegetated slope, which would provide stability by the ability of the plant life growing on slopes to prevent erosion of the slope.

4. Rock-filled timber crib walls, which creates a framework of large timbers, or concrete, that are filled with rock that secures a fence post without having to set it into the soil. This system holds/retains material in place to stop and control the erosion process.

5. Stone revetment, which is the placement of rock along the bank/shoreline to absorb or deflect incoming wave energy in order to minimize and mitigate erosion.

6. Living shoreline, a protected stabilized coastal edge made of natural materials such as native plants, sand, or rock. Unlike a concrete sea wall or other hard structure, which impede the growth of plants and animals, living shorelines grow over time and provide valuable habitat that enhances coastal resilience.

7. Precast modular retaining walls, with consist of modular precast concrete units and select backfill. The system is a simple proven solution for grade separation on highways, bridges, railroads, or water.

8. Longitudinal peaked stone toe protection, which is a stone structure consisting of well sorted, self-launching stone built on the toe of an eroding bank.

9. Breakwaters, which are barriers usually constructed with rock that are built out into a body of water parallel to the shoreline to protect a coastline from the force of waves.

10. Relocating the road and utilities was also considered as a non-structural measure.

11. No action, or the future without project condition, was also considered.

2.4.2 SCREENING OF MEASURES

The initial array of alternatives was developed early in the planning process. The team evaluated measures based on the criteria listed in Table 2-4. If the proposed measure satisfied project objective, and avoided the two identified constraints, it was carried forward for further consideration. Additional justification for screening out or carrying forward the measures is also provided following Table 2-4.

Table 2-4. Screening Measures for the Initial Array of Alternatives.

Measure(s)	Objective 1 Stabilize eroding shoreline	Constraint 1 Not induce erosion right or left	Constraint 2 enviromental and cultural impacts
1) Vertical sheet piling	X		
2) Rock sill to sabilize base of slope	X	X	X
3) Vegetated slope	X	X	X
4) Rock-filled timber cribs	X		
5) Stone revetment	X	X	X
6) Vegetative erosion control (Living Shoreline)	X	X	X
7) Precast modular retaining walls	X		
8) Longitudinal peaked stone toe protection	X	X	X
9) Breakwaters	X		

1. Vertical steel sheet piling was screened out because it would be cost prohibitive in that it would exceed the cost of the road relocation or that it would exceed the total cost allowed for a CAP Section 14;

2. Rock sill to stabilize to stabilize base of slope was carried forward because this is a typical measure that is used to solve similar study problems and is generally cost effective;

3. Vegetative Slope was carried forward because this is a typical measure used to solve similar study problems and is generally cost effective;

4. Rock-filled timber cribs was not carried forward due to the fact that the structure would need to be replaced after 25 years (halfway through the 50-year period of analysis) and would not be cost effective;

5. Stone Revetment was carried forward because this is a typical measure used to solve similar study problems and is generally cost effective;

6. Vegetative erosion control (living shoreline) was carried forward but had some concern due to the 5 years of monitoring (cost concern) and long fetch, but it has been used along the James River for other projects;

7. Precast modular retaining walls were not carried forward due to the environmental (vegetation or habitat) resources that could be impacted. These impacts could be mitigated but that mitigation cost would likely increase the cost of the measure so that it exceeds the cost limit allowed for CAP Section 14;

8. Longitudinal peaked stone protection was carried forward because this is a typical measure used to solve similar study problems and is generally cost effective; and

9. Breakwaters were not carried forward due to the combination of three factors: 1) required modeling that would likely put the cost over the cost limit allowed for CAP Section 14; 2) breakwaters do

not reduce wind erosion; and 3) breakwaters could impact the existing piers and the additional real estate cost associated with those impacts would likely put the cost over the cost limit allowed for CAP Section 14.

The measures that provided the "best protection with the least amount of disruption to the environment for the longest life span and for a reasonable budget" were carried forward. A summary of measures screening is shown in Table 2-5.

Table 2-5. Summary of Measures Screening

Measure Description	Carried Forward?	Notes
Vertical steel sheet piling	N	Cost criterion - prohibitive
Rock sill to stabilize base of slope	Y	Typical measure used to solve similar study problems
Vegetated slope	Y	Typical measure used to solve similar study problems
Rock-filled timber cribs	N	Lifecycle criterion – 25 years
Stone revetment	Y	Typical measure used to solve similar study problems
Vegetative erosion control (Living Shoreline)	Y	5 years monitoring (cost concern), long fetch, previously used along James River
Precast modular retaining walls	N	Environmental/ EN Feasibility criteria
Longitudinal peaked stone toe protection	Y	Typical measure used to solve similar study problems
Breakwaters	N	Requires modeling, doesn't combat wind erosion, real estate issues

2.5 ALTERNATIVE FORMULATION

Alternatives include one or more management measures functioning together to address the planning objectives. Only alternatives that were practical in terms of the engineering, economic, environmental, and social impacts were developed and included the measures carried forward in Table 2-4. Relocation of the road and utilities, the no action alternative (future without project), and four action alternatives with various means of protecting the bank from erosion. The alternatives included in the initial array are discussed below:

- *Relocation of Road and Utilities:* Involves relocating public utilities and relocating the road. The baseline to which the cost of all other alternatives are compared;
- *Alternative 0:* Is the No Action/Future Without Project Alternative; and
- *Alternative 1:* Rock Sill with Vegetated Slope. This will consist of the entire slope being graded back to a 1V:3H slope, placement of VDOT Class III rip rap on top of VDOT number 1 stone and filter fabric at the toe (see Figure 2-14)

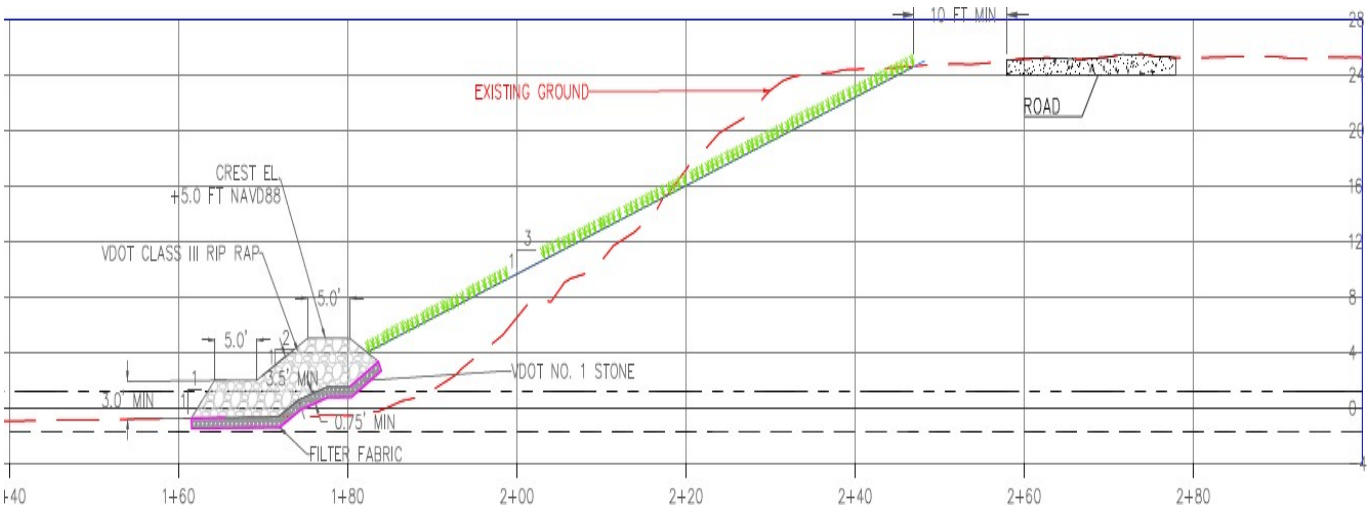

Figure 2-14. Alternative 1

- *Alternative 2:* Full Rock Revetment. This consists of re-grading the slope to a 1V:3H slope, placement of filter fabric, placement of VDOT number 1 stone, and the placement of VDOT Class III rip rap (see Figure 2-15).

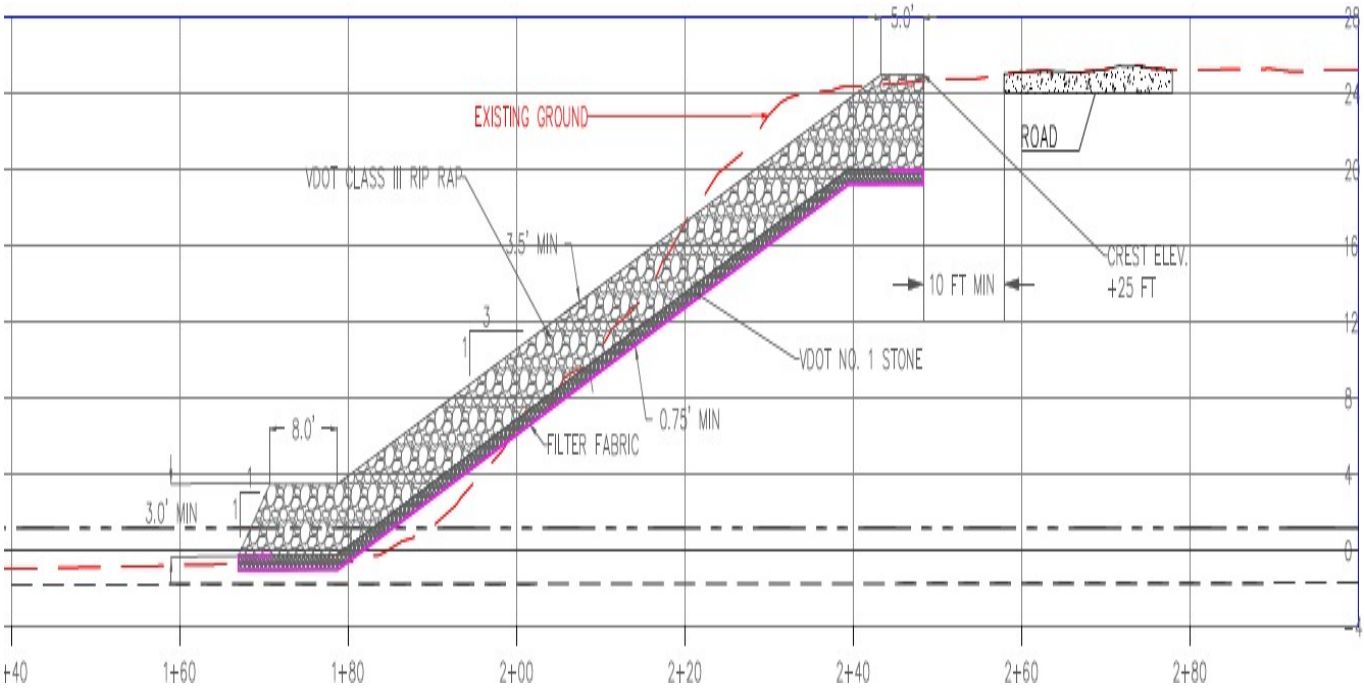

Figure 2-15. Alternative 2.

- *Alternative 3:* Partial Rock Revetment with vegetated slope. This consists of re-grading the slope to 1V:3.5H slope that will be vegetated, placement of filter fabric with VDOT number 1 stone, and topped with VDOT Class III rip rap (see Figure 2-16. Alternative 3.).

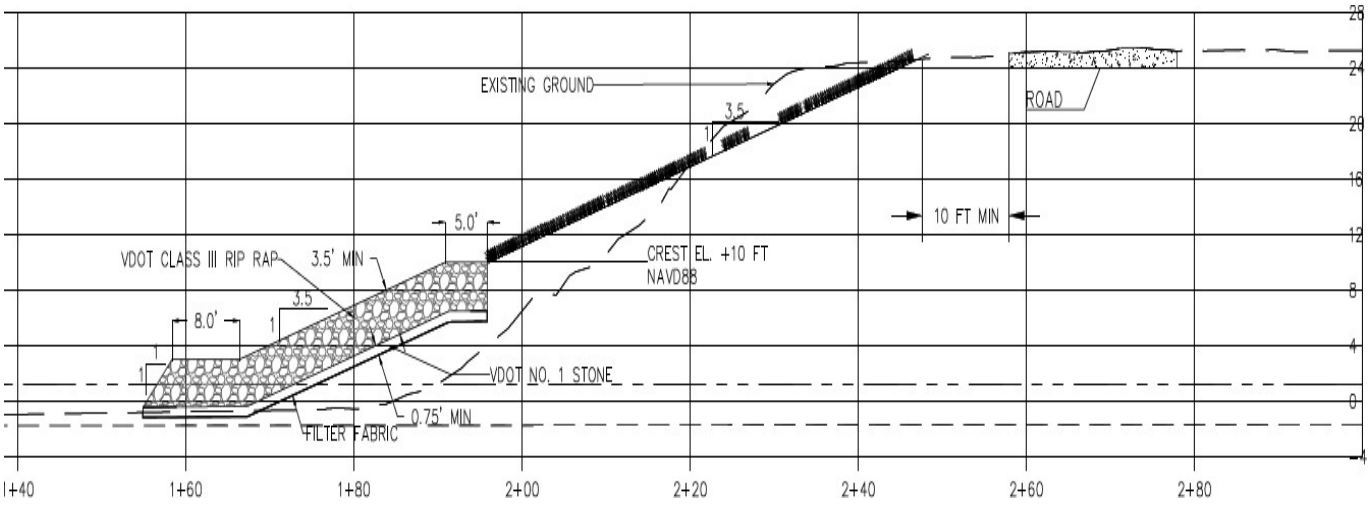

Figure 2-16. Alternative 3.

- *Alternative 4:* Living Shoreline with vegetated slope. This consists of re-grading a portion of the slope to a 1V:4H, then transition to a 1V:10H for wetland planting, placement of filter fabric, VDOT number 1 stone topped with VDOT Class III rip rap (see Figure 2-17. Alternative 4.).

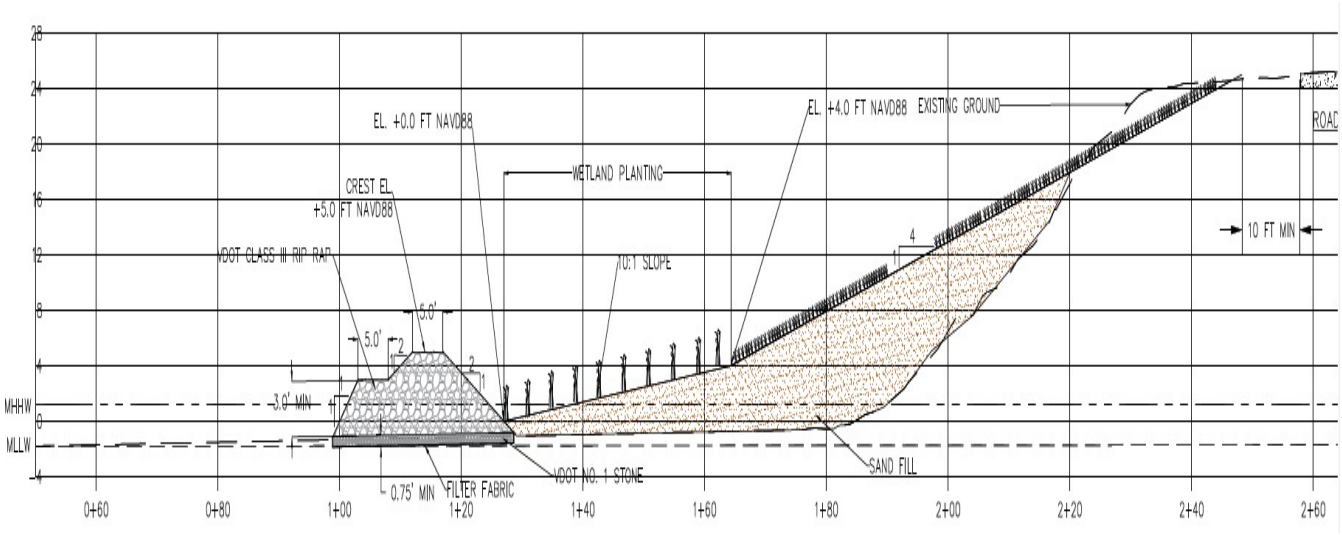

Figure 2-17. Alternative 4.

3 EVALUATION AND COMPARISON OF ALTERNATIVES

In accordance with Engineering Regulation 1105-2-100, the recommended plan is considered to be justified if it is the least cost of all alternative streambank protection plans and is also less than the cost to relocate the threatened facilities.

3.1 SCREENING OF PRELIMINARY ALTERNATIVES

Alternatives 2, 3, and 4 were screened from further consideration since these alternatives were found to have significantly higher costs than Alternative 1. Based onthe economic analysis shown in table 3-1 below, Alternative 1 is the least cost alternative and also meets the project objective of protecting the facilities at risk.

3.2 FINAL ALTERNATIVES FOR EVALUATION AND CONSIDERATION

Remaining alternatives include relocation of the road and utilities, Alternative 0 (no action), and Alternative 1. Alternative 1 was studied further as the least cost alternative that would meet the study's objective of reducing the risk of erosion to the road and utilities.

3.2.1 RELOCATION OF ROAD AND UTILITIES

River Road and utilities at risk could be relocated further away from the shoreline so they are no longer at risk from erosion. The road would have to be relocated far enough that the risk of erosion is addressed but that there is continued access the homes in that area. Relocating the road is the baseline to which all other alternative costs are compared.

3.2.2 ALTERNATIVE 0: NO ACTION/FUTURE WITHOUT PROJECT ALTERNATIVE

There would be no federal action. The shoreline would not be stabilized and erosion would continue to threaten the existing utilities and River Road. The No Action Alternative is the baseline to which environmental effects are compared and is also the future without project condition.

3.2.3 ALTERNATIVE 1: ROCK SILL WITH VEGETATED SLOPE

Alternative 1 consists of the following:

- Longitudinal rock sill running the length of the project area at a height of 5-feet (NAVD88);
- Re-grade the earthen slope berm to 1V:3H. Remove 700 cubic yards of debris;
- Place 4300 cubic yards of fill where needed;
- Place 1600 square yards of geotextile filter fabric under 2900 tons of VDOT Class III rip rap and 800 tons of VDOT number 1 stone; and
- The vegetated slope portion will receive 35,000 square feet of seed to stabilize the earthen slope.

3.2.4 COMPARISON OF ALTERNATIVES

Table 3-1 below compares the relocation alternative with alternatives 1, 2, 3, and 4. Alternative 1 is the least cost alternative and the Recommended Plan.

Table 3-1. Comparison of the No Action Alternative with Alternatives 1, 2, 3, and 4.

Cost Description	(A1) Rock Sill with Vegetated Slope	(A2) Full Rock Revetment	(A3) Partial Rock Revetment with Vegetated Slope	(A4) Living Shoreline with Vegetated Slope	Relocation of Road and Utilities
ROM Construction Cost with 30% contingency	$2,113,000	$2,447,000	$2,865,000	$2,932,000	$4,319,000
Real Estate (LERRD)	$647,000	$83,000	$83,000	$95,000	$4,489,000
Compensatory Mitigation	$0	$0	$0	$0	$0
Planning, Engineering, and Design (PED)	$358,000	$490,000	$572,000	$589,000	$862,000
Construction Management (CM) (20% of construction cost)	$364,000	$489,000	$572,000	$586,000	$863,000
TOTAL	$3,481,000	$3,509,000	$4,092,000	$4,202,000	$10,533,000

1 Source: Project First Cost Summary prepared 09 July 2021; and
2 FY21 Federal Discount Rate of 2.5%.

Operations and Maintenance (O&M) costs are not included in the table above. The non-federal Sponsor is responsible for 100% of the O&M costs, per ER 1105-2-100 Appendix G Section III F-23.

Average Annual Costs v. Average Annual Benefit

The least cost alternative plan is considered to be justified if the total cost of the proposed alternative is less than the cost to relocate the threatened facility. In this case,the average annual cost (AAC) of the relocation alternative was compared to the AAC of Alternative 1. Interest during construction was computed assuming mid year payments intervals for a construction period of twelve months. Considering the construction period, yearly construction period expenditures, a fiscal year 2021 discount rate of 2.5 percent, the amount of interest which would accrue during the construction period was calculated to total $37,000.

Table 3-2. AAB v. AAC

AAC - Alt 1 v. Relocation	
Average Annual Benefit (Relocation of Road)	575,000
Average Annual Cost (Alternative 1)	185,000
Benefit (Reduced Relocation Cost Benefit)	390,000
BCR	3.1

1 Costs are annualized over a 50-year period of analysis;
2 FY21 Federal Discount Rate of 2.5%;
3 Length of construction assumed to be 12 months; and
4 Capital Recovery Factory 0.0542

Similarly, one can compare Average Annual Benefits to Average Annual Costs using the same method. It is clear that the benefits significantly outweigh the costs.

3.2.5 LOCALLY PREFERRED PLAN

There is no locally preferred plan at this time.

4 DESCRIPTION OF THE RECOMMENDED PLAN

The Recommended Plan is Alternative 1 (Figure 4-1), which is the stabilization of the 25 foot bluff of eroding riverbank along the James River to provide risk management from further erosion that would damage and ultimately compromise River Road and utilities that are currently at risk. The plan includes longitudinal rock sill running the length of the project area at a height of 5-feet (NAVD88) and a native vegetated seed mix will be planted on the slope.

Specifications of the plan include:

1. Earthen sloped berm graded on a 1V:3H;
2. 2900 tons of VDOT Class III riprap and 800 tons of VDOT No. 1 stone;
3. 4300 cubic yards of fill;
4. 1600 square yards of geotextile filter fabric;
5. 35,000 square feet of seeding (native vegetation mix); and
6. 700 cubic yards of debris removal.

The Norfolk District has completed similar projects within the District using toe protection that have been successful at reducing erosion while providing a more natural, vegetated bank. Alternative 1, the least cost alternative, underwent design and cost estimates to arrive at a feasibility level cost that was District Quality Control reviewed.

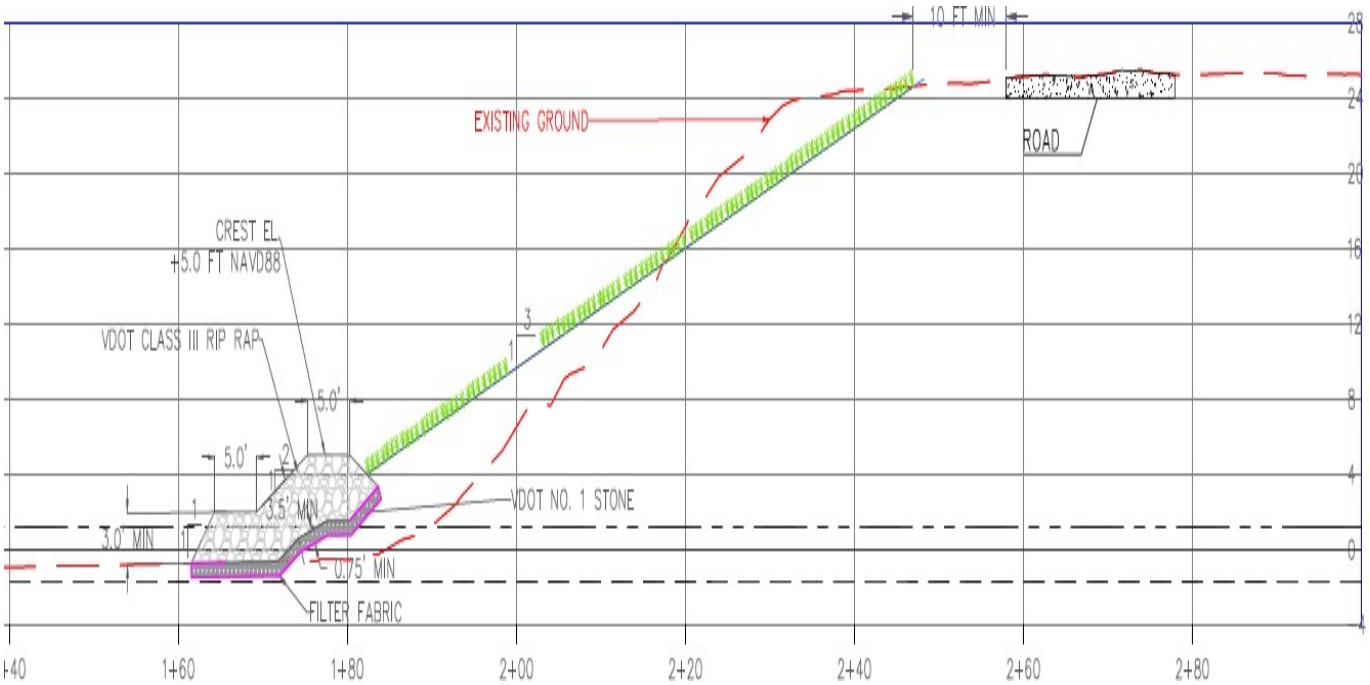

Figure 4-1. Tentatively Selected Plan (TSP) Alternative 1.

5 ENGINEERING CONSIDERATIONS

5.1 NORTH ATLANTIC COAST COMPREHENSIVE STUDY (NACCS)

Appendix C contains the engineering design and construction data and documents the engineering analysis and follows the format of Engineering Regulation 1110-2-1150.

This study used Stillwater levels from the North Atlantic Coast Comprehensive Study (NACCS) performed by the USACE Engineering, Research and Development Center (ERDC). The purpose of the NACCS was to identify flood risk and then plan and implement strategies to reduce the risk now and in the future. The study also determined the magnitude and uncertainty of existing and future forcing conditions. It concluded to use its findings to assess coastal engineering projects for coastal storm risk management and resiliency for the areas in the region. The study focused on the Northeast coastal region of the United States (from Virginia to Maine).

For this study, NACCS data for the Base Conditions + 96 random tides were downloaded from CHS in November 2019. The CHS shows the Advanced Circulation Model (ADCIRC) and Steady State Special Wave (STWAVE) save points which contain NACCS results (storm surge, water level, wave height, wave period, wave direction, and current magnitude, etc.) in different locations. ADCIRC Save Point 17351 (Figure 5-1) was the nearest save point to the project location and was analyzed for all engineering evaluation purposes.

Figure 5-1. NACCS model save points near the project location.

5.2 RELATIVE SEA LEVEL RISE EFFECTS ON STRUCTURE HEIGHTS

The native datum of the NACCS results was based on local mean sea level (MSL) tidal epoch 1983-2001. This was the datum that was used to define the NACCS regional hydrodynamic model (ADCIRC), from which storm surge results were obtained. The results of the NACCS water levels were referenced to the year 1992, the midpoint of the current National Tidal Datum Epoch (NTDE) (1983-2001). Therefore, the difference or increase in the relative local level rise (based on the USACE low scenario) from 1992 to 2020 (0.43 feet) was added to bring the water levels to present date. The values were also converted from, MSL to NAVD 88.

The NACCS results (Figure 5-2) produced water levels for different storm frequencies and confidence limits, Figure 5.2 displays Stage-Frequency Curves from the NACCS results from (CHS) at Save Point 17351 for the mean (50%), 84%, 95%, and 98% confidence limits for water levels. Table 5.1 displays the values of the NACCS mean (50%) and 98% confidence limits at Save Point 17351 adjusted with SLR to the present date.

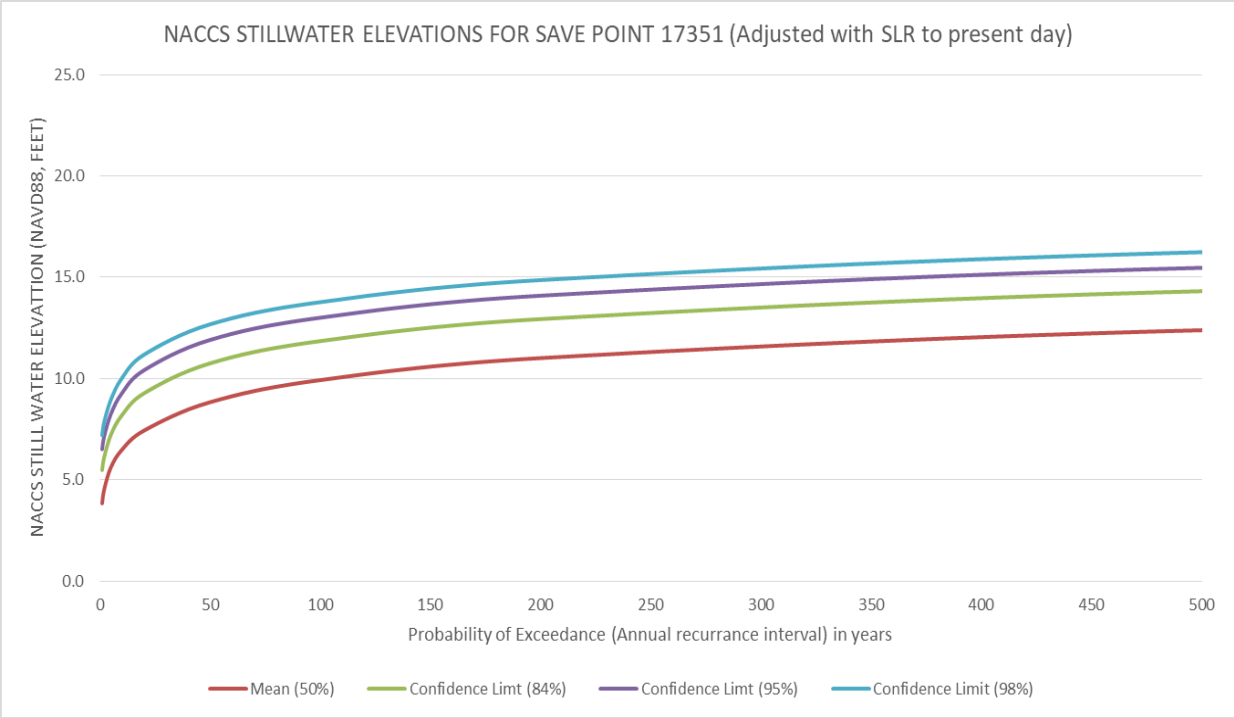

Figure 5-2. NACCS Stillwater elevations for Save Point 17351.

Table 5-1. NACCS Mean (50%) and 98% Confidence Limits Stillwater elevationsfor Save Point 17351 Adjusted to Present Day.

NACCS WATER LEVELS ADJUSTED FOR SLR TO YEAR 2020 (LOW CURVE)					
		Base Conditions + 96 Random Tides (NAVD88)			
		Mean (50%)		Confidence Limit (98%)	
Recurrance (Yrs)	ACE %	m	ft	m	ft
1	100%	1.2	3.8	2.2	7.2
2	50%	1.4	4.5	2.4	7.9
5	20%	1.7	5.6	2.7	9.0
10	10%	2.0	6.5	3.1	10.0
20	5%	2.3	7.4	3.4	11.2
50	2%	2.7	8.8	3.9	12.7
100	1%	3.0	9.9	4.2	13.8
200	0.5%	3.4	11.0	4.5	14.9
500	0.2%	3.8	12.4	4.9	16.2
1000	0.1%	4.1	13.3	5.2	17.2
2000	0.05%	4.3	14.2	5.5	18.0
5000	0.02%	4.6	15.2	5.8	19.0
10000	0.01%	4.8	15.8	6.0	19.7

Engineering Pamphlet (EP) 1100-2-1, Global Changes – Procedures to Evaluate Sea Level Change: Impacts, Responses, and Adaptation, recommends analyzing the effects of SLR on the project at three future time period post construction (the year 2022). The time periods include 20 years after construction is completed (the calendar year 2042), 50 years after construction (the calendar year 2072), and 100 years after construction (the calendar year 2122). Table 5.2 shows the predicted increase in SLR for the NACCS water levels using the USACE intermediate curve 20 years (2042), 50 years (2072), and 100 years (2122) into the future after the proposed construction year of 2022.

Table 5-2. Additional Increase in SLR predicted 20 years, 50 years, and 100 years into the future (in feet) from project start year of 2022 to 2122.

NACCS MEAN (50%) WATER LEVELS ADJUSTED FOR SLR (USACE INTERMEDIATE CURVE) TO YEAR 2022,2042, 2072, and 2122					
		Year 2022	Year 2042	Year 2072	Year 2122
Recurrance (Yrs)	ACE %	ft	ft	ft	ft
1	100%	3.9	4.3	5.1	6.8
2	50%	4.6	5.0	5.8	7.6
5	20%	5.7	6.1	6.9	8.6
10	10%	6.5	7.0	7.8	9.5
20	5%	7.5	7.9	8.7	10.4
50	2%	8.9	9.3	10.1	11.8
100	1%	10.0	10.4	11.2	12.9
200	0.5%	11.1	11.5	12.3	14.0
500	0.2%	12.4	12.9	13.7	15.4
1000	0.1%	13.4	13.8	14.6	16.3
2000	0.05%	14.2	14.7	15.5	17.2
5000	0.02%	15.2	15.7	16.5	18.2
10000	0.01%	15.9	16.3	17.1	18.9

The Sea Level Tracker tool was used to visualize the observed changes in sea level and to compare trends to the projected sea level changes per USACE Engineer Regulation 1100-2- 8162 and Engineer Pamphlet (EP) 1100-2-1. The tool shows the historical, observed changes in mean sea level (MSL) as measured and reported for National Oceanic Atmospheric Administration (NOAA) tide gauges, mapped against the USACE sea level change (SLC) projections. Taken together, the tool enables the comparison of actual SLC with USACE SLC projections (as described in ER 1100-2-8162), along with observed monthly water levels and the computation of SLC trends based on historical data (Sant-Miller et al, 2018). Figure 5.1 displays the results of this tool, comparing actual SLC for

the 19-year (metonic cycle) midpoint moving average (dark blue line) and 5-year midpoint moving average (orange line) against the USACE SLC curve projections for the entire period of record and for the entire period of record (Figure 5.1). The observed 19-year moving average is tracking along the intermediate SLC scenario while the 5-year moving average fluctuates more between the intermediate and high scenario since 2010. The intermediate curve was selected for this project. For more information about sea level rise, refer to the Engineering Appendix.

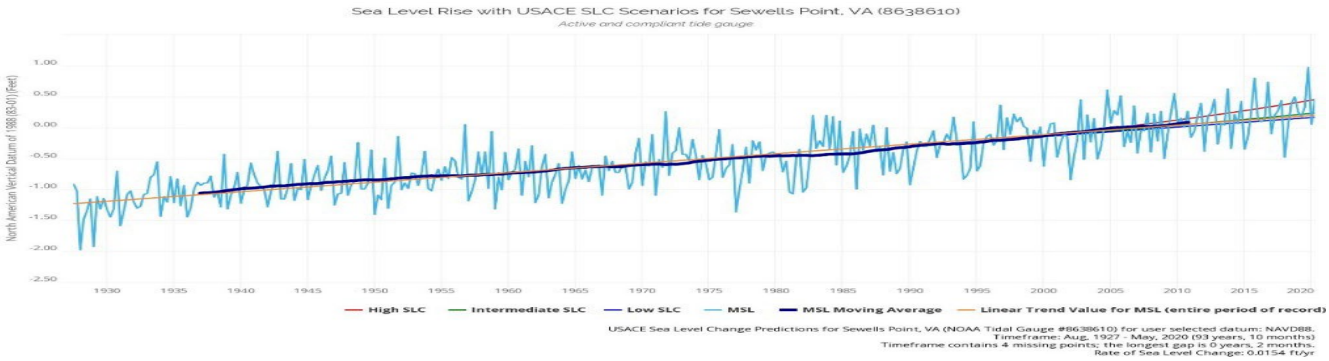

Figure 5.3 Historical Sea Level Rise with USACE Scenarios for Sewells Point (8638610) forthe entire period of record

In order to estimate the level of protection for the alternative to the year 2072, the statistical data was used to produce equivalent ACE's (or return periods) from estimated future stillwater levels for the selected alternative. The project overtops at one-year event. The water levels for mean high tide and mean low tide were reviewed at year 2072. The project will provide protection for mean high tide for the low and intermediate sea level curves. If the project location experiences the high sea level curve, it will only protect to mean low water.

Table 5.3 Level of Projection over time

USACE Sea Level Curve	FT NAVD88		Increase in Sea Level rise from 2020-2072 (feet)	Water Level at 2072 (FT NAVD88)
Low	Mean High Water	0.95	1.23	2.18
Intermediate	Mean High Water	0.95	1.80	2.75
High	Mean Low Water	-1.48	3.61	2.13

5.3 VERTICAL CONTROLS AND DATUMS

All surveys and mapping products should have the same horizontal and vertical datum. The horizontal datum for this study is tied to the State Plane Coordinate System using North American Datum of 1983 (NAD83, Virginia South, 4502). Distances are in feet by horizontal measurement. Coordinates are Virginia South Zone. Unless otherwise noted, the vertical datum for this study is tied to the North American Vertical Datum of 1988 (NAVD88), a requirement of ER 1110-2-8160. Elevations are in feet.

5.4 DESIGN AND CONSTRUCTION CONSIDERATIONS

This section includes a summary of the design considerations on the Selected Plan Alternative, Alternative 1, Rock Sill with Vegetated Slope. For more information regarding the other alternatives in the focused array, please see the Engineering Appendix. The 10% drawing for Alternative 1 is shown in Attachment 3 to the Engineering Appendix.

Alternative 1 comprises a low rock sill that will protect against the most frequent erosive events at the base of a vegetated slope composed of a slope stabilization blanket. Slope stabilization blankets are typically made of biodegradable materials which are designed to hold seeds and soil in place until vegetation is established. This alternativeis a similar design used in adjacent properties to the project shoreline. The crest elevation of the low crested sill is set at +5.0 feet NAVD88, which will protect against high tide and 1-year events, potentially for 50 years until the year 2072 (Table 6.5). Thelow crested sill would be overtopped during severe storm events similar to Hurricane Isabel. However, the vegetation and grading of the slope behind would provide some protection against erosion during these events.

Based on preliminary estimates, the design would be constructed using VDOT (Virginia Department of Transportation) Class III armor stone/rip rap with a minimum armor thickness of 3.5 feet and crest width of 5 ft. The preliminary design also includes a 5 feet wide toe for the rock sill to protect against scour, a 0.75 -1 feet thick bedding layer under the armor stone composed of VDOT No. 1 aggregate stone, and geotextile fabric beneath the bedding layer. The remaining slope from +5 feet to +25 feet NAVD88 wouldbe stabilized with slope stabilization blankets. According to the slope stability analysis, the minimum slope inclination required for this alternative is 1 Vertical to 3 Horizontal (1V:3H).

Although a Geotechnical Engineering Data Report was completed by Schnabel in 2013 and provided by the City of Newport News, it is recommended that another geotechnical exploration be performed during the design phase. While the 2013 report provides in- situ soils data, additional Standard Penetration Testing (SPT) in accordance with American Society for Testing and Materials (ASTM) D1586 and soils laboratory testing is recommended to confirm the results provided by Schnabel in the 2013 report.
Prior to construction the river bank slopes, starting 10 feet beyond the southern edge of River Road, the Contractor will be required to be grubbed of all trees, vegetation, stumps, and roots. Due to some large trees, roots may extend two to three feet below the ground surface. Debris removal will be required within the project limits of the river bank slopes and up to approximately 40 feet offshore from the shoreline or as shown inthe design drawings. The Contractor shall expect to encounter debris as described in the Engineering Appendix section 8.1 Site Description. The Contractor shall also anticipate the removal of dilapidated groins and remains of old piers within the project limits.

Excavation and construction near and/or on top of the river bank may result in failure of the natural river bank. The Contractor shall proceed with extreme caution and will be required to provide whatever means necessary to prevent failure of the natural river bank. The Contractor shall take into consideration if construction may need to proceed from the toe of the bank until the bank is adequately supported.

The soils which will be excavated on-site may be reused but shall only be reused as backfill in areas on the natural river bank in accordance with the satisfactory materials requirements to be provided in the design specifications. Unsatisfactory materials will berequired to be removed offsite by the Contractor.

On-site excavated soils to be reused and imported satisfactory soils shall be compacted with suitable compaction equipment 95% of maximum laboratory value for the standard moisture density relationship in accordance with ASTM D1557.

Groundwater was encountered in the Geotechnical Engineering Data Report dated May 10, 2013 at approximate depths of 19 to 28 feet below the ground surface of the river bank. As indicated in the report, the final design should anticipate the fluctuation of the hydrostatic water table depending on variations in precipitation, surface runoff, pumping,tidal action, river levels, evaporation, leaking utilities, and similar factors. Excavations will encounter groundwater and seepage water which will require dewatering methods such as well points or wells to lower the groundwater and allow construction under dry conditions. If the groundwater is not properly controlled the soil may begin to slough and unravel during the slope excavation. The Contractor shall also consider the fluctuating river levels which may require construction of temporary cofferdam.

The Contractor will be responsible for Contacting Miss Utility of Virginia and verifying that all utilities are located prior to construction. The Contractor shall maintain all utility markings through all phases of construction.

The Contractor will be utilizing public roads to access the project area for construction. The Contractor shall take care not to damage the roadways or utilities. Any damage caused to the roadways and utilities shall be repaired by the Contractor to new or existing condition at no additional cost to the government. All roadway and utility repairs shall receive approval from the City of Newport News prior to completion.

At this time, it is our understanding that laydown areas will be available for the Contractor to utilize during construction. Proposed laydown locations are identified in sections of this feasibility report.

The Contractor shall take into consideration to allow property owners to access their properties at all times. Traffic control may need to be taken into consideration by the Contractor. The roadway shall have enough space to allow emergency vehicles to access the properties.

It is recommended that the Contractor perform a pre-construction and post construction survey to document all existing conditions prior to construction and after construction. Detailed requirements for these surveys should be provided in the specifications during the design phase for the Contractor to photo document the conditions and complete regular reports.

5.5 CONSTRUCTION SEQUENCING STRATEGY

The sequencing recommendation for the Selected Plan Alternative is as follows:

1. Install erosion and control measures were applicable;
2. Remove necessary existing debris and vegetation on shoreline bank;
3. Grade and fill existing slope bank to 1V:3H slope;
4. Grade and fill area for rock sill;
5. Install geotextile fabric;
6. Install bedding layer;
7. Install armor stone;
8. Install slope stabilization blankets; and
9. Plant native vegetation.

6 ENVIRONMENTAL CONSEQUENCES

This chapter describes the existing and projected future conditions for each of the resources that reasonably could be expected to be impacted by the project. These conditions are described without implementation of the Recommended Plan and with implementation of the Recommended Plan (Alternative 1). The comparison of the Relocation of Road Alternative provides a baseline for comparison to evaluate the impacts of the Future With Project Alternative (Alternative 1).

Guidelines established by the CEQ (40 CFR 1508.27) specify that the significance of an impact should be determined in relationship to both context and intensity (severity). 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 impact is predicted;
- Less than significant impact – An impact is predicted, but the impact does not meet the intensity/context significance criteria for the specific resource; and
- Significant impact – An impact is predicted that meets the intensity/context significance criteria for the specific resource.

Impacts are defined in general terms and are qualified as adverse or beneficial and as temporary or permanent. Beneficial impacts provide desirable situations or outcomes; whereas adverse impacts may negatively impact a resource area. Negligible impacts are localized and are generally not measurable. Minor impacts are localized and slight but detectable; moderate impacts are readily apparent and appreciable, and major impacts are severely adverse or highly noticeable and considered to be significant.

Moderate impacts may not meet the criteria to be classified as significant, but the degree of change is noticeable and has the potential to become significant if not effectively mitigated. Additionally, CEQ regulations (at 40 CFR § 1508.20) further define mitigation in the following five ways, in order of preference:

1. Avoiding the impact altogether by not taking a certain action or parts of an action.

2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

3. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

5. Compensating for the impact by replacing or providing substitute resources or environments.

The means for reducing adverse environmental impacts, including the use of BMPs, are also discussed for each resource area where appropriate.

6.1 AESTHETICS

No Action/Future Without Project Alternative

The aesthetic environment would continue to be defined by scenic views of the James River. However, bank erosion would continue over time and would increase the susceptibility of the existing utilities and roadway to potential damage over time. Adverse, minor permanent impacts to the visual resources within the ROI would be anticipated with implementation of the No Action/Future Without Project Alternative.

Alternative 1: Rock Sill with Vegetated Slope

The proposed construction of a rock sill with a vegetated slope would result in beneficial, permanent minor effects to the aesthetic environment. Prior to construction, the project site would need to be cleared of all trees and roots, stumps, and vegetation. Debris removal would be required within the project limits of the river bank slopes and up to approximately 40 feet offshore from the shoreline or as shown in the design drawings. The removal of the debris on the shoreline and the placement of the stone sillwould also improve the aesthetic environment. The proposed vegetated slope would be planted with native grasses and potentially other native vegetation (if determined necessary in the future) adjacent to River Road to abate stormwater runoff where feasible. Any vegetation, such as native grasses, that may be planted adjacent to River Road would be expected to be maintained by the City of Newport News Public Works Department.

During construction, there would be adverse, temporary, minor impacts to the aesthetic environment resulting from the use of construction equipment and a staging area that would be present along River Road and/or the use of marine equipment, such as a crane-mounted work barge, that would occupy the nearshore areas until the project is fully constructed. Overall, impacts to the aesthetic environment would be less than significant with the proposed construction of a rock sill and vegetated slope.

6.2 AIR QUALITY

No Action/Future Without Project Alternative

Minor, permanent adverse impacts to air quality would result from continuous emissions-producing sources, such as vehicle emissions and vessel traffic in the vicinity of the project site with implementation of the No Action/Future Without Project Alternative.

Alternative 1: Rock Sill with Vegetated Slope

Implementation of Alternative 1 would result in minor, temporary, adverse increases in air emissions during construction. Criteria pollutant air emissions would be produced from the combustion of fuels in heavy construction equipment. Particulate matter air emissions, such as fugitive dust, would potentially be produced from the ground- disturbing activities. Fugitive dust air emissions would vary depending on the work phase, level of activity, and prevailing weather conditions. Construction methods would incorporate best management

practices (BMPs) to minimize fugitive dust emissions in accordance with 9VAC-5060 et seq., including the use, where possible, the covering of open equipment for conveying materials; and prompt removal of spilled or tracked dirt or other materials from the paved street and removal of dried sediments resulting from soil erosion.

Impacts to air quality would be less than significant with the proposed construction of a rock sill and vegetated slope.

6.3 BATHYMETRY, HYDROLOGY, AND TIDAL PROCESSES

No Action/Future Without Project Alternative

Existing hydrologic conditions as described in Section 2.3.3 would continue to persist. Groundwater levels in the existing bank would continue to fluctuate depending on surface runoff patterns, precipitation, tidal action, and river levels. In the absence of any shoreline stabilization measure, the likelihood of increases in storm surge and the frequency and intensity of precipitation events would be expected to result in continued erosion of the riverbank.

Alternative 1: Rock Sill with Vegetated Slope

Implementation of Alternative 1 would have a negligible to minor, permanent adverse impact on existing, nearshore bathymetry. The proposed sill would be constructed primarily in the intertidal area with a portion of the stone sill potentially being constructed channelward of mean low water. During the Design and Implementation Phase, the exact alignment of the toe of the sill will be determined. However, the stone sill would be constructed using approximately 2,900 tons of VDOT Class III riprap and 800 tons of VDOT No. 1 Stone. The VDOT Class III rip rap material would be placed over top of the VDOT No. 1 stone which would be used as bedding stone. Additionally, the existing debris present on the shoreline would be removed prior to construction.

Implementation of Alternative 1 would not be anticipated to directly impact hydrologic and tidal processes. However, the proposed stone sill would stabilize the existing eroding shoreline and would mitigate impacts resulting from the increase in storm surgeand frequency/intensity of storm events associated with climate change.

Therefore, impacts to bathymetry, hydrology, and tidal processes would be less than significant with implementation of Alternative 1.

6.4 CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS

No Action/Future Without Project Alternative

Existing site conditions would persist and the shoreline would continue to experience long-term erosion from the combined effects of storm surge and stormwater runoff during high precipitation events or coastal storms thus further threaten the existing upland public utilities, including River Road. Existing GHG-producing activities or sources would be expected to persist resulting in minor, permanent adverse impacts toair quality; however, this would not cumulatively or synergistically interact with climate change and/or other cumulative effects. In the absence of any shoreline stabilization measure, the likelihood of increases in storm surge and the frequency and intensity of precipitation events associated with climate change would be expected to result in continued erosion of the riverbank.

As a result of climate change, global temperatures and sea levels are expected to rise in the foreseeable future. Predicted climate change impacts including sea level rise, and the potential increase in the frequency and intensity of storm events have the potential to affect the nature and character of the estuarine and coastal ecosystem in the ROI.

Alternative 1: Rock Sill with Vegetated Slope

Greenhouse gas emissions would temporarily increase resulting from combustion of fuel during construction. The temporary increase would result in minor, adverse effects to air quality; however, this would not cumulatively or synergistically interact with climate change and/or other cumulative effects.

Therefore, impacts to climate change and greenhouse gas emissions would be less than significant with implementation of Alternative 1.

6.5 CULTURAL RESOURCES

No Action/Future Without Project Alternative

There would be no direct, indirect, or cumulative effects to cultural resources anticipated with implementation of the No Action/Future Without Project Alternative. There are no identified historic buildings or archeological resources in the APE. However, since a Phase 1 Archeological Survey of the project site has not been conducted, it is possible that if archeological resources are present within the existing river bank, they could be destroyed or lost as a result of continued bank erosion.

Alternative 1: Rock Sill with Vegetated Slope

The construction of the rock sill and associated vegetated slope to stabilize the shoreline would not result in impacts to known cultural resources, including historic building structures or known archeological sites. However, due to the soil disturbing activities which include bank grading to achieve a 1V:3H slope, the potential to impact unidentified archeological resources exists. A Phase 1 Archeological Survey of the site was not conducted for this study. The Virginia DHR concurred with the USACE's determination that no historic properties would be affected by the proposed undertaking on September 29, 2020.

Therefore, impacts to cultural resources would be less than significant with implementation of Alternative 1.

6.6 FISHERY RESOURCES AND ESSENTIAL FISH HABITAT

No Action/Future Without Project Alternative

Existing fishery resources would persist as described in Section 2.3.6. Sea level rise may result in changes to the estuarine environment that could influence life history characteristics of fish species common to the James River and Chesapeake Bay. Temporal or spatial shifts in foraging, breeding, or prey species availability could occur, although further research is needed to fully understand the extent of these potential impacts resulting from climate change impacts on fishes occurring in Chesapeake Bay.

Alternative 1: Rock Sill with Vegetated Slope

The construction of the proposed rock sill would result in temporary, negligible to minor adverse impacts to the nearshore estuarine environment including fishery resources. The proposed sill would be constructed primarily in the intertidal area with a portion of the stone sill potentially being constructed channelward of mean low water. During the Preconstruction, Engineering, and Design Phase, the exact alignment of the toe of thesill will be determined. However, the stone sill would be constructed using approximately 2,900 tons of VDOT Class III riprap and 800 tons of VDOT No. 1 Stone. Fishes would be expected to avoid the area during in-water construction. There are nopile-driving activities associated with Alternative 1; therefore, acoustic underwater impacts to fish resources would be negligible and would be associated with vessel traffic such as work barges that may be necessary for construction. Vessel traffic is common to the James River and contributes to the existing ambient underwater noise environment.

Construction activities would temporarily increase turbidity immediately adjacent to the project site. However, Best Management Practices (BMPs) such as the use of a turbidity curtain if feasible, would be implemented. Additionally, the nearshore benthic environment is largely comprised of sandy material which would be expected to settle quickly from the water column following disturbance.

Minor, adverse impacts to nearshore benthic resources would be permanent due to the placement of the stone. The existing Eastern oyster and Atlantic ribbed mussel resources attached to the existing debris along the shoreline would be removed along with debris removal during construction. However, their presence in the area indicates that settlement and attachment of the Eastern oyster to the stone sill is likely to occur once construction is complete.

Essential Fish Habitat may be adversely affected as a result of construction; however, these effects are anticipated to be minimal. Impacts to EFH are further addressed in the EFH Assessment worksheet provided in Appendix A. The NMFS concurred with the USACE’s determination of EFH impacts on September 29, 2020.

In summary, impacts to fishery resources and Essential Fish Habitat would be less than significant with implementation of Alternative 1.

6.7 FLOODPLAINS AND FLOOD RISK MANAGEMENT

No Action/Future Without Project Alternative

Shoreline and bank erosion would continue within the project area. Land areas that are currently dry during a normal daily high tide will eventually be underwater at high tide. Over time, the combined effects of shoreline erosion caused by high tides, storm surge,and wave action and bank loss from rainfall runoff will result in public facilities, including River Road, electric, gas, communications, and public water and sewer lines, becoming more vulnerable to damage associated with nor'easters and tropical storms/hurricanes.

Ongoing and continued relative sea level rise will only worsen the shoreline erosion problem. The historic rate of sea level rise at the Sewells Point tide gage (1927-2018) is approximately 0.18 inches per year or approximately 1.5 feet per 100 years (NOAA 2020). A 2018 study by the Virginia Institute of Marine Science shows relative sea level rise rates along the east coast are trending higher than historic rates. The study evaluated tide gage records from 1969 to 2017, where most gages have complete or near complete records. At the Sewells Point gage, the study found a relative sea level rise rate of approximately 0.20 inches per year for the period 1969 to 2017 (Boon et al. 2018). In addition, predicted changes with climate may also cause an increase in storm activity with respect to frequency, intensity, storm surge, and rainfall.

Alternative 1: Rock Sill with Vegetated Slope

Implementation of Alternative 1 will have minor, permanent, and beneficial impacts to existing floodplain areas resulting from shoreline stabilization. While the public facilities, including River Road, electric, gas, communications, and public water and sewer lines, are at/near elevation 25 feet, NAVD88 and not located within the current effective FEMA1- and 0.2-percent-annual-chance floodplains, without implementation of Alternative 1, they will over time possibly become at risk to damage associated with flooding.

Adverse impacts to floodplain areas during construction would be temporary and minor; best management practices, regulations, and inspections would be followed during design and construction.

6.8 GEOLOGY, PHYSIOGRAPHY, AND TOPOGRAPHY

No Action/Future Without Project Alternative

There would be negligible to minor, permanent, adverse effects to geology, physiography, and topography with implementation of the No Action/Future Without Project Alternative. Bank erosion would persist in the future as a result of the combined effects of storm surge and stormwater runoff from high precipitation and coastal stormevents.

Alternative 1: Rock Sill with Vegetated Slope

Ground disturbance would occur as a result of construction of the rock sill and vegetated slope. In addition to the stone required to construct the sill, approximately 4,300 cubic yards of fill material, and 35,000 square feet of soil stabilization blankets would be required to achieve the desired 1V:3H vegetated slope. The implementation of Alternative 1 would result in minor, permanent beneficial impacts to topography resulting from the shoreline stabilization. There would be no anticipated impacts to geology or physiography.

6.9 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

No Action/Future Without Project Alternative

Implementation of the No Action/Future Without Project Alternative is not anticipated to result in any release of hazardous, toxic, or radioactive release within the ROI.

Alternative 1: Rock Sill with Vegetated Slope

There is no evidence of environmental contamination in the ROI; furthermore, there would be no anticipated releases of petroleum, hazardous, toxic, or radioactive waste with implementation of Alternative 1. A potential for oil spills exists with vessel and construction equipment in the area, but accident and spill prevention plans included in the contract specifications would prevent most spills. The potential exists for negligible to minor, temporary adverse impacts if a spill occurred, however, adherence to the accident and spill prevention plan would mitigate these risks. Additionally, the construction contract would include requirements to properly manage, store, and dispose of all fuels and materials generated by or used for the project.

In summary, impacts associated with hazardous, toxic, and radioactive waste would be less than significant with implementation of Alternative 1.

6.10 NOISE AND VIBRATION

No Action/Future Without Project Alternative

Implementation of the No Action/Future Without Project Alternative would result in continued threats to the existing utilities and River road as a result of the continuous bank erosion. The existing noise environment would be expected to persist as described in Section 2.3.10. Noise-producing sources in the area would continue to include vehicles and vessel traffic.

Alternative 1: Rock Sill with Vegetated Slope

Minor, temporary adverse effects to the existing noise environment in the ROI which is located within a residential community would occur during construction which would be

anticipated to occur during daylight hours. The homes located along River Road are approximately 60-70 feet from the project site. Heavy construction equipment would be used intermittently throughout the day, and noise levels would vary depending on the type of construction equipment required. The typical noise level for backhoes and loaders approximately 50 feet from the source is 80 and 85 decibels, respectively (U.S.Department of Transportation 2017). Noise-related impacts would only occur during the construction of the project. Upon completion, there would be no further noise-related impacts.

Therefore, impacts to the ambient noise environment would be less than significant with implementation of Alternative 1.

6.11 OCCUPATIONAL HEALTH AND SAFETY

No Action/Future Without Project Alternative

Implementation of the No Action/Future Without Project Alternative would result in the existing shoreline continuing to erode over time posing a threat to the existing utilities and River Road. The site conditions would be expected to continue and potentially threaten public safety due to the long-term deteriorating conditions of the site. Minor to moderate, permanent adverse impacts to occupational health and safety would be anticipated with implementation of the No Action Alternative.

Alternative 1: Rock Sill with Vegetated Slope

During project construction, safety risks would be associated with operating machinery and equipment during construction of the rock sill and grading of the bank. These risks would be temporary, minor and adverse to occupational health and safety. While working in and around the water, drowning is always a safety risk, therefore, work vessels, if required, should be equipped with flotation devices and first aid equipment.

The existing site constraints, including bank steepness and a shallow nearshore environment, present access and staging issues that may increase hazardous work conditions during construction. Contractors would be required to prepare an Accident Prevention Plan (APP) for review by USACE safety staff prior to the start of construction (USACE EM-385-1-1). The APP specifies the safety and occupational health plan, responsible personnel and their Occupational Safety and Health Administration certifications, safety training for all personnel, protective equipment, Clothing and Personal Protective Equipment (PPE) are typically required for workers and may include: appropriate clothing for weather conditions; steel toed boots; hard hat; eye protection, work vest/personal floatation device; and hearing protection. While working in and around the water, drowning is always a safety risk, therefore, all vessels would be required to be equipped with flotation devices and first aid equipment.

Therefore, impacts associated with occupational health and safety would be less than significant with implementation of Alternative 1.

6.12 RECREATION

No Action/Future Without Project Alternative

Implementation of the No Action/Future Without Project Alternative is not anticipated to result in any impacts to recreation beyond the existing conditions within the ROI as described in Section 2.3.12.

Alternative 1: Rock Sill with Vegetated Slope

During project construction, minor, temporary adverse to recreation would occur. Although private property access along River Road would not be restricted, the utilization of River Road for recreational activities such as bike riding or walking may be temporarily limited due to the presence of equipment and/or material stockpiles during construction.

If site access by water is required for construction, temporary, minor impacts to recreational boating activities in the nearshore environment may occur. Small, recreational vessels would be expected to avoid the nearshore environment during construction.

There are existing privately owned parcels that have the potential to be utilized for recreational purposes by property owners in the future for access to navigable waters. Real estate actions necessary to support the project are anticipated as a result of the implementation of Alternative 1. For more information regarding the Real Estate Plan, please refer to Appendix B. As such, the potential exists for minor to moderate, permanent adverse impacts to recreational activities that would be impacted by the proposed construction of a rock sill and vegetated slope.

In summary, impacts to recreation would be less than significant with implementation of Alternative 1.

6.13 SOCIOECONOMICS

No Action/Future Without Project Alternative

Implementation of the No Action/Future Without Project Alternative is not anticipated to result in any socioeconomic impacts beyond the existing conditions within the ROI as described in Section 2.3.13.

Alternative 1: Rock Sill with Vegetated Slope

Implementation of Alternative 1 would have negligible, temporary beneficial impacts on employment during construction which would require local construction workers to construct the proposed project. The proposed shoreline improvements would have no effects on community cohesion or local income levels and would not result in any population displacement. Real estate actions, including the potential for easements or acquisition, would be required for the private property parcels located within the project footprint unless it is further determined in the PED Phase that the project could be constructed without impacts to the privately owned parcels. Real estate actions would be expected to have a minor, permanent adverse effect as there are fewer than five private parcels within the length of the 600-foot shoreline.

Therefore, impacts to socioeconomics would be less than significant with implementation of Alternative 1.

6.14 SPECIAL STATUS SPECIES

No Action/Future Without Project Alternative

Implementation of the No Action/Future Without Project Alternative is not anticipated to result in impacts to special status species with the potential to occur in the ROI as described in Section 2.3.14.

Alternative 1: Rock Sill with Vegetated Slope

The proposed construction of a rock sill and associated vegetated slope may affect and is likely to adversely affect the Northern long-eared bat if present. However, due to a lack of suitable roosting, foraging, and hibernacula, the northern long-eared bat is not likely to be present.

The proposed action may affect but is not likely to adversely affect the Atlantic sturgeon, shortnose sturgeon, leatherback sea turtle, Kemp's ridley sea turtle, hawksbill sea turtle,and loggerhead sea turtle which have the potential to occur in the ROI. In- water impacts associated with project construction would occur in the nearshore environment at shallow depths. The protected species under the jurisdiction of NMFS are all highly mobile and would be expected to move into deeper waters and avoid the project site due to the temporary construction disturbance in the area. Additionally, sea turtles are seasonal transients to the area and may not be present if construction occurs during cold-weather months. Turbidity controls would be implemented during construction if determined to be feasible and would further minimize any potential impacts to special status species.

If vessels such as work barges are required for construction of the stone sill, the potential for vessel strikes to a protected species is negligible. The shallow, nearshore environment adjacent to the project site would necessitate the use of shallow draft vessels, and the requirement that vessels operate at slow speeds upon approach to the shoreline.

Accordingly, impacts to special status species would be less than significant with implementation of Alternative 1. Consultation requirements in accordance with the ESA are documented in Appendix A.

6.15 VEGETATION, WETLANDS, AND SUBMERGED VEGETATION

No Action/Future Without Project Alternative

Implementation of the No Action/Future Without Project Alternative is not anticipated to result in any impacts to vegetation, wetlands, and submerged aquatic vegetation beyond the existing conditions as described in Section 2.3.15.

Alternative 1: Rock Sill with Vegetated Slope

Minor, permanent adverse effects to existing upland vegetation at the project site would occur as a result of the removal of existing trees and upland vegetation prior to construction. Once the site has been graded to achieve the 1V:3H slope, slope stabilization blankets, which are typically made of biodegradable materials, would be installed to hold soil and seeds in place until vegetation is established. This similar slope design was observed adjacent to the proposed project site on the far side of Government Ditch as shown in Figure 5-3.

Figure 6-1. Vegetated slope adjacent to Government Ditch. Image taken 2/06/19.

The slope is anticipated to be seeded following placement of the slope stabilization blankets. Although the planting plan would be finalized in the Design and Implementation Phase, the following type of grasses would likely be considered. Warm-season grasses generally require less maintenance and have a shorter growing season. Warm-season grasses such as Bermuda grass and zoysia grass are well adapted to the environmental conditions found in the Eastern Virginia/Southern Piedmont region and are likely to be considered good candidate grass types for vegetating the slope. Other warm-season grasses that may also warrant considerationinclude St. Augustine grass, however, vegetated plantings as opposed to seeding, would likely be required and may not be as cost effective. Fescue can also be established from seed and is suitable for low management conditions. To ensure the long-term stability of the slope and stone sill,

it is not anticipated that trees would be re-planted on the adjacent upland following construction. Any additional native vegetation planted in associated with this project would not impede the existing scenic view of the James River.

As noted in Section 2.3.15, the only invasive species at the project site is the common reed, *Phragmites australis*, which is present in small patches at mid-bank height where groundwater seepage has likely occurred to facilitate survival. This species would be expected to be removed from the site as a result of the bank grading, placement of soil stabilization blankets, and subsequent seeding. The common reed would not be expected to return to the site once the slope has been stabilized. Accordingly, implementation of the Recommended Plan would eliminate the invasive common reed from the site and would not contribute to the spread of this invasive species.

There were no observed vegetated wetlands onsite; therefore, there would be no anticipated impacts to vegetated wetlands resulting from implementation of Alternative 1. Additionally, there would be no impacts to submerged aquatic vegetation due to its absence from the nearshore areas of the project site.

Impacts to vegetation, wetlands, and SAV would be less than significant with implementation of Alternative 1.

6.16 WATER QUALITY

No Action/Future Without Project Alternative

Implementation of the No Action/Future Without Project Alternative is not anticipated to result in any impacts to water quality beyond the existing conditions as described in Section 2.3.16. The ongoing erosion has the potential to result in minor impacts to water quality as a result of sedimentation and increased turbidity.

Alternative 1: Rock Sill with Vegetated Slope

Implementation of Alternative 1 would result in negligible to minor, temporary adverse impacts to water quality. Turbidity would increase along with total suspended solids in the nearshore environment during construction; however, turbidity impacts would be minimized by the use of turbidity curtains if determined feasible. Additionally, the nearshore benthic environment is largely comprised of sand which would be expected to settle quickly from the water column following disturbance. Following construction completion, the existing water quality conditions would be expected to return to ambient conditions. Additionally, stabilization of the shoreline may slightly improve localized water quality by minimizing erosion and sedimentation impacts.

Therefore, water quality impacts would be less than significant with implementation of Alternative 1.

6.17 WILDLIFE

No Action/Future Without Project Alternative

Implementation of the No Action/Future Without Project Alternative is not anticipated to result in any impacts to wildlife beyond the existing conditions as described in Section 2.3.17. Minor impacts to wildlife and associated habitat have the potential to occur as a result of water quality impacts attributed to the ongoing erosion.

Alternative 1: Rock Sill with Vegetated Slope

Implementation of Alternative 1 would result in negligible to minor, temporary adverse impacts to wildlife. During construction activities, small mammals, reptiles, and amphibians would be temporarily displaced and certain species, such as shore-dwelling birds would likely avoid the area until all construction activities are complete and ambient conditions are restored. Additionally, turbidity increases during in-water construction may temporarily disrupt foraging abilities of wildlife. There would be no anticipated effects to bald eagles since the closest reported bald eagle nest is located tothe northwest approximately two miles.

The noise and temporary disturbance during construction may cause migratory birds and associated prey species, such as benthic invertebrates and fish, to move away from project site if present; however, this is a temporary, negligible to minor adverse impact that does not substantially impact their long-term foraging or breeding success.

Therefore, impacts to wildlife would be less than significant with implementation of Alternative 1.

6.18 TRANSPORTATION

No Action/Future Without Project Alternative

Implementation of the No Action/Future Without Project Alternative would result in the potential for permanent, adverse effects to transportation as a result of the continued erosion which could pose a threat to River Road in the absence of measures to halt the erosion.

Alternative 1: Rock Sill with Vegetated Slope

During construction of the rock sill and vegetated slope, minor, temporary adverse impacts to transportation would occur. Construction vehicles and equipment would be present along River Road. Portions of River Road adjacent to the project site may be temporary closed for short durations during construction which could affect access to residential property. Stabilization of the shoreline along this stretch of the James River would ultimately protect the existing roadway resulting in permanent, beneficial effect to transportation.

6.19 CUMULATIVE IMPACTS

No Action/Future Without Project Alternative

In the absence of shoreline stabilization at the project site, the threat to existing public utilities would continue to increase. The project location along the James River shoreline is likely susceptible to both SLR and land subsidence. Predicted climate change impacts

have the potential to cause long-term changes in the nature and character of the estuarine ecosystem over time. However, implementation of the No Action/Future Without Project Alternative would not be anticipated to substantially cumulatively or synergistically interact with climate change and/or other cumulative effects.

Alternative 1: Rock Sill with Vegetated Slope

The construction of a rock sill with vegetated slope would stabilize the existing 600-foot shoreline resulting in improved site conditions that would eliminate the current threat to existing public utilities, including River Road. Other potential cumulative projects that could occur in the future includes the future construction of residential piers on private property within the project footprint. The future construction of residential piers could potentially cause constructability issues for the proposed shoreline stabilization project. Additionally, an existing private pier and rock sill currently exists, and could also present constructability issues; however, it is anticipated that the proposed rock sill will tie into the existing rock structures. If the existing stone protection is not maintained by the private property owner and fails, this could increase the vulnerability of the proposed rock sill to failure. Close coordination with all stakeholders, including local residents andthe City of Newport News, into the Design and Implementation Phase would mitigate issues that could potentially arise.

Therefore, implementation of Alternative 1 would not be anticipated to substantially cumulatively or synergistically interact with climate change and/or other cumulative effects.

6.20 CONCLUSION

Potential impacts to the aforementioned resource areas resulting from implementation of Alternative 1, which includes the construction of a proposed rock sill and vegetated slope, would be less than significant.

The alternatives evaluated in Section 3.2.4 include the full rock revetment (A2) Partial Rock Revetment with Vegetated Slope (A3), and the living shoreline with vegetated slope (A4). The environmental impacts associated with implementation of Alternatives A2-A4 would be comparable to the environmental consequences of implementation of the Recommended Plan for all resource areas except for Fishery Resources and EFH. Alternatives A3 and A4 would include a footprint that extends slightly further channelward than the footprint of the Recommended Plan. Although the impacts wouldbe minor, there would be a slightly larger area of EFH impacted with implementation of A3 and A4. Minor, adverse impacts to nearshore benthic resources would be permanent due to placement of the stone material. These impacts would not be considered significant.

The proposed shoreline stabilization project would improve site conditions through the removal of existing debris that is composed of broken concrete along the shoreline and the construction of a stable slope for the approximate 600-foot stretch of shoreline which would further eliminate the current threat to existing public utilities, including River Road.

7 ENVIRONMENTAL COMPLIANCE

This chapter discusses the status of coordination and compliance of the Recommended Plan with environmental requirements. As stated in Chapter 1, this document has been prepared as an Integrated Feasibility Study/Environmental Assessment. The compliance status for the Recommended Plan is identified for relevant environmental laws and EOs in Tables 5-4 and 5-5, respectively. Anticipated future environmental permits/authorizations are identified in Table 5-6.

Table 7-1. Environmental Compliance.

Title of Law	U.S. Code	Compliance Status
Abandoned Shipwreck Act of 1987	43 United States Code (U.S.C.) 2101	N/A
American Bald and Golden Eagle Protection Act of 1962, as amended	16 U.S.C. 668	Full compliance.
Anadromous Fish Conservation Act of 1965	16 U.S.C. 757 a et seq	Full compliance.
Clean Air Act of 1972, as amended	42 U.S.C. 7401 et seq	Full compliance.
Clean Water Act of 1972, as amended	33 U.S.C. 1251 et seq	Full compliance.
Coastal Zone Management Act of 1972, as amended	16 U.S.C. 1451 et seq	Full compliance. Concurrence received from Virginia DEQ on November 20, 2020.
Comprehensive Environmental Responses, Compensation and Liability Act of 1980	42 U.S.C. 9601	Full Compliance.
Deepwater Port Act of 1974, as amended	33 U.S.C. 1501	N/A
Emergency Wetlands Resources Act	16 U.S.C. 3901-3932	N/A
Endangered Species Act of 1973	16 U.S.C. 1531	Full compliance. Consultation with the USFWS has

Title of Law	U.S. Code	Compliance Status
		concluded and the USFWS verification letter of August 21, 2020 is provided in Appendix A.
Estuary Protection Act of 1968	16 U.S.C. 1221 et seq	N/A
Fish and Wildlife Coordination Act of 1958, as amended	16 U.S.C. 661	Full compliance. The FWCA letter was received from the USFWS on April 12, 2021.
Flood Control Act of 1970	33 U.S.C. 549	N/A
Land and Water Conservation Act	16 U.S.C. 460	Full Compliance.
Magnuson-Stevens Fishery Conservation and Management Act	16 U.S.C. 1801	Full compliance. Concurrence received from NMFS on September 29, 2020.
Marine Mammal Protection Act of 1972, as amended	16 U.S.C. 1361	N/A
Marine Protection, Research, and Sanctuaries Act of 1972	33 U.S.C. 1401	N/A
Migratory Bird Conservation Act of 1928, as amended	16 U.S.C. 715	Full compliance.
Migratory Bird Treaty Act of 1918, as amended	16 U.S.C. 703	Full compliance.
National Environmental Policy Act of 1969, as amended	42 U.S.C. 4321 et seq	Full compliance is anticipated following the signing of the Finding of No Significant Impact.
National Historic Preservation Act of 1966, as amended	16 U.S.C. 470	Full Compliance. Concurrence received from Virginia DHR on September 29, 2020.

Title of Law	U.S. Code	Compliance Status
National Historic Preservation Act Amendments of 1980	16 U.S.C. 469a	Full Compliance.
Native American Graves Protection and Repatriation Act of 1990	25 U.S.C. 3001	N/A
Noise Control Act of 1972, as amended	42 U.S.C. 4901	Full Compliance.
Resource Conservation and Recovery Act of 1976	42 U.S.C. 6901 et seq	Full Compliance.
River and Harbor Act of 1888, Section 11	33 U.S.C. 608	Full Compliance.
River and Harbor Act of 1899	33 U.S.C. 401 et seq	Full Compliance.
Safe Drinking Water Act of 1974, as amended	42 U.S.C. 300	Full Compliance.
Submerged Lands Act of 1953	43 U.S.C. 1301 et seq	Full Compliance.
Toxic Substances Control Act of 1976	15 U.S.C. 2601	Full Compliance.

Table 7-2. Executive Orders.

Title of Executive Order	Executive Order Number	Compliance Status
Protection and Enhancement of Environmental Quality	11514/11991	Full Compliance.
Protection and Enhancement of the Cultural Environment	11593	Full Compliance.
Floodplain Management	11988	Full Compliance.
Protection of Wetlands	11990	Full Compliance anticipated.
Federal Compliance with Pollution Control Standards	12088	Full Compliance.

Title of Executive Order	Executive Order Number	Compliance Status
Offshore Oil Spill Pollution	12123	N/A
Federal Compliance with Right-to-Know Laws and Pollution Prevention	12856	N/A
Federal Actions to Address Environmental Justice and Minority and Low-income Populations	12898	Full Compliance.
Protection of Children from Environmental Health Risks and Safety Risks	13045	Full Compliance.
Invasive Species	13112	Full Compliance.
Marine Protected Areas	13158	N/A
Consultation and Coordination with Indian Tribal Governments	13175	Full Compliance.
Responsibilities of Federal Agencies to Protect Migratory Birds	13186	Full compliance.
Facilitation of Cooperative Conservation	13352	N/A
Preparing the United States for Impacts of Climate Change	13659	Full Compliance.
Planning for Federal Sustainability in the Next Decade (2015)	13693	Full Compliance.

Table 7-3. Environmental Permitting Requirements.

Law	Agency Responsible	Permit, Agreement, Authorization, or Notification Required
American Bald and Golden Eagle Protection Act of 1962, as amended	USFWS	No take permit is required.
Comprehensive Environmental Responses, Compensation and Liability Act of 1980, as amended	USEPA	N/A
Clean Water Act, Section 401	VDEQ	401 Water Quality Certification anticipated.
CZMA	VDEQ	CZMA Federal Consistency Concurrence required; concurrence received on November 20, 2020.
Coastal Barrier Resources Act (CBRA)	USFWS	N/A
Endangered Species Act of 1973	USFWS/NMFS	USFWS verification letter received August 21, 2020; NMFS concurrence received on September 21, 2020.
Fish and Wildlife Coordination Act (FWCA)	USFWS	FWCA comments were received from USFWS on April 14, 2021.
Magnuson-Stevens Fishery Conservation and Management Act	NMFS	Concurrence from NMFS received on September 29, 2020.
Marine Mammal Protection Act of 1972, as amended	NMFS	N/A; no authorization required.
Marine Protection, Research, and Sanctuaries Act of 1972*	USEPA	N/A

Law	Agency Responsible	Permit, Agreement, Authorization, or Notification Required
Migratory Bird Treaty Act of 1918, as amended	USFWS	No take permit required.
National Historic Preservation Act of 1966, as amended	Advisory Council on Historic Preservation, Virginia Department of Historic Resources	Concurrence Determination received from Virginia Department of Historic Resources on September 29, 2020.
Noise Control Act of 1972	USEPA	N/A
Resource Conservation and Recovery Act of 1976	USEPA, VDEQ	N/A
Section 28.2-1200 et seq. of the Code of Virginia, Submerged Lands	VMRC	Subaqueous permit required for impacts to State-owned submerged lands channelward of mean low water.

N/A = Not Applicable; VDEQ = Virginia Department of Environmental Quality; NMFS = National Marine Fisheries Service; USEPA = U.S. Environmental Protection Agency; USFWS = U.S. Fish and Wildlife Service

National Environmental Policy Act of 1969, as amended

This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C.] §§ 4321 et seq.) and the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [CFR] Parts 1500–1508 [the 1978 version of this rule was used because the NEPA process had been previously initiated prior to the 14 September 2020 implementation of the CEQ NEPA streamlining rule]). The NEPA requires that all Federal agencies use a systematic, interdisciplinary approach to protect the human environment. This approach promotes the integrated use of natural and social sciences in planning and decision-making that could have an impact on the environment. NEPA requires the preparation of an EIS for any major Federal action that could have a significant impact on quality of the human environmentand the preparation of an EA for those Federal actions that do not cause a significant impact but do not qualify for a categorical exclusion. The NEPA regulations issued by CEQ provide for a scoping process to identify and the scope and significance of environmental issues associated with a project. The process identifies and eliminates from further detailed study issues that are not significant. As previously stated, the USACE used this process to comply with NEPA and focus this

IFR/EA on the issues most relevant to the environment and the decision-making process. For a description ofthe agency, tribal, and public coordination completed to date and information on the NEPA scoping that was completed, please refer to Appendix A. Full compliance under

NEPA is anticipated in the future with signature of the Finding of No Significant Impact (FONSI). The draft FONSI is provided at the beginning of the report on page ii.

Clean Water Act

This IFR/EA contains sufficient information to demonstrate that the Recommended Plan is in compliance with the Clean Water Act. The Clean Water Act, 404(b)(1) Report provided in Appendix A documents this project is in full compliance with Section 404 of the Clean Water Act.

The State Water Control Board issued conditional §401 Water Quality Certification for Regional Permit (RP) 19 (effective date 5 September 2018) as meeting the requirements of the Virginia Water Protection Permit Regulation. A copy of the RP- 19 including terms and conditions is provided in the Integrated Report/EA Environmental Appendix, Appendix A-3. The Recommended Plan appears to meet the requirements of the RP-19 and its associated Water Quality Certification, pending confirmation based on information to be developed during the Design and Implementation Phase. Therefore, this provides reasonable assurance that a WaterQuality Certification pursuant to Section 401 of the Clean Water Act could be issued for the Recommended Plan from the Virginia Department of Environmental Quality (VDEQ). A Water Quality Certification pursuant to Section 401 of the Clean Water Act would be obtained from the VDEQ prior to construction. All conditions of the Water Quality Certification would be implemented in order to minimize adverse impacts to water quality.

Wetlands

Section 404 of the Clean Water Act and 33 C.F.R. 336(c)(4) and 33 C.F.R. 320.4(b) require the USACE to avoid, minimize, and mitigate impacts to wetlands. There are no vegetated, tidal wetlands located at the project site. Impacts to vegetated tidal wetlands are not anticipated as a result of this project. Therefore, no wetland mitigation is required for this project.

Coastal Zone Management Act

The Federal CZMA requires each Federal agency activity performed within or outside the coastal zone (including development projects) that affects land or water use, or natural resources of the coastal zone to be carried out in a manner which is consistent to the maximum extent practicable, i.e. fully consistent, with the enforceable policies of approved state management programs unless full consistency is prohibited by existing law applicable to the Federal agency.

To implement the CZMA and to establish procedures for compliance with its Federal consistency provisions, the U.S. Department of Commerce, NOAA, promulgated regulations which are contained in 15 C.F.R. Part 930. As per 15 CFR 930.37, a Federal agency may use its NEPA documents as a vehicle for its consistency determination.

The Virginia Coastal Management Program was established under the guidelines of the National Coastal Zone Management Act (1972) as a state-Federal partnership to comprehensively manage coastal resources. The VDEQ is the designated state coastal management agency and is responsible for the implementation of the state's Coastal Management Program. Implementation includes the direct regulation of impacts to coastal resources within the critical areas of the state including coastal waters, tidelands, beaches and beach dune systems; and indirect certification authority over Federal actions and state permit decisions within the eight coastal counties.

The goals of the Virginia Coastal Management Program are attained by enforcement of the policies of the State as codified within the Virginia Code of Regulations. "Policy" or

"policies" of the Virginia Coastal Management Program means the enforceable provisions of present or future applicable statutes of the Commonwealth of Virginia. The statutes cited as policies of the program were selected because they reflect the overall program goals of developing and implementing a balanced program for the protection of the natural resources, as well as promoting sustainable economic development of the coastal area. In accordance with the CZMA, it has been determined that the proposed project would be carried out in a manner that is fully consistent with the enforceable policies of the Virginia CMP. A Federal Consistency Determination was submitted to the Virginia DEQ on September 29, 2020, and a concurrence response was received from the Virginia DEQ on November 20, 2020 (Appendix A).

Clean Air Act, as amended

There will be negligible to minor, temporary increases in air emissions from operation of construction equipment during construction operations. These emissions will be below de minimis levels. No conformity analysis is required for this project.

Fish and Wildlife Coordination Act

Consultation pursuant to the Fish and Wildlife Coordination Act (FWCA) occurred with the USFWS. The FWCA letter was received from the USFWS on April 12, 2021. In their letter, the USFWS acknowledges Alternative 1 as a reasonable compromise between cost and ecological benefit. Consultation documentation is located in Appendix A. The project is in full compliance with the FWCA.

Endangered Species Act

The Not Likely to Adversely Affect (NLAA) Program Verification Form, which evaluates potential impacts to protected species under the jurisdiction of NMFS, was submitted to

NMFS on September 18, 2020 to initiate informal consultation (Appendix A). The NMFS provided their concurrence with the USACE's determination on September 21,2020. Therefore, the proposed project is in full compliance with Section 7 of the ESA.

The USACE determined that the Recommended Plan may affect and is likely to adversely affect the Northern long-eared bat if present. The U.S. Fish and Wildlife Service (FWS) indicated in their verification letter dated 21 August 2020 that this project may affect the northern long-eared bat; however, any take that may occur as a result ofthe action is not prohibited under the ESA Section 4(d) rule. The FWS verified that the January 5, 2016 Programmatic Biological Opinion concludes the USACE's consultation responsibilities under ESA Section 7(a)(2) with respect to the northern long-eared bat in their letter dated 21 August 2020.

Table 7-4. Federally listed species known or with the potential to occur in the Action Area.

Taxonomic Category/Common Name	Scientific Name	Status	Critical Habitat	Affect Determination
Fish				
Atlantic sturgeon	*Acipenser oxyrinchus*	E*	Y	May Affect, Not Likely to Adversely Affect
Shortnose sturgeon	*Acipenser brevirostrum*	E	N	May Affect, Not Likely to Adversely Affect
Sea turtles				
Leatherback sea turtle	*Dermochelys coriacea*	E	N	May Affect, Not Likely to Adversely Affect
Kemp's ridley sea turtle	*Lepidochelys kempii*	E	N	May Affect, Not Likely to Adversely Affect
Hawksbill sea turtle	*Eretmochelys imbricata*	E	N	May Affect, Not Likely to Adversely Affect

Loggerhead sea turtle	*Caretta caretta*	E*	N	May Affect, Not Likely to Adversely Affect
Mammals				
Northern long-eared bat	*Myotis septentrionalis*	T	N	May Affect, Likely to Adversely Affect

T = Threatened; E = Endangered; Y = Yes; N = No; *Species status is reported as it pertains to the Chesapeake Bay Distinct Population Segment for Atlantic sturgeon and the Northeast Atlantic Ocean Distinct Population Segment for the Loggerhead sea turtle.

Magnuson-Stevens Fishery Conservation and Management Act, as amended

This Act requires Federal action agencies to consult with the NMFS if a proposed action may adversely affect EFH. The USACE evaluated potential impacts on NMFS-managed fish species and EFH (Appendix A). Negligible to minor, adverse impacts to some EFH is anticipated, however no impacts are anticipated to substantively impact EFH. The NMFS concurred with the USACE's determination on September 29, 2020. Relevant correspondence is provided in Appendix A.

Anadromous Fish Conservation Act

The project considered habitat impacts to the an adromous fish. Adverse, temporary, negligible to minor impacts are anticipated due to increased potential of total suspended solids and turbidity in the water column during construction.

Marine Mammal Protection Act

The Marine Mammal Protection Act prohibits the take of marine mammals in the ROI. There would be no anticipated impacts to marine mammals with implementation of the Recommended Plan.

Section 106 of the National Historic Preservation Act

The NHPA applies to properties listed in or eligible for listing in the NRHP; these are referred to as "historic properties." Historic properties eligible for listing in the NRHP include prehistoric and historic sites, structures, buildings, objects, and collections of these in districts. Section 106 of the NHPA and its implementing regulations at 36 CFR Part 800, require the lead Federal agency to assess the potential effects of an undertaking on historic properties that are within the proposed project's Area of Potential Effect, which is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 C.F.R. § 800.16[d]).

The USACE evaluated the potential for adverse impacts to archaeological or historic resources and determined there would be no adverse impacts to historic resources. A Phase 1 Archeological Survey of the site was not conducted. The Virginia DHR concurred with the

USACE's determination that no historic properties will be affected by the proposed undertaking on September 29, 2020.

Resource Conservation and Recovery Act, as amended

The RCRA controls the management and disposal of hazardous waste. "Hazardous and/or toxic wastes," classified by the RCRA, are materials that may pose a potential hazard to human health or the environment due to quantity, concentration, chemical characteristics, or physical characteristics. This applies to discarded or spent materials that are listed in 40 CFR 261.31-.34 and/or that exhibit one of the following characteristics: ignitable, corrosive, reactive, or toxic. Radioactive wastes are materials contaminated with radioactive isotopes from anthropogenic sources (e.g., generated byfission reactions) or naturally occurring radioactive materials (e.g., radon gas, uranium ore). There are no RCRA generators in the vicinity of the project area.

Comprehensive Environmental Response, Compensation and Liability Act

The CERCLA (or Superfund) governs the liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and the cleanup of inactive hazardous substance disposal sites. There is no evidence or history of contamination at the project site under the CERCLA.

Executive Order 11988, Floodplain Management

Federal agencies should avoid, to the extent possible, the long-and short-term adverse impacts associated with the occupancy and modification of the Base Floodplain (1% annual chance floodplain as defined by FEMA, and the avoidance of direct and indirect support of development in the Base Floodplain wherever there is a practicable alternative. Under the EO, USACE is required to provide leadership and take action to:

a. Avoid development in the Base Floodplain unless it is the only practicable alternative; and

b. Reduce the hazard and risk associated with floods; c. Minimize the impact of floods on human safety, health and welfare; and d. Restore and preserve the natural and beneficial values of the Base Floodplain. For critical facilities, the 0.2% annual chance floodplain should be evaluated.

From USACE ER 1165-2-26, in accordance with EO 11988, USACE uses the eight-step process below to address floodplain management, with project-specific responses:

1. Determine if the proposed action is in the Base Floodplain. Due to location, type, and nature of the proposed action involving shoreline protection, all alternatives are located in the Base Floodplain.
2. If the action is in the Base Floodplain, identify and evaluate practicable alternatives to the action or to location of the action in the Base Floodplain. Chapter 2 discusses the process of considering, screening, and comparing

alternatives. Due to location, type, and nature of the proposed action involving shoreline protection, all alternatives are located in the Base Floodplain.

3. If the action must be in the floodplain, advise the general public in the affected area and obtain their views and comments. As shown in Chapter 1, as part of NEPA, public scoping was conducted in April 2020 to solicit public comments on the study scope, identify potential measures to be included in the study, and to discuss potential issues to be addressed during the environmental impact analysis for the study. No comments were received with specific concerns for flooding or the Base Floodplain. Please refer to Appendix A for scoping coordination.
4. Identify beneficial and adverse impacts due to the action and any expected losses of natural and beneficial floodplain values. Where actions proposed to be located outside the Base Floodplain will affect the Base Floodplain, impacts resulting from these actions should also be identified. The Environmental Consequences section identifies beneficial and adverse impacts. There are no expected losses of natural and beneficial floodplain values with the proposed action.
5. If the action is likely to induce development in the Base Floodplain, determine if a practicable non-floodplain alternative for the development exists. Most of the study area is developed, such that the purpose of the proposed action is not to induce development, but to help protect existing public facilities.
6. As part of the planning process under the Principles and Guidelines, determine viable methods to minimize any adverse impacts of the action including any likely induced development for which there is no practicable alternative and methods to restore and preserve the natural and beneficial floodplain values. This should include reevaluation of the "no action" alternative. If the proposed action is properly constructed and maintained, any adverse impacts would be temporary and minimal. The project is not intended to induce development, but to restore and preserve the shoreline and river bank.
7. If the final determination is made that no practicable alternative exists to locating the action in the Base Floodplain, advise the general public in the affected area of the findings. Due to location, type, and nature of the proposed project involving flood risk management, all alternatives are located in the Base Floodplain. The public has been advised and informed of the study through an initial scoping process and public notification for review of the draft Integrated Feasibility Reportand Environmental Assessment.
8. Recommend the plan most responsive to the planning objectives established by the study and consistent with the requirements of the Executive Order. Alternative 1, Rock Sill with Vegetated Slope, is the best protection with the least amount of disruption to the environment for the longest life span and for a reasonable budget and is consistent with the requirements of the Executive Order.

Executive Order 11990, Protection of Wetlands

This EO directs all Federal agencies to minimize the destruction, loss, or degradation of wetlands; and preserve and enhance the natural beneficial values of wetlands in the conduct of the agency's responsibilities. This project is in full compliance with this EO. There are no anticipated impacts to vegetated tidal wetlands resulting from implementation of the Recommended Plan.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

In accordance with this EO, the USACE has determined that no group of people would bear a disproportionately high share of adverse environmental consequences resulting from the proposed work. The Recommended Plan is in full compliance with this EO.

Executive Order 13045, Protection of Children from Environmental

Health Risks and Safety Risks

This EO ensures that all Federal actions address the unique vulnerabilities of children.In accordance with this EO, the USACE has determined that no children would bear a disproportionately high share of adverse environmental consequences resulting from the proposed work. The Recommended Plan is in full compliance with this EO.

Migratory Bird Treaty Act; Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

This Act makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations. No take permits would be required, and the Recommended Plan is in full compliance with the Migratory Bird Treaty Act.

8 COORDINATION

The NEPA regulations issued by CEQ provide for a scoping process to identify the scope and significance of environmental issues associated with a proposed project. The process identifies issues important to the stakeholder community which includes the general public and federal and state resource agencies. The NEPA scoping process was initiated on Saturday April 11, 2020 with the publication of a legal notice in the Daily Press requesting public scoping comments and concluded on May 11, 2020. A public scoping notice was made available on the project website: www.nao.usace.army.mil/About/Projects/JamesRiverNewportNewsShoreline/. For copies of all scoping-related materials, please see Appendix A-5.

The draft Integrated Feasibility Report/EA was release for public and agency comment on November 6, 2020 for a 30-day review period. The draft report was available for download from the project website. A legal notice announcing the release of the draft Integrated Feasibility Report/EA was published in the Daily Press on Saturday, November 7, 2020. Additionally, certified letters were mailed to residents adjacent to the project site along River Road. A virtual public meeting was held on November 19, 2020 and was attended by several of the residents along River Road adjacent to the project site.

8.1 PUBLIC VIEWS AND RESPONSES

Only one email inquiry was received from the general public as a result of the scoping process. The inquiry related to potential viewshed impacts as a result of the proposed project and also mentioned the intent to construct a private pier in the future within the study area. No additional concerns or issues were raised as a result of the public scoping process.

During the public comment period on the draft IFR/EA, one comment was received from the general public. The comment and response are provided in Appendix A-4.

8.2 AGENCY RESPONSES

Agency scoping comments received during the scoping period identified general information recommended for inclusion in the draft Integrated Feasibility Report/Environmental Assessment. Agency scoping comments are provided in Appendix A-5. Consultation documentation with other federal and state resource agencies is also located in Appendix A.

Agency and Tribal coordination comments received during the public comment period on the draft IFR/EA are included along with responses in Appendix A-4.

9 PLAN IMPLEMENTATION REQUIREMENTS

Completion of this report by the Norfolk District must occur before the project can be constructed. The report must go out for public review for 30 days, and the North Atlantic Division Commander must approve the report. After approval, the feasibility phase ends, and the project moves to the design and implementation phase. Steps in this phase include:

1. Execution of a Project Partnership Agreement (PPA) – The City of Newport News must declare their intent in a letter (see Appendix D) to enter into a PPA for the design and construction of the project. This letter must state they are willing and have the authority to sign a PPA. The PPA defines the obligations ofthe federal government and the sponsor in the construction, maintenance, and cost sharing of the project.
2. Preparation of the plans and specifications and land acquisition – the Corps must complete plans and specifications for project construction, and project lands, easements, right-of-way, access routes, relocations, and disposal areas must be acquired by sponsor, and right-of-entry must be provided to the Corps.
3. Permits for Clean Water Act Section 404 and 401 and National Environmental Policy Act (NEPA) compliance must be obtained.
4. Construction contracts must be advertised and awarded; and
5. Project construction begins.

With respect to cost apportionment, the non-federal sponsor is responsible for a minimum of 35 percent of the total project costs to maximum of 50 percent during the design and implementation phase. In accordance with terms of the PPA, the non-federal sponsor must pay at least 5 percent of the total project costs in cash and provide all lands, easements, right-of-way, relocations, and disposal areas (LERRDs). The City of Newport News is eligible to receive full credit for the value of LERRD because the City of Newport News and private property owners share ownership of the land required for the project implementation. These LERRD requirements that are not owned by the City of Newport News must be obtained from the private property owners and provided by the City to construct the project. If the value of the non-federal sponsor's contribution is less than 35 percent of the total project costs, the non-federal sponsor must pay additional cash contribution so that its total contribution equals 35 percent of the total project costs. The federal project limit for CAP Section 14 is $5,000,000. Any costs above the federal expenditure limit cannot be cost shared and would be 100 percent non-federal cost. The total project cost of Alternative 1 is $3,748,000, of which $1,311,800 is the sponsor's share. The Sponsor's 5 percent cash contribution would be $187,400 (Table 9-1).

Table 9-1. Summary of Federal and Non-Federal Total Project Cost for Recommended Plan.

Feature	Federal Cost	Non-Federal Cost	Total Cost
LERRD	681,000*	0*	681,000*
Design & Implementation		0	
Construction Contract	2,293,000	0	2,293,000
Engineering & Design	371,000	0	371,000
Construction Management	403,000	0	403,000
Totals	**3,748,000**	**0**	**3,748,000**
Cash Contribution (5%)	0	187,400	187,400
Add'l Contribution (30%)	0	1,124,400	1,124,400
Cost Share Percentage	**65%**	**35%**	**100%**
Final Cost Allocation	**2,436,000**	**1,312,000**	**3,748,000**

1. *Any LERRDs crediting for any administrative costs will be updated during Design and Implementation and included in the PPA; and
2. Costs were determined using October 2021 price levels.

Operations and Maintenance (O&M) costs are not included in the cost share. The non-federal Sponsor is responsible for 100% of the O&M costs, per ER 1105-2-100 Appendix G Section III F-23.

9.1 FEDERAL RESPONSIBILITIES

The USACE would be responsible for plans and specification as well as constructing the bank stabilization project. The sponsor would be responsible for right of way and easements and disposal lands. Project construction is contingent upon the sponsor and the USACE executing a PPA.

9.2 NON-FEDERAL RESPOSIBILITIES

Prior to implementation, the non-federal sponsor must:

1. Provide without cost to the United States all lands, easements, right-of-way, access routes, relocations, and disposal areas necessary for project construction;
2. In accordance with the Water Resources Development Act of 1986 (PL 99-662), provide a cash contribution equal to at least 5 percent of the total cost (see Table 9-1);
3. Provide additional cash contribution such that the total non-Federal share is equal to 35 percent of the project total cost (see Table 9-1);
4. Hold and save the Unites States free from damages caused by the construction, operation, and maintenance of the project, excepting damages due to the fault or negligence of the United States or its contractors;

5. Maintain and operate the project after completion without cost to the United States;
6. Assume full responsibility for all project costs in excess of the Federal cost limitation of $5,000,000; and
7. Execute a Project Partnership Agreement incorporating all required measures of local operation.

9.3 VIEW OF NON-FEDERAL SPONSOR, LETTER OF SUPPORT

Appendix D contains the City of Newport News's Letter of Support, Dated May 5, 2021, Explaining their support for the Recommended Plan. Appendix D also contains the City of Newport News Self Certification of financial capabilities for the decision document, stating their willingness and their ability to cost share in implementing the project.

10 LIST OF PREPARERS

1. Ian Swisher, PMP, Project Manager/Plan Formulator, Planning Branch, Planning Resources Section, U.S. Army Corps of Engineers, Norfolk District
2. Richard Harr, PWS, CES, Project Manager/Plan Formulator, Planning Branch, PlanningResources Section, U.S. Army Corps of Engineers, Norfolk District
3. Paul Moye, P.E., Engineer, Planning Branch, Flood Plain Management Section, U.S. Army Corps of Engineers, Norfolk District
4. Candice Miranda, E.I.T. Engineer, Engineering Branch, Hydraulics and Hydrology, U.S. Army Corps of Engineers, Norfolk District
5. Kyle McElroy, P.E. Engineer, Engineering Branch, Hydraulics and Hydrology, U.S. Army Corps of Engineers, Norfolk District
6. John Haynes, Archeologist, Planning Branch, Environmental Analysis Section, U.S. Army Corps of Engineers, Norfolk District
7. Laura Frank, Economist, Planning Branch, Planning Resources Section, U.S. Army Corps of Engineers, Norfolk District
8. Justine Woodward, Biologist, Planning Branch, Environmental Analysis Section, U.S. Army Corps of Engineers, Norfolk District
9. Miranda Ryan, GIS Specialist, Operations Branch, GIS Section, U.S. Army Corps of Engineers, Norfolk District
10. Keith Butler, Engineer, Engineering Branch, Cost Engineering Section, U.S. Army Corps of Engineers, Norfolk District
11. Jennifer Spitz, EIT, Engineer, Engineering Branch, Geo-Environmental Section, U.S. Army Corps of Engineers, Norfolk District
12. Jack Wall, P.E., Engineering Branch, Civil Engineering Section, U.S. Army Corps of Engineers, Norfolk District
13. Alicia Barrette, Real Estate Branch, U.S. Army Corps of Engineers, Norfolk District
14. Mark Higgins, Office of Counsel, U.S. Army Corps of Engineers, Norfolk District
15. Mark Haviland, Public Affairs Office, U.S. Army Corps of Engineers, Norfolk District

11 LIST OF AGENCIES AND INDIVIDUALS CONTACTED

Agency Representative Names	Agencies/Governments
Christine Vaccaro, Brian Hopper, Dave O'Brien	NOAA Fisheries
Carrie Traver	Environmental Protection Agency
Troy Andersen, Chris Guy, Amy O'Donnell	U.S. Fish and Wildlife Service
Caitlin Rogers	Catawba Indian Nation
Chief Gerald A. Steward	Chickahominy Tribe Eastern Division
Erin Thompson-Paden	Delaware Nation
Chief Samuel M. Bass	Nansemond Indian Nation
Terry Clouthier	Pamunkey Indian Tribe
Tyler Meader, Rene Hypes	Virginia Department of Conservation and Recreation - Division of Natural Heritage
Bettina Rayfield	Virginia Department of Environmental Quality
Samantha Henderson	Virginia Department of Historic Resources
Amy Ewing	Virginia Division of Wildlife Resources
Jeffery Madden	Virginia Marine Resources Commission
Individuals Contacted	**Individuals Contacted**
Katherine Long and Phyllis Miller	Dana Leaphart
Brent and Sharon Mathison	Ryan Sykes
Eric and Katherine Feldl	Donald and Sandra Britt
Christopher Ellis and Denise Gillman	Joy Tomlin
Ralph and Carole Robinson	John and Ann Pizzano
John Newell	Princeton Investors LLC
Vo Chinh and Thao Khau	

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13 RECOMMENDATION

An approximate 600-foot section of the riverbank along the James River is severely eroded by the combined effects of natural erosion processes; river flow, relative sea level rise, and tidal, storm, and wind driven wave action. The resulting 25-foot-high receding sandy bluff results in a continuing loss of land and is an imminent threat to existing public facilities and utilities, including River Road, electric, gas, communications, public water and sewer lines, as well as creating dangerous conditions associated with the steep eroding slope.

The Recommended Plan is the least cost option, Alternative 1 and involves a longitudinal rock sill running the length of the project area, earthen slope berm graded on a 1V:3H, 2900 tons of VDOT class III riprap, 800 tons of VDOT number 1 stone, 4300 cubic yards of fill, 1600 square yards of geotextile filter fabric, 35,000 square feet of seeding, and 700 cubic yards of debris removal. The project first cost of Alternative 1 is $3,481,000. The total estimated federal cost-shared 65% is $2,262,650 and the total estimated non-federal cost-shared 35% is $1,218,350.

The City of Newport News is willing and financially capable of cost sharing in the project construction. The Corps of Engineers finds that the Recommended Plan will have no significant adverse environmental impacts, and an Environmental Impact Statement according to the National Environmental Policy Act of 1969 (PL 91-190) is not required. Therefore, the Corps of Engineers recommends that the selected plan, as generally described in this report, be approved for implementation under the authority of Section 14 of the Flood Control Act of 1946, as amended.

Date: _____24 August 2021_

Brian P. Hallberg
2021.08.24 16:12:35
-04'00'

Brian P. Hallberg
Colonel, EN
Commanding

APPENDIX A
ENVIRONMENTAL APPENDIX

CONTINUING AUTHORITIES PROGRAM, SECTION 14

EMERGENCY STREAMBANK AND SHORELINE PROTECTION

JAMES RIVER SHORELINE, NEWPORT NEWS

FINAL INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

OCTOBER 2021

U.S. Army Corps
of Engineers
Norfolk District

APPENDIX A-1
ENDANGERED SPECIES ACT SECTION 7
CONSULTATION DOCUMENTATION U.S. FISH AND WILDLIFE SERVICE

CONTINUING AUTHORITIES PROGRAM, SECTION 14

EMERGENCY STREAMBANK AND SHORELINE PROTECTION

JAMES RIVER SHORELINE, NEWPORT NEWS

U.S. Army Corps
of Engineers
Norfolk District

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: August 21, 2020
Consultation Code: 05E2VA00-2020-TA-4462
Event Code: 05E2VA00-2020-E-15839
Project Name: James River Shoreline Stabilization Project

Subject: Verification letter for the 'James River Shoreline Stabilization Project' 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 Justine Woodward:

The U.S. Fish and Wildlife Service (Service) received on August 21, 2020 your effects determination for the 'James River Shoreline Stabilization Project' (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

James River Shoreline Stabilization Project

2. Description

The following description was provided for the project 'James River Shoreline Stabilization Project':

> The project site is situated in Newport News along the north bank of the James River west of the James River Bridge (US Routes 17/258) and between Newmarket Creek and North Avenue, immediately adjacent to River Road.
> An approximately 600-foot section of riverbank along the James River is severely eroded due the combined effects of natural erosion processes including tidal, storm, and wind driven wave action and stormwater runoff. The resulting 25-foot high receding sandy bluff is an imminent threat to existing public facilities, including River Road. The proposed shoreline stabilization project includes a rock sill, bank grading to achieve a slope of 3:1, and vegetative stabilization.

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/37.02047724642835N76.45842618955837W

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-eared 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. [Semantic] 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 and other sources of information on the locations of northern long-eared bat roost trees and hibernacula 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 project includes forest conversion, report the appropriate acreages 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 project includes timber harvest, report the appropriate acreages 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 project includes prescribed fire, report the appropriate acreages 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 project includes new wind turbines, report the megawatts of wind capacity below. Otherwise, type '0' in question 10.

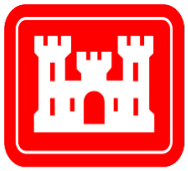
10. What is the estimated wind capacity (in megawatts) of the new turbine(s)?
0

APPENDIX A-2
ENDANGERED SPECIES ACT SECTION 7
CONSULTATION DOCUMENTATION NATIONAL MARINE
FISHERIES SERVICE

CONTINUING AUTHORITIES PROGRAM, SECTION 14

EMERGENCY STREAMBANK AND SHORELINE PROTECTION

JAMES RIVER SHORELINE, NEWPORT NEWS



U.S. Army Corps
of Engineers
Norfolk District

NOAA FISHERIES
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Greater Atlantic Region

US Army Corps of Engineers ®

GARFO ESA Section 7: NLAA Program Verification Form

(Please submit a signed version of this form, together with any project plans, maps, supporting analyses, etc., to nmfs.gar.esa.section7@noaa.gov with "**USACE NLAA Program: [Application Number]**" in the subject line)

Section 1: General Project Details

Application Number:	N/A
Reinitiation:	No
Applicant(s):	U.S. Army Corps of Engineers Norfolk District
Permit Type:	Civil Works/Federal Navigation
Anticipated project start date (e.g., 10/1/2020)	Construction would be expected to commence in 2021 month not known at this time.
Anticipated project end date (e.g., 12/31/2022 – if there is no permit expiration date, write "N/A")	Construction is anticipated to take several months.

Project Type/Category (check all that apply to entire action):

☐	Aquaculture (shellfish) and artificial reef creation	☐	Mitigation (fish/wildlife enhancement or restoration)
☐	Dredging and disposal/beach nourishment	☑	Bank stabilization
☐	Piers, ramps, floats, and other structures	☐	If other, describe project type category:

Town/City:	Newport News	Zip:	23601
State:	Virginia	Water body:	James River

Project/Action Description **and** Purpose (*include relevant permit conditions that are not captured elsewhere on form*):
The project site is situated in Newport News along the north bank of the James River west of the James River Bridge (US Routes 17/258) and between Newmarket Creek and North Avenue, immediately adjacent to River Road. An approximately 600-foot section of riverbank along the James River is severely eroded due the combined effects of natural erosion processes including tidal, storm, and wind driven wave action. The resulting 25-foot high receding bluff is an imminent threat to existing public facilities, including River Road. The Proposed Action seeks to stabilize the existing, eroding shoreline and includes the construction of a continuous rock sill parallel to the existing shoreline with a crest elevation of +5 ft NAVD88, crest width of 5 ft, and installing soil stabilization blankets from the top of the rock sill to the top of the shoreline bank on a 1V:3H slope to create a vegetated slope anticipated to be planted with native grasses. It is estimated that this alternative will require approximately 2900 tons of VDOT Class III riprap, 800 tons of VDOT No. 1 Stone, 4300 CY of fill, 1600 SY of geotextile filter fabric, 700 CY of existing debris removal, and 35,000 SF of soil stabilization blankets. There are no pile driving

Type of Bottom Habitat Modified:	Permanent/Temporary:	Area (acres):
Sand (saline)	Permanent	0.14
Select Type of Bottom Habitat	Select Permanent or Temporary	
Select Type of Bottom Habitat	Select Permanent or Temporary	

Project Latitude (e.g., 42.625884)	37.020210
Project Longitude (e.g., -70.646114)	-76.463240
Mean Low Water (MLW)(m)	-1.58
Mean High Water (MHW)(m)	1.04

Width (m) of water body in action area:	Stressor Category (stressor that extends furthest distance into water body – e.g., turbidity plume; sound pressure wave):	Max extent (m) of stressor into the water body:
7,600.00	turbidity plume	10.00

Section 2: ESA-listed species and/or critical habitat in the action area:

☑	Atlantic sturgeon (all DPSs)	☑	Kemp's ridley sea turtle
☑	Atlantic sturgeon critical habitat Indicate which DPS : Chesapeake Bay	☑	Loggerhead sea turtle (NW Atlantic DPS)
☑	Shortnose sturgeon	☑	Leatherback sea turtle
☐	Atlantic salmon (GOM DPS)	☐	North Atlantic right whale
☐	Atlantic salmon critical habitat (GOM DPS)	☐	North Atlantic right whale critical habitat
☑	Green sea turtle (N. Atlantic DPS)	☐	Fin whale

* Please consult GARFO PRD's ESA Section 7 Mapper for ESA-listed species and critical habitat information for your action area at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-species-critical-habitat-information-maps-greater.

Section 3: NLAA Determination (check all applicable fields):
If the Project Design Criteria (PDC) is met, select Yes. If the PDC is not applicable (N/A) for your project (e.g., the stressor category is not included for your project activity, or for PDC 2, your project does not occur within the range of the GOM DPS of Atlantic salmon), select N/A. If the PDC is applicable, but is not met, leave both boxes blank and provide a justification for that PDC in Section 4.

a) GENERAL PDC			
Yes	N/A	PDC #	PDC Description
☑	☐	1.	No portion of the proposed action will individually or cumulatively have an adverse effect on ESA-listed species or designated critical habitat.
☐	☑	2.	No portion of the proposed action will occur in the tidally influenced portion of rivers/streams where Atlantic salmon presence is possible from April 10–November 7. **Note**: If the project will occur within the geographic range of the GOM DPS Atlantic salmon but their presence is not expected following the best available commercial scientific data, the work window does not need to be applied (include reference in project description).
☐	☑	3.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as spawning grounds as follows: i. Gulf of Maine: April 1–Aug. 31 ii. Southern New England/New York Bight: Mar. 15–Aug. 31 iii. Chesapeake Bay: March 15–July 1 and Sept. 15–Nov. 1 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval (include reference in project description).
☐	☑	4.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as overwintering grounds, where dense aggregations are known to occur, as follows: i. Gulf of Maine: Oct. 15–April 30 ii. Southern New England/ New York Bight: Nov. 1–Mar. 15 iii. Chesapeake Bay: Nov. 1–Mar. 15 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval (include reference in project description).
☐	☑	5.	Within designated Atlantic salmon critical habitat, no portion of the proposed action will affect spawning and rearing areas (PBFs 1-7).
☑	☐	6.	Within designated Atlantic sturgeon critical habitat, no work will affect hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand) (PBF 1).

Yes	N/A	PDC #	PDC Description
☑	☐	7.	Work will result in no or only temporary/short-term changes in water temperature, water flow, salinity, or dissolved oxygen levels.
☐	☑	8.	If ESA-listed species are (a) likely to pass through the action area at the time of year when project activities occur; and/or (b) the project will create an obstruction to passage when in-water work is completed, then a zone of passage (~50% of water body) with appropriate habitat for ESA-listed species (e.g., depth, water velocity, etc.) must be maintained (i.e., physical or biological stressors such as turbidity and sound pressure must not create barrier to passage).
☐	☑	9.	Any work in designated North Atlantic right whale critical habitat must have no effect on the physical and biological features (PBFs).
☑	☐	10.	The project will not adversely impact any submerged aquatic vegetation (SAV).
☐	☑	11.	No blasting or use of explosives will occur.

b) The following stressors are applicable to the action (check all that apply – use Stressor Category Table for guidance):

☐	Sound Pressure
☐	Impingement/Entrapment/Capture
☑	Turbidity/Water Quality
☐	Entanglement (Aquaculture)
☑	Habitat Modification
☑	Vessel Traffic

	Stressor Category					
Activity Category	Sound Pressure	Impingement/ Entrapment/ Capture	Turbidity/ Water Quality	Entanglement	Habitat Mod.	Vessel Traffic
Aquaculture (shellfish) and artificial reef creation	N	N	Y	Y	Y	Y
Dredging and disposal/beach nourishment	N	Y	Y	N	Y	Y

	Stressor Category					
Activity Category	Sound Pressure	Impingement/ Entrapment/ Capture	Turbidity/ Water Quality	Entanglement	Habitat Mod.	Vessel Traffic
Piers, ramps, floats, and other structures	Y	N	Y	N	Y	Y
Transportation and development (e.g., culvert construction, bridge repair)	Y	N	Y	N	Y	Y
Mitigation (fish/wildlife enhancement or restoration)	N	N	Y	N	Y	Y
Bank stabilization and dam maintenance	Y	N	Y	N	Y	Y

c) SOUND PRESSURE PDC

Information for Pile Driving:
If your project includes non-timber piles*, please attach your calculation to this verification form showing that the noise is below the injury thresholds of ESA-listed species in the action area. The GARFO Acoustic Tool is available as one source, should you not have other information:

https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-consultation-technical-guidance-greater-atlantic

*Sound pressure effects from timber and steel sheet piles were analyzed in the NLAA programmatic consultation, so no additional acoustic information is necessary.

	Pile material	Pile diameter/width (inches)	Number of piles	Installation method
a)	Select pile material			Select installation method
b)	Select pile material			Select installation method
c)	Select pile material			Select installation method
d)	Select pile material			Select installation method

Yes	N/A	PDC #	PDC Description
☐	☑	12.	If pile driving is occurring during a time of year when ESA-listed species may be present, and the anticipated noise is above the behavioral noise threshold, a "soft start" is required to allow animals an opportunity to leave the project vicinity before sound pressure levels increase. *In addition to using a soft start at the beginning of the work day for pile driving, one must also be used at any time following cessation of pile driving for a period of 30 minutes or longer.* For impact pile driving: pile driving will commence with an initial set of three strikes by the hammer at 40% energy, followed by a one minute wait period, then two subsequent 3-strike sets at 40% energy, with one-minute waiting periods, before initiating continuous impact driving. For vibratory pile installation: pile driving will be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period will be repeated two additional times, followed immediately by pile-driving at full rate and energy.
☐	☑	13.	Any new pile supported structure must involve the installation of ≤ 50 piles (below MHW).
☐	☑	14.	All underwater noise (pressure) is below (<) the physiological/injury noise threshold for ESA-species in the action area.

d) IMPINGEMENT/ENTRAINMENT/CAPTURE PDC

Information for Dredging/Disposal:			
Type of dredge:	Select type of dredge		
Maintenance dredging?:	Select Yes or No	If "Yes", how many acres?	
If maintenance, when was the last dredge cycle?			
New dredging:	Select Yes or No	If "Yes", how many acres?	
Estimated number of dredging events covered by permit:			
ESA-species exclusion measures required (e.g., cofferdam, turbidity curtain):	Select Yes or No		
If no exclusion measures required, explain why:	Select reason why no exclusion measures are required		
Information for Intake Structures:			
Mesh screen size (mm) for temporary intake:			

Yes	N/A	PDC #	PDC Description
☐	☑	15.	Only mechanical, cutterhead, and low volume hopper (e.g., CURRITUCK, ~300 cubic yard maximum bin capacity) dredges may be used.
☐	☑	16.	No new dredging in Atlantic sturgeon or Atlantic salmon critical habitat (maintenance dredging still must meet all other PDCs). New dredging outside Atlantic sturgeon or salmon critical habitat is limited to one time dredge events (e.g., burying a utility line) and minor (≤ 2 acres) expansions of areas already subject to maintenance dredging (e.g., marina/harbor expansion).
☐	☑	17.	Work behind cofferdams, turbidity curtains, or other methods to block access of animals to dredge footprint is required when operationally feasible or beneficial and ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, exclusion methods are not necessary).
☐	☑	18.	Temporary intakes related to construction must be equipped with appropriate sized mesh screening (as determined by GARFO section 7 biologist and/or according to Chapter 11 of the NOAA Fisheries Anadromous Salmonid Passage Facility Design) and must not have greater than 0.5 fps intake velocities, to prevent impingement or entrainment of any ESA-listed species life stage.
☐	☑	19.	No new permanent intake structures related to cooling water, or any other inflow at facilities (e.g. water treatment plants, power plants, etc.).

e) TURBIDITY/WATER QUALITY PDC

Information for Turbidity Producing Activity (excluding disposal):	
ESA-species turbidity control measures required (e.g., turbidity curtain):	Yes
If no turbidity control measures required, explain why:	Select reason why no turbidity control measures are required
Information for Dredged Material Disposal:	
Disposal site:	Select disposal site
Estimated number of trips to disposal site:	
Relevant disposal site permit/special conditions required (NAE: for offshore disposal, include Group A, B, C, or relevant Long Island Sound consultation):	

Yes	N/A	PDC #	PDC Description
☑	☐	20.	Work behind cofferdams, turbidity curtains, or other methods to control turbidity is required when operationally feasible or beneficial and ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, turbidity control methods are not necessary).
☐	☑	21.	In-water offshore disposal may only occur at designated disposal sites that have been the subject of ESA section 7 consultation with NMFS, where a valid consultation is in place and appropriate permit/special conditions are included.

Yes	N/A	PDC #	PDC Description
☐	☑	22.	Any temporary discharges must meet state water quality standards (e.g., no discharges of substances in concentrations that may cause acute or chronic adverse reactions, as defined by EPA water quality standards criteria).
☐	☑	23.	Only repair, upgrades, relocations and improvements of existing discharge pipes or replacement in-kind are allowed; no new construction of untreated discharges.
	f) ENTANGLEMENT PDC		

Information for Aquaculture Projects:

Approximate distance from shore (MHW)(m):	
Grow season begins (approximate):	
Grow season ends (approximate):	
Total number of vertical lines:	
Total number of horizontal lines:	
Is any gear seasonally removed from the water? If yes, which parts and when?	

	Aquaculture Gear	Acreage (total permit footprint)	Type of Shellfish Cultivated
a)	Select aquaculture gear		Select type of shellfish cultivated
b)	Select aquaculture gear		Select type of shellfish cultivated
c)	Select aquaculture gear		Select type of shellfish cultivated

Yes	N/A	PDC #	PDC Description
☐	☑	24.	Shell on bottom <50 acres with maximum of 4 corner marker buoys;
☐	☑	25.	Cage on bottom with no loose floating lines <5 acres and minimal vertical lines (1 per string of cages, 4 corner marker buoys);
☐	☑	26.	Floating cages in <3 acres in waters and shallower than -10 feet MLLW with no loose lines and minimal vertical lines (1 per string of cages, 4 corner marker buoys);
☐	☑	27.	Floating upweller docks in >10 feet MLLW.
☐	☑	28.	Any in-water lines, ropes, or chains must be made of materials and installed in a manner to minimize or avoid the risk of entanglement by using thick, heavy, and taut lines that do not loop or entangle. Lines can be enclosed in a rigid sleeve.
	g) HABITAT MODIFICATION PDC		
Yes	N/A	PDC #	PDC Description
☐	☑	29.	No conversion of habitat type (soft bottom to hard, or vice versa) for aquaculture or reef creation.

	h) VESSEL TRAFFIC PDC

Information for Vessel Traffic:

	Temporary Project Vessel Type	Number of Vessels
a)	Work barge	1
b)	Select temporary vessel type	
c)	Select temporary vessel type	
	Type of Non-Commercial or Aquaculture Vessels Added *– only include if there is a net increase directly/indirectly resulting from project*)	Number of Vessels (*if sum > 2, PDC 33 is not met and justification required in Section 4*)
a)	Select type of non-commercial or aquaculture vessels	
b)	Select type of non-commercial or aquaculture vessels	
	Type of Commercial Vessels Added (*only include if there is a net increase directly/indirectly resulting from project*)	Number of Vessels (*if > 0, PDC 33 is not met and justification required in Section 4*)
a)		
b)		

If no temporary/permanent vessel traffic, briefly explain (e.g., all land-based work, no net increase in vessel traffic)	At this time, it is unknown if construction will occur from the water or land due to the existing site constraints. However, it is anticipated that if construction occurs from the water, a work barge with crane-mounted excavators would be expected to be used.

Yes	N/A	PDC #	PDC Description
☐	☑	30.	Maintain project vessels operating within the action area to speed limits below 10 knots and dredge vessel speeds of 4 knots maximum, while dredging.
☐	☑	31.	Maintain a 1,500-foot buffer between project vessels and ESA-listed whales and a 150-foot buffer between project vessels and sea turtles unless the vessel is navigating to an in-water disposal site/activity. If the vessel is navigating to an in-water disposal site/activity, refer to and include the conditions contained in the appropriate GARFO-USACE/EPA consultation for the disposal site.
☑	☐	32.	The number of project vessels must be limited to the greatest extent possible, as appropriate to size and scale of project.
☐	☑	33.	The permanent net increase in vessels resulting from a project (e.g., dock/float/pier/boating facility) must not exceed two non-commercial vessels. A project must not result in the permanent net increase of any commercial vessels (e.g., a ferry terminal).

Section 4: Justification for Review under the NLAA Program

If the action is not in compliance with all of the General PDC and appropriate stressor PDC, but you can provide justification and/or special conditions to demonstrate why the project still meets the NLAA determination and is consistent with the aggregate effects considered in the programmatic consultation, you may still certify your project through the NLAA program using

this verification form. Please identify which PDC your project does not meet (e.g., PDC 9, PDC 15, PDC 22, etc.) and provide your rationale and justification for why the project is still eligible for the verification form.

To demonstrate that the project is still NLAA, you must explain why the effects on ESA-listed species or critical habitat are **insignificant** (i.e., too small to be meaningfully measured or detected) or **discountable** (i.e., extremely unlikely to occur). **Please use this language in your justification.**

PDC#	Justification
PDC #	
PDC #	
PDC #	

PDC #	

Section 5: USACE Verification of Determination

☑	In accordance with the NLAA Program, USACE has determined that the action complies with all applicable PDC and is not likely to adversely affect listed species.
☐	In accordance with the NLAA Program, the USACE has determined that the action is not likely to adversely affect listed species per the justification and/or special conditions provided in Section 4.

USACE Signature:	Date:
	09/18/2020

Section 6: GARFO Concurrence

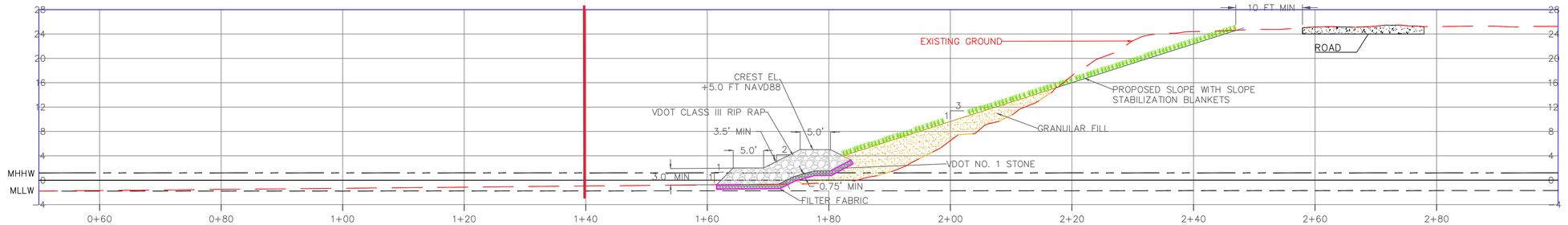
☑	In accordance with the NLAA Program, GARFO PRD concurs with USACE's determination that the action complies with all applicable PDC and is not likely to adversely affect listed species or critical habitat.
☐	In accordance with the NLAA Program, GARFO PRD concurs with USACE's determination that the action is not likely to adversely affect listed species or critical habitat per the justification and/or special conditions provided in Section 4.
☐	GARFO PRD does not concur with USACE's determination that the action complies with the applicable PDC (with or without justification), and recommends an individual Section 7 consultation to be completed independent from the NLAA Program.

GARFO Signature:	Date:
	09/21/2020

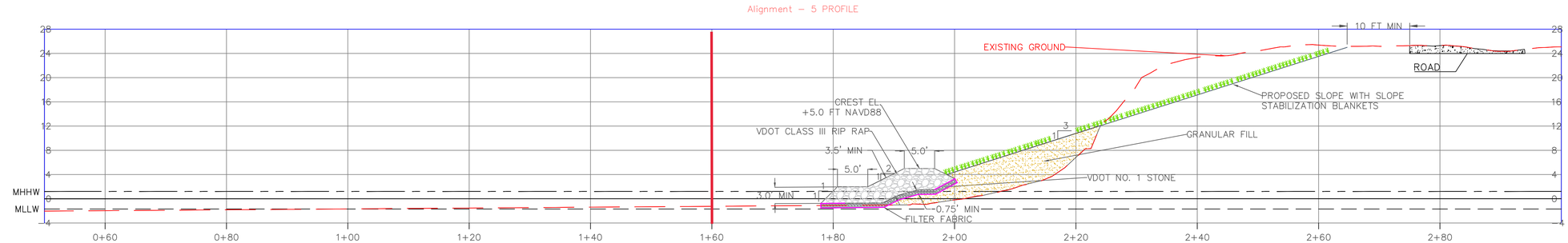
DATUM DIAGRAM
1983-2001 NTDE
(SCALE 1"=1')

PROJECT SITE LOCATION (LONGITUDE: -76.460853, LATITUDE: 37.023014) NAVD88 – NOS MLW DATUM DIFFERENCE DERIVED BY NOAA VDATUM MODEL.

Alignment – 2 PROFILE



Alignment – 5 PROFILE



US Army Corps of Engineers®

MARK	DESCRIPTION	DATE

DESIGNED BY: K. MCELROY
DRAWN BY: K. MCELROY
CHECKED BY:
ISSUE DATE: 28 JANUARY 2020
SOLICITATION NO.:
CONTRACT NO.:
NAO FILE NO.:
SUBMITTED BY:
SIZE: ANSI D

U.S. ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
803 FRONT STREET
NORLFOLK, VA 23510

CONTINUING AUTHORITIES PROGRAM (CAP)
JAMES RIVER SHORELINE STABILIZATION PROJECT

ALTERNATIVE 1

SHEET ID
C-002

10% DESIGN

Drawn Action Area & Overlapping S7 Consultation Areas

Area of Interest (AOI) Information

Area : 2,222.93 acres

Jun 22 2020 14:52:09 Eastern Daylight Time

Summary

Name	Count	Area(acres)	Length(mi)
Atlantic Sturgeon	3	3,153.83	N/A
Shortnose Sturgeon	1	1,051.28	N/A
Atlantic Salmon	0	0	N/A
Sea Turtles	4	4,205.11	N/A
Atlantic Large Whales	0	0	N/A
In or Near Critical Habitat	1	1,051.28	N/A

Atlantic Sturgeon

#	Feature ID	Species	Life Stage	Behavior	Zone	From	Until	From (2)	Until (2)	Area(acres)
1	ANS_JAM_SUB_MAF	Atlantic sturgeon	Subadult	Migrating & Foraging	James River	03/15	11/30	N/A	N/A	1,051.28
2	ANS_JAM_JUV_MAF	Atlantic sturgeon	Juvenile	Migrating & Foraging	James River	01/01	12/31	N/A	N/A	1,051.28
3	ANS_JAM_ADU_MAF	Atlantic sturgeon	Adult	Migrating & Foraging	James River	03/15	11/30	N/A	N/A	1,051.28

Shortnose Sturgeon

#	Feature ID	Species	Life Stage	Behavior	Zone	From	Until	From (2)	Until (2)	Area(acres)
1	SNS_JAM_ADU_MAF	Shortnose sturgeon	Adult	Migrating & Foraging	James River	03/01	11/30	N/A	N/A	1,051.28

Sea Turtles

#	Feature ID	Species	Life Stage	Behavior	Zone	From	Until	From (2)	Until (2)	Area(acres)
1	GRN_STS_AJV_MAF	Green sea turtle	Adults and juveniles	Migrating & Foraging	Massachusetts (S of Cape Cod) through Virginia	5/1	11/30	*No Data*	*No Data*	1,051.28
2	KMP_STS_AJV_MAF	Kemp's ridley sea turtle	Adults and juveniles	Migrating & Foraging	Massachusetts (S of Cape Cod) through Virginia	5/1	11/30	*No Data*	*No Data*	1,051.28
3	LTR_STS_AJV_MAF	Leatherback sea turtle	Adults and juveniles	Migrating & Foraging	Massachusetts (S of Cape Cod) through Virginia	5/1	11/30	*No Data*	*No Data*	1,051.28
4	LOG_STS_AJV_MAF	Loggerhead sea turtle	Adults and juveniles	Migrating & Foraging	Massachusetts (S of Cape Cod) through Virginia	5/1	11/30	*No Data*	*No Data*	1,051.28

In or Near Critical Habitat

#	Species	In or Near Critical Habitat Unit	Area(acres)
1	Atlantic Sturgeon	Chesapeake Bay Unit 5: James River	1,051.28

Drawn Action Area & Overlapping S7 Consultation Areas

Area of Interest (AOI) Information

Area : 2,222.93 acres

Jun 22 2020 14:52:09 Eastern Daylight Time

Summary

Name	Count	Area(acres)	Length(mi)
Atlantic Sturgeon	3	3,153.83	N/A
Shortnose Sturgeon	1	1,051.28	N/A
Atlantic Salmon	0	0	N/A
Sea Turtles	4	4,205.11	N/A
Atlantic Large Whales	0	0	N/A
In or Near Critical Habitat	1	1,051.28	N/A

Atlantic Sturgeon

#	Feature ID	Species	Life Stage	Behavior	Zone	From	Until	From (2)	Until (2)	Area(acres)
1	ANS_JAM_SUB_MAF	Atlantic sturgeon	Subadult	Migrating & Foraging	James River	03/15	11/30	N/A	N/A	1,051.28
2	ANS_JAM_JUV_MAF	Atlantic sturgeon	Juvenile	Migrating & Foraging	James River	01/01	12/31	N/A	N/A	1,051.28
3	ANS_JAM_ADU_MAF	Atlantic sturgeon	Adult	Migrating & Foraging	James River	03/15	11/30	N/A	N/A	1,051.28

Shortnose Sturgeon

#	Feature ID	Species	Life Stage	Behavior	Zone	From	Until	From (2)	Until (2)	Area(acres)
1	SNS_JAM_ADU_MAF	Shortnose sturgeon	Adult	Migrating & Foraging	James River	03/01	11/30	N/A	N/A	1,051.28

Sea Turtles

#	Feature ID	Species	Life Stage	Behavior	Zone	From	Until	From (2)	Until (2)	Area(acres)
1	GRN_STS_AJV_MAF	Green sea turtle	Adults and juveniles	Migrating & Foraging	Massachusetts (S of Cape Cod) through Virginia	5/1	11/30	*No Data*	*No Data*	1,051.28
2	KMP_STS_AJV_MAF	Kemp's ridley sea turtle	Adults and juveniles	Migrating & Foraging	Massachusetts (S of Cape Cod) through Virginia	5/1	11/30	*No Data*	*No Data*	1,051.28
3	LTR_STS_AJV_MAF	Leatherback sea turtle	Adults and juveniles	Migrating & Foraging	Massachusetts (S of Cape Cod) through Virginia	5/1	11/30	*No Data*	*No Data*	1,051.28
4	LOG_STS_AJV_MAF	Loggerhead sea turtle	Adults and juveniles	Migrating & Foraging	Massachusetts (S of Cape Cod) through Virginia	5/1	11/30	*No Data*	*No Data*	1,051.28

In or Near Critical Habitat

#	Species	In or Near Critical Habitat Unit	Area(acres)
1	Atlantic Sturgeon	Chesapeake Bay Unit 5: James River	1,051.28

APPENDIX A-3
CLEAN WATER ACT SECTION 404(B)(1) REPORT

CONTINUING AUTHORITIES PROGRAM, SECTION 14

EMERGENCY STREAMBANK AND SHORELINE PROTECTION

JAMES RIVER SHORELINE, NEWPORT NEWS

U.S. Army Corps
of Engineers
Norfolk District

Draft Evaluation of 404(b)(1) Guidelines

CONTINUING AUTHORITIES PROGRAM, SECTION 14
EMERGENCY STREAMBANK AND SHORELINE PROTECTION

JAMES RIVER SHORELINE, NEWPORT NEWS

August 21, 2020

1. Technical Evaluation Factors

a. Physical and Chemical Characteristics of the Aquatic Ecosystem (40 CFR §§ 230.20-230.25)(Subpart C)

	N/A	Not Significant	Significant
(1) Substrate impacts	☐	☒	☐
(2) Suspended particulates/turbidity impacts	☐	☒	☐
(3) Water Quality Control	☐	☒	☐
(4) Alteration of current patterns and water circulation	☒	☐	☐
(5) Alteration of normal water fluctuations/hydro-period	☒	☐	☐
(6) Alteration of salinity gradients	☒	☐	☐

The proposed shoreline stabilization project consists of the stabilization of approximately 600 linear feet of eroding riverbank along the James River in Newport News. The plan includes a longitudinal rock sill running the length of the project area at a height of 5-feet (NAVD88).

Specifications of the plan include the following:

1. Earthen sloped berm graded on a 1V:3H;
2. 2,900 tons of VDOT Class III riprap and 800 tons of VDOT No. 1 stone;
3. 4,300 cubic yards of fill;
4. 1,600 square yards of geotextile filter fabric;
5. 35,000 square feet of seeding;
6. 700 cubic yards of debris removal.

The rock sill would be constructed a maximum of approximately 10 feet channelward of mean low water. Project designs are currently at 10% for the feasibility study; therefore, the exact siting of the rock sill would be determined during the Preconstruction, Engineering, and Design Phase. Construction of the proposed rock sill would result in negligible to minor, temporary adverse impacts to water quality. Turbidity would

increase along with total suspended solids in the nearshore environment during construction; however, turbidity impacts would be minimized by the use of turbidity curtains if determined feasible given the existing, shallow water depths of the site. Additionally, the nearshore benthic environment is largely comprised of sand which would be expected to settle quickly from the water column following disturbance. Following construction completion, the existing water quality conditions would be expected to return to ambient conditions. Additionally, stabilization of the shoreline may slightly improve localized water quality by minimizing erosion and sedimentation impacts. Overall, water quality impacts would be less than significant with construction of the rock sill and vegetated slope.

b. Biological Characteristics of the Aquatic Ecosystem (40 CFR §§ 230.30-230.32) (Subpart D)

	N/A	Not Significant	Significant
(1) Effect on threatened/endangered species and their habitat	☐	☒	☐
(2) Effect on the aquatic food web	☐	☒	☐
(3) Effect on other wildlife (mammals, birds, reptiles, and amphibians)	☐	☒	☐

Pursuant to Section 7 of the Endangered Species Act (ESA) and Magnuson-Stevens Fishery Conservation and Management Act (MSA), coordination is underway with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) for the potential impacts that could occur directly and/or indirectly from the construction of the proposed rock sill and vegetated slope.

The project is also undergoing coordination with the USFWS and the Commonwealth of Virginia in accordance with the Fish and Wildlife Coordination Act (FWCA). Comments concerning the FWCA are anticipated to be received through the National Environmental Policy Act (NEPA) process from USFWS.

Informal consultation with the NMFS and USFWS is anticipated because of the potential minor, adverse effects to listed threatened and endangered species resulting from the proposed project. The analysis and findings for listing species and critical habitat are described in detail in the Special Status Species Section of the Integrated Feasibility Report and Environmental Assessment.

As described in the draft Integrated Feasibility Report and Environmental Assessment, potential impacts may affect but are not likely to adversely affect the following federally listed species: the northern long-eared bat (*Myotis septentrionalis*) under the jurisdiction of the USFWS, and the Atlantic sturgeon (*Acipenser oxyrinchus*), shortnose sturgeon (*Acipenser brevirostrum*), leatherback sea turtle (*Dermochelys coriacea*), Kemp's ridley sea turtle (*Lepidochelys kempii*), hawksbill sea turtle (*Eretmochelys imbricata*), and loggerhead sea turtle (*Caretta caretta*) under the jurisdiction of the NMFS.

Federal action agencies are required to consult with the NMFS if a proposed action may affect Essential Fish Habitat (EFH) pursuant to the MSA. Minor, adverse effects on EFH are being addressed through coordination with the NMFS. Impacts to fishery resources and Essential Fish Habitat would be less than significant as a result of the construction of a rock sill and vegetated slope. The EFH Assessment in the Environmental Appendix describes species with EFH in the vicinity of the project site and evaluates the impacts to Essential Fish Habitat for designated species.

c. Special Aquatic Site (40 CFR §§ 230.40-230.45) (Subpart E)

	N/A	Not Significant	Significant
(1) Sanctuaries and refuges	☒	☐	☐
(2) Wetlands	☒	☐	☐
(3) Mud flats	☒	☐	☐
(4) Vegetated shallows	☒	☐	☐
(5) Coral reefs	☒	☐	☐
(6) Riffle and pool complexes	☒	☐	☐

There are no tidal, vegetated wetlands onsite; therefore, there would be no anticipated impacts to tidal, vegetated wetlands resulting from construction of the rock sill and vegetated slope. Nearshore sediments consist of sand; therefore there are no mudflats in the vicinity of the project site. Additionally, there would be no impacts to submerged aquatic vegetation due to its absence from the project site.

d. Human Use Characteristics (40 CFR §§ 230.50-230.54) (Subpart F)

	N/A	Not Significant	Significant
(1) Effects on municipal and private water supplies	☒	☐	☐
(2) Recreational and Commercial fisheries impacts	☐	☒	☐
(3) Effects on water-related recreation	☐	☒	☐
(4) Aesthetic impacts	☐	☒	☐
(5) Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves	☒	☐	☐

Potential impacts to the following resources were examined: aesthetics, air quality, bathymetry, hydrology and tidal processes, climate change and greenhouse gas emissions, cultural resources, fishery resources and essential fish habitat, floodplains, geology, physiography, and topography, hazardous, toxic, and radioactive waste, noise and vibration, occupational health and safety, recreation, socioeconomics, special status species, vegetation, water quality, wildlife, and transportation. The anticipated impacts to these resources areas analyzed ranged from adverse to beneficial, temporary to permanent, and negligible to moderate. There are no major, adverse

impacts to any resource areas as a result of construction of the rock sill and vegetated slope. Accordingly, there are no significant resource impacts associated with implementation of the proposed shoreline stabilization project.

The proposed construction of a rock sill with a vegetation slope would result in beneficial, permanent minor effects to the aesthetic environment. Prior to construction, the project site would need to be cleared of all trees and roots, stumps, and vegetation. Debris removal would be required within the project limits of the river bank slopes and up to approximately 40 feet offshore from the shoreline or as shown in the design drawings. The removal of the debris on the shoreline and the placement of the rock sill would improve the aesthetic environment. The proposed vegetated slope would be planted with native grasses and potentially other native vegetation (if determined necessary in the future) adjacent to River Road to abate stormwater runoff where feasible. Any vegetation, such as native grasses, that may be planted adjacent to River Road would be expected to be maintained by the City of Newport News Public Works Department.

During construction, there would be adverse, temporary, minor impacts to the aesthetic environment resulting from the use of construction equipment and a staging area that would be present along River Road and/or the use of marine equipment, such as a crane-mounted work barge, that would occupy the nearshore areas until the project is fully constructed. Overall, impacts to the aesthetic environment would be less than significant with the proposed construction of a rock sill and vegetated slope.

If site access by water is required for construction, temporary, minor impacts to recreational boating activities in the nearshore environment may occur. Small, recreational vessels would be expected to avoid the nearshore environment during construction.

There are existing privately-owned parcels within the project footprint that have the potential to be utilized for recreational purposes by property owners in the future for access to navigable waters. As such, the potential exists for minor to moderate, permanent adverse impacts to recreational that would be impacted by the proposed construction of a rock sill and vegetated slope. However, impacts to recreation would be less than significant.

2. Evaluation of Dredged or Fill Material (40 CFR § 230.60) (Subpart G)

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. (**Check only those appropriate**)
   ☒ (1) Physical characteristics
   ☒ (2) Hydrography in relation to known or anticipated sources of contaminants
   ☒ (3) Results from previous testing of the material in the vicinity of the project

☐ (4) Known, significant, sources of persistent pesticides from land runoff or percolation
☒ (5) Spill records for petroleum products or designated (Section 311 of CWA) hazardous substances
☒ (6) Other public records of significant introduction of contaminants from industries, municipalities or other sources
☐ (7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge/fill
☐ (8) Other sources (specify)

The existing conditions for hazardous, toxic, and radioactive waste and materials producers are discussed in the Draft Integrated Feasibility Report and Environmental Assessment. It is anticipated as a standard practice that only clean fill material demonstrating no potential for contaminants would be used as backfill to construct the 3:1 slope.

There are currently no Hazardous, Toxic, or Radioactive Waste (HTRW) producers adjacent to the potential project impact sites that discharge effluents near the project site.

There would be no anticipated releases of petroleum, hazardous, toxic, or radioactive waste associated with construction of the rock sill and vegetated slope. A potential for oil spills exists with vessel and construction equipment in the area, but accident and spill prevention plans included in the contract specifications would prevent most spills. The potential exists for negligible to minor, temporary adverse impacts if a spill occurred, however, adherence to the accident and spill prevention plan would mitigate these risks. Additionally, the construction contract would include requirements to properly manage, store, and dispose of all fuels and materials generated by or used for the project. In summary, impacts associated with hazardous, toxic, and radioactive waste would be less than significant.

b. An evaluation of the appropriate information in 2a above indicated that there is reason to believe the proposed dredged or fill material is <u>not</u> a carrier of contaminants, of that levels of contaminants are substantively similar at extraction and disposal sites and <u>not</u> likely to exceed constraints. The material meets the testing exclusion criteria.

YES ☒ NO ☐

<u>3. Disposal Site Delineation (40 CFR § 230.11(f))</u>

a. The following factors, as appropriate, have been considered in evaluating the disposal site.

☐ (1) Depth of water at disposal site
☐ (2) Current velocity, direction, and variability at disposal site
☐ (3) Degree of turbulence
☐ (4) Water volume stratification
☐ (5) Discharge vessel or fill speed and direction
☐ (6) Rate of discharge/fill
☐ (7) Dredged material characteristics (constituents, amount, and type of material, settling velocities)
☐ (8) Number of discharges/fill per unit of time
☐ (9) Other factors affecting rates and patterns of mixing (specify)

There are no dredging operations associated with this project. It is anticipated that all disposal of material, including the removal of existing debris currently on the shoreline, would be disposed of at a certified, upland disposal facility. A Clean Water Act Section 401 water quality certification is required from the Commonwealth of Virginia for this project. Any and all applicable authorizations will be coordinated and obtained prior to the start of construction.

b. An evaluation of the appropriate factors in 4a above indicates that the disposal site and/or size of mixing zone are acceptable.

YES ☒ NO ☐

4. Actions to Minimize Adverse Effects (40 CFR §§ 230.70-230.77)(Subpart H)

All appropriate and practicable steps have been taken, through application of recommendation of Section 230.70-230.77 to ensure minimal adverse effects of the proposed discharge/fill.

YES ☒ NO ☐

It is anticipated that the impacts would not be significant and would be avoided or minimized to the maximum extent practicable. Best management practices would be employed to ensure minimal adverse effects associated with the construction of the rock sill and vegetated slope.

5. Factual Determination (40 CFR § 230.11)

A review of appropriate information as identified in items 2-5 above indicates that there is minimal potential for short or long-term environmental effects of the proposed discharge/fill as related to:

☒ a. Physical substrate at the disposal site (review sections 2a, 3, 4, & 5)
☒ b. Water circulation, fluctuation & salinity (review sections 2a 3, 4, & 5)
☒ c. Suspended particulates/turbidity (review sections 2a, 3, 4, & 5)

☒ d. Contaminant availability (review sections 2a, 3, & 4)
☒ e. Aquatic ecosystem structure and function (review sections 2b, c; 3, & 5)
☒ f. Disposal site (review sections 2, 4, & 5)
☒ g. Cumulative impact on the aquatic ecosystem
☒ h. Secondary impacts on the aquatic ecosystem

Potential impacts to environmental resources are described in the Draft Integrated Feasibility Report and Environmental Assessment. The anticipated direct or indirect and cumulative impacts based on available existing data range from adverse to beneficial, temporary to permanent, and negligible to minor or moderate. There is minimal potential for short or long-term environmental effects or cumulative and/or secondary impacts associated with construction of the proposed shoreline stabilization project.

6. Review of Compliance (40 CFR § 230.10(a)-(d) (Subpart B)

A review of the Draft Integrated Feasibility Report and Environmental Assessment indicates that:

a. The discharge/fill represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge/fill must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose (if no, see section 2 and information gathered for EA alternative);
YES ☒ NO ☐

b. The activity does not appear to 1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of the CWA; 2) jeopardize the existence of Federally designated marine sanctuary (if no, see section 2b and check responses from resource and water quality certifying agencies; YES ☒ NO ☐

c. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values (if no, see section 2); YES ☒ NO ☐

d. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge/fill on the aquatic ecosystem (if no, see section 5);
YES ☒ NO ☐

The proposed construction of a rock sill and vegetated slope to stabilize the eroding shoreline is anticipated to be the preliminary least environmentally damaging practicable alternative (LEDPA). All appropriate and practicable steps would be employed to ensure minimal adverse effects of the proposed discharge/fill associated with construction of the stone sill to human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values. The project would be designed to not violate applicable state water quality standards or effluent standards prohibited under Section 307 of the CWA.

7. Findings

☒ a. The proposed disposal site for discharge of dredged or fill material complies with the Section 404 (b)(1) guidelines

☐ b. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines with the inclusion of the following conditions:

c. The proposed disposal site for discharge of dredged or fill material does not comply with the Section 404(b)(1) guidelines for the following reason(s):

☐ (1) There is a less damaging practicable alternative

☐ (2) The proposed discharge/fill will result in significant degradation of the aquatic ecosystem

☐ (3) The proposed discharge/fill does not include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem

U.S. Army Corps
Of Engineers
Norfolk District

Fort Norfolk, 803 Front Street
Norfolk, VA 23510-1011

CENAO-WRR
18-RP-19

REGIONAL PERMIT

Effective Date: September 5, 2018 **Expiration Date: September 5, 2023**

I. AUTHORIZED ACTIVITIES:

18-RP-19, Regional Permit 19 (RP), authorizes living shorelines, riprap revetments, bulkheads, breakwaters, groins, jetties, spurs, baffles, aquaculture activities and boat ramps. A living shoreline is defined as a shoreline management practice that provides erosion control and water quality benefits; protects, restores, or enhances natural shoreline habitat; and maintains coastal processes through the strategic placement of plants, stone, sand fill, and other structural and organic materials. The Norfolk District encourages the use of living shorelines as the preferred alternative for stabilizing tidal shorelines where viable.

18-RP-19 authorizes the following activities, subject to the conditions, limitations, and descriptions set out further herein:

1. Living Shoreline Group 1: Non-structural activities that provide substrate necessary to support wetland vegetation and/or beach nourishment.
2. Living Shoreline Group 2: Sill structures with tidal marsh and/or associated sandy fill material.
3. Low breakwaters and associated sandy fill material.
4. Bulkheads, riprap, and associated backfill and/or excavation, including bulkhead repair and/or replacement.
5. Groins, jetties, spurs and/or baffles and associated sandy fill material.
6. Aquaculture or mariculture activities.
7. Boat ramps and accessory structures, including any fill or excavation for installation.

II. AUTHORITIES:

For projects located within the Commonwealth of Virginia, project proponents are hereby authorized by the Secretary of the Army and the Chief of Engineers pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. § 403) and Section 404 of the Clean Water Act (33 U.S.C. § 1344) to perform the aforementioned work in all waters of the U.S. pursuant to the terms and conditions herein.

Activities receiving written authorization under this RP do not require further authorization under the provisions contained in 33 CFR Part 325 unless the District Engineer determines, on a case-by-case basis, that additional review is in the public interest. All work undertaken outside the following conditions, terms, and limitations will require separate Department of the Army authorization.

III. STATE AND LOCAL APPROVALS:

1. Prospective permittees may be required to obtain additional State and/or Local approvals prior to commencement of work in waters of the U.S. from the Virginia Department of Environmental Quality (DEQ), the Virginia Marine Resources Commission (VMRC) and/or the Local Wetlands Board (LWB). You may contact the DEQ at (804) 698-4000, the VMRC at (757) 247-2200, and/or your local government office for further information concerning their permit requirements.

2. The State Water Control Board provided conditional §401 Water Quality Certification for the 18-RP-19. As such, the activities that qualify for this RP meet the requirements of Department of Environmental Quality's (DEQ) Virginia Water Protection Permit Regulation, provided that the permittee abides by the §401 Water Quality Certification condition, below, and all of the terms and conditions of 18-RP-19.

   §401 Water Quality Certification Conditions:

   In non-tidal surface waters of Virginia, for activities listed in #3 (low breakwaters and associated sandy fill material), #4 (bulkheads, riprap, and associated backfill and/or excavation, including bulkhead repair and/or replacement) and #5 (groins, jetties, spurs and/or baffles and associated sandy fill material) the following conditions apply:

   a) Stabilization activities shall not be placed for the purpose of a stream diversion.
   b) Stabilization activities shall not permanently impact more than 1,500 linear feet of any type of non-tidal stream bed.
   c) For maintenance of bulkhead structures, the discharge shall not increase the capacity of an impoundment or reduce the quantity of instream flows downstream.
   d) Any compensatory mitigation shall meet the requirements in the Code of Virginia, Section 62. 1-44. 15:23 A through C, except in the absence of same river watershed alternatives in Hydrologic Unit Codes (HUC) 02040303 and 02040304, single family dwellings or locality projects may use compensatory mitigation in HUC 02080102, 02080108, 02080110, or 02080111 in Virginia.

   For activities listed in #6 (aquaculture or mariculture activities) the following conditions apply:

a) The activity shall comply with the conditions of any Virginia Pollutant Discharge Elimination System (VPDES) permit issued for the facility.
b) The associated activities shall not include a surface water withdrawal or diversion unless otherwise excluded from surface water withdrawal permitting per 9VAC-25-210-310.
c) Any compensatory mitigation shall meet the requirements in the Code of Virginia, Section 62. 1-44. 15:23 A through C, except in the absence of same river watershed alternatives in Hydrologic Unit Codes (HUC) 02040303 and 02040304, single family dwellings or locality projects may use compensatory mitigation in HUC 02080102, 02080108, 02080110, or 02080111 in Virginia.

In non-tidal surface waters of Virginia, for activities listed in #7 (boat ramps and accessory structures, included any fill or excavation for installation) the following conditions apply:

Construction of boat ramps in non-tidal waters that do not meet the following criteria require application to DEQ for consideration of a VWP permit:
(a) The discharge into surface waters is 50 cubic yards or less of concrete, rock, crushed stone or gravel into forms, or in the form of pre-cast concrete planks or slaps, unless waived in writing by the Corps district engineer because the discharge will result in no more than minimal adverse environmental effects;
(b) The boat ramp is 20 feet or less in width, unless waived in writing by the Corps district engineer because the discharge will result in no more than minimal adverse environmental effects;
(c) The base material is crushed stone, gravel or other suitable material;
(d) The excavation is limited to the area necessary for site preparation and all excavated material is removed to an area that has no surface waters;
(e) No material is placed in special aquatic sites, including wetlands.

In tidal waters of Virginia, for activities listed in #3, #4, #5, and #7, the project proponent must obtain any applicable, required permits issued by the Virginia Marine Resources Commission.

3. Those activities on the Potomac River extending channelward of the mean low water line may require authorization by the Virginia Marine Resources Commission (VMRC) and/or the Maryland Department of Natural Resources.

4. Authorization may also be needed from the Tennessee Valley Authority for projects constructed on the Clinch and Holston Rivers.

5. Pursuant to the Coastal Zone Management Act (CZMA) of 1972, the Virginia Department of the Environmental Quality, Virginia Coastal Zone Management Program completed its review of the Federal Consistency Determination and issued its conditional concurrence on August 16, 2018. Specifically, DEQ

concurs that the RPs and General Conditions are consistent to the maximum extent practicable with the Virginia CZM Program provided that the following conditions are satisfied:

a) Prior to construction, applicants shall obtain all required permits and approvals for the activities to be performed that are applicable to the enforceable policies and that applicants adhere to all conditions contained therein.
b) The activities that qualify for the RPs meet the requirements of DEQ's Virginia Water Protection Permit Regulation and the permittee abides by the conditions of the RP as certified under Section 401 of the Clean Water Act.

6. Permittees should ensure that their projects are designed and constructed in a manner consistent with all State and Local requirements pursuant to the Chesapeake Bay Preservation Act (CBPA) and the Chesapeake Bay Preservation Area Designation and Management Regulations.

7. Authorizations under this RP do not supersede State or Local government authority or responsibilities pursuant to the Chesapeake Bay Preservation Act, the Virginia Tidal Wetlands Act, or to any State or Local laws or regulations.

IV. PROCEDURES:

1. Prospective permittees must submit a pre-construction notification (PCN) in accordance with the procedures outlined below and must receive written authorization from the Corps before any work may begin. This RP shall not be interpreted as authorizing any work other than which is outlined above and which strictly meet all terms and conditions set out herein. All work undertaken that does not strictly comply with the following terms, conditions, standards and limitations will require separate Department of the Army authorization.

2. Within Virginia, the U.S. Army Corps of Engineers, Norfolk District encourages perspective permittees to utilize the Joint Permit Application (JPA) as the pre-construction notification. The JPA is also used to apply for corresponding permits from the Virginia Marine Resources Commission, the Virginia Department of Environmental Quality, and/or Local Wetlands Boards. The JPA process and JPA forms are used by the Corps, the VMRC, the DEQ, and the LWB for permitting purposes involving tidal and/or non-tidal water, tidal and/or non-tidal wetlands, and/or dune/beach resources, including, but not limited to, construction, dredging, filling, or excavation. Read the directions on the application carefully to determine how many copies must be submitted to the VMRC, who acts as the clearinghouse for permit applications. Prospective permittees may obtain paper copies of the Joint Permit Applications by calling the Corps at 757-201-7652, or by downloading and using one of the two versions of the JPA on the Norfolk District Regulatory Webpage: http://www.nao.usace.army.mil/Missions/Regulatory/JPA.aspx

V. PERMIT SPECIFIC CONDITIONS:

ACTIVITIES DO NOT QUALIFY FOR THIS RP UNLESS THEY SATISFY ALL OF THE PERMIT SPECIFIC AND GENERAL CONDITIONS LISTED BELOW:

1. Living Shoreline Group 1: Non-structural activities that provide substrate necessary to support wetland vegetation and/or beach nourishment:

a. For the purpose of this RP, the Living Shoreline Group 1 activities are associated with existing tidal marsh improvements and/or new marsh creation, or beach nourishment projects that may include the placement of sand fill, coir logs, coir mats, woven containment bags, and/or native oyster shell.

b. This activity authorizes the placement of sandy fill material. The maximum fill area for sandy fill material within waters of the U.S. that can be authorized under this RP is one (1) acre.

c. The grain size of the source material used for fill must be quality beach sand that is the same size or larger than that of the native beach material and suitable for the proposed project. Excess silt/clay fraction and grain sizes slightly smaller than the former native sands will perform poorly. In most cases, sand material with no more than 10% passing a #100 sieve will be appropriate. All material will be obtained from either an upland source, a borrow pit, or dredge material approved by the Corps.

d. Coir logs, coir mats, woven containment bags and native oyster shell should be of sufficient weight, adequately anchored, or placed in a manner to prevent their being dislodged and carried away by wave action.

e. The total amount of vegetated wetlands which may be filled, graded, or excavated, in square feet, may not exceed the length of the activity along the shoreline in linear feet unless the District Engineer waives this criterion by making a written determination concluding that the project will result in minimal adverse effects. All impacts to sub-tidal, inter-tidal, and/or existing wetland vegetation may require a wetland vegetation planting plan and must result in no net loss of areal vegetated wetlands.

f. If the proposed project results in impacts to existing wetland vegetation, then a written monitoring report may be required at the end of the first full growing season following planting, and after the second year of establishment. The monitoring should be undertaken between June and September of each year and should include at a minimum: the project location, the Corps project number, representative photos of the site, and a brief statement on the success of the project.

g. As the design of a living shoreline project is site specific, it is suggested that you refer to the Virginia Institute of Marine Sciences Living Shoreline Design Guidelines for Shore Protection in Virginia's Estuarine Environments and other reference documents which can be found at: http://ccrm.vims.edu/livingshorelines/agencies/index.html.

h. The District Engineer will require an Individual Department of the Army permit for any project which he/she determines to have greater than minimal individual or cumulative impacts.

i. Projects which include placement of sandy fill material may result in creation of suitable habitat for various federally listed threatened or endangered species. If this occurs and the permittee seeks to either add to or replenish the area previously filled, the Corps will consult with the U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act to ensure work is not likely to adversely affect proposed or listed species or proposed or designated critical habitat. Specific requirements on the type of sand allowed for beach and dune work may be required.

2. Living Shoreline Group 2: Sill structures with tidal marsh and/or associated sandy fill material:

a. For the purpose of this RP, a sill is defined as a low structure constructed near shore and parallel to the shoreline for the purpose of building up an existing beach by trapping and retaining sand in the littoral zone. Because a sill acts like a natural bar, it is most effective when constructed at or near the mean low water line and low enough to allow wave overtopping.

b. Sills may be constructed of riprap, gabion baskets, or clean broken concrete free of metal and re-bar. Alternative materials may be considered for use during the permit review process. The materials should be of sufficient weight or adequately anchored to prevent their being dislodged and carried about by wave action. Asphalt and materials containing asphalt or other toxic substances shall not be used in the construction of sills.

c. Sills will be designed with at least one 5 foot window/gap per property and per 100 linear feet of sill unless waived by the District Engineer.

d. This activity authorizes the placement of sandy fill material landward of the sills provided the fill is for erosion control and/or wetland enhancement (and not solely for recreational activities). The maximum fill area for sandy fill material within waters of the U.S. that can be authorized under this RP is one (1) acre.

e. The grain size of the source material used for fill must be quality beach sand that is the same size or larger than that of the native beach material and suitable for the proposed project. Excess silt/clay fraction and grain sizes slightly smaller than the former native sands will perform poorly. In most

cases, sand material with no more than 10% passing a #100 sieve will be appropriate. All material will be obtained from either an upland source, a borrow pit, or dredge material approved by the Corps.

f. The sill height should be a maximum of +1 foot above mean high water and should be placed a distance no greater than 30 feet from mean low water to the landward side of the sill unless waived by the District Engineer.

g. The total amount of vegetated wetlands which may be filled, graded, or excavated, in square feet, may not exceed the length of the activity along the shoreline in linear feet unless the District Engineer waives this criterion by making a written determination concluding that the project will result in minimal adverse effects. All impacts to sub-tidal, inter-tidal and/or wetland vegetation may require a wetland vegetation planting plan and must result in no net loss of areal vegetated wetlands.

h. If the proposed project results in impacts to existing wetland vegetation, then a written monitoring report may be required at the end of the first full growing season following planting, and after the second year of establishment. The monitoring should be undertaken between June and September of each year and should include at a minimum: The project location, the Corps project number, representative photos of the site, and a brief statement on the success of the project

i. As the design of a living shoreline project is site specific, it is suggested that you refer to the Virginia Institute of Marine Sciences Living Shoreline Design Guidelines for Shore Protection in Virginia's Estuarine Environments and other reference documents which can be found at: http://ccrm.vims.edu/livingshorelines/agencies/index.html

j. The District Engineer will require an Individual Department of the Army permit for any project which he/she determines to have greater than minimal individual or cumulative impacts.

k. Projects which include placement of sandy fill material may result in creation of suitable habitat for various federally listed threatened or endangered species. If this occurs and the permittee seeks to either add to or replenish the area previously filled, the Corps, will consult with the Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act to ensure work is not likely to adversely affect proposed or listed species or proposed or designated critical habitat. Specific requirements on the type of sand allowed for beach and dune work may be required.

3. Low breakwaters and associated sandy fill material:

a. For the purpose of this RP, a breakwater is defined as a structure constructed parallel to and channelward of a shoreline for the purpose of reducing incoming wave energy.

b. This RP authorizes low breakwaters constructed close to shore for the purpose of erosion protection by reducing wave height and thereby reducing the erosive power of the waves reaching the shoreline. This permit does not include high breakwaters constructed farther offshore for the purpose of creating quiet water for the protection of a boat harbor.

c. Under this RP, a breakwater may be a single structure or a series of structures separated by gaps, but may not be connected to the upland or constructed in conjunction with other land attached structures, unless waived by the District Engineer. Such structures will require individual Department of the Army review.

d. Breakwaters may be constructed of quarry stone, gabion baskets, or clean broken concrete free of metal and re-bar. Alternative materials may be considered for use during the permit review process. However, as breakwaters are barriers to the forces of waves, they should be massive enough to resist the full power of the maximum expected wave energy. Asphalt and materials containing asphalt or other toxic substances shall not be used in the construction of breakwaters. As the design and location of breakwaters is site specific, it is suggested that the Virginia Institute of Marine Science be consulted for advice.

e. Authorization under this permit includes floating breakwaters (i.e. wave screens) which diffuse energy from the incoming waves as they pass through the device, thereby reducing wave energy reaching a shoreline or harbor. Floating breakwaters should be adequately anchored to prevent their being dislodged by wave action.

f. This activity authorizes the placement of sandy fill material landward of the breakwaters provided the fill is for erosion control (and not solely for recreational activities). Planting of vegetation to stabilize the nourishment area may be required by the Corps, where appropriate. The maximum fill area for sandy fill material within waters of the U.S. that can be authorized under this RP is one (1) acre.

g. The grain size of the source material used for fill must be quality beach sand that is the same size or larger than that of the native beach material and suitable for the proposed project. Excess silt/clay fraction and grain sizes slightly smaller than the former native sands will perform poorly. In most cases, sand material with no more than 10% passing a #100 sieve will be appropriate. All material will be obtained from either an upland source, a borrow pit, or dredge material approved by the Corps.

h. The total amount of vegetated wetlands which may be filled, graded, or excavated, in square feet, may not exceed the length of the activity along the shoreline in linear feet unless the District Engineer waives this criterion by making a written determination concluding that the project will result in

minimal adverse effects. All impacts must be offset by new plantings and result in no net loss of areal vegetated wetlands.

i. If the proposed project results in impacts to existing wetland vegetation, then a written monitoring report may be required at the end of the first full growing season following planting, and after the second year of establishment. The monitoring should be undertaken between June and September of each year and should include at a minimum: The project location, the Corps project number, representative photos of the site, and a brief statement on the success of the project.

j. The District Engineer will require an Individual Department of the Army permit for any project which he/she determines to have greater than minimal individual or cumulative impacts.

k. Projects which include placement of sandy fill material may result in creation of suitable habitat for various federally listed threatened or endangered species. If this occurs and the permittee seeks to either add to or replenish the area previously filled, the Corps, will consult with the Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act to ensure work is not likely to adversely affect proposed or listed species or proposed or designated critical habitat. Specific requirements on the type of sand allowed for beach and dune work may be required.

4. Bulkheads, riprap, and associated backfill and/or excavation, including bulkhead repair and/or replacement:

a. This RP authorizes the construction of bulkheads, riprap, and associated backfill and/or excavation, if such work is necessary to address and remediate an existing erosion problem.

b. The total amount of vegetated wetlands which may be filled, in square feet, may not exceed the length of the activity along the shoreline in linear feet unless the District Engineer waives this criterion by making a written determination concluding that the project will result in minimal adverse effects.

c. The structure and backfill must be placed as closely to the shoreline or existing structure as practicable. No material may be placed in excess of the minimum necessary for erosion protection.

d. Only clean, non-metallic, non-organic, non-floatable fill obtained from an approved source may be used as backfill material.

e. Any temporary fills must be removed in their entirety and the affected areas returned to their pre-existing elevation.

f. This RP also covers the repair, rehabilitation, or replacement of any previously authorized, currently serviceable bulkhead, or of any currently serviceable bulkhead authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Currently serviceable is defined as, "useable as is or with some maintenance, but not so degraded as to essentially require reconstruction." Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to make the repair, rehabilitation, or replacement are authorized. This RP also authorizes the replacement of a non-serviceable bulkhead up to two feet channelward of the existing deteriorating bulkhead. This authorization includes no limitation on length, nor does it exclude bulkheads which may result in the filling of wetland vegetation as long as there is an apparent existing erosion problem. As above, the total amount of vegetated wetlands which may be filled, in square feet, must not exceed the length of the activity along the shoreline in linear feet unless the District Engineer waives this criterion by making a written determination concluding that the project will result in minimal adverse effects. This total does not include wetlands that have formed landward due to the failure of the existing bulkhead because that portion of the work is considered maintenance and complies with the Corps Nationwide Permit Number 3. The Corps Nationwide Permits and Conditions can be found on our website at http://www.nao.usace.army.mil/Missions/Regulatory/Nationwide-Permit-Conditions/. The filling of wetlands behind free-standing bulkheads that have never been backfilled is prohibited as part of this permit, and may require an Individual Department of the Army Permit.

5. Groins, jetties, spurs and/or baffles and associated sandy fill material:

a. For this regional permit, groins are defined as structures constructed perpendicular (or nearly so) to a shoreline and extending seaward from the shoreline for the purpose of accreting sand. Groins may merely stop further erosion of a shoreline or they may actually build a sand beach by trapping sand moving in the near shore zone. A jetty is a structure constructed perpendicular to the shoreline with the primary purpose of stabilizing and/or protecting an inlet or harbor. Spurs and baffles are defined as short (less than 20 feet) structures constructed perpendicular to groins or jetties for the sole purpose of dampening diffracted wave energy. Groins and jetties may be constructed of quarry stone, gabion baskets, or clean broken concrete free of metal and re-bar. As the design and location of groins and jetties are site specific, it is suggested that the Virginia Institute of Marine Science be consulted for advice.

b. This activity may authorize the placement of sandy fill material landward of the groins provided the fill is for erosion control (and not solely for recreational activities). Planting of vegetation to stabilize the fill area may be

required by the Corps, where appropriate. The maximum fill area for sandy fill material within waters of the U.S. that can be authorized under this RP is one (1) acre.

c. The grain size of the source material used for fill must be quality beach sand that is the same size or larger than that of the native beach material and suitable for the proposed project. Excess silt/clay fraction and grain sizes slightly smaller than the former native sands will perform poorly. In most cases, sand material with no more than 10% passing a #100 sieve will be appropriate. All material will be obtained from either an upland source, a borrow pit, or dredge material approved by the Corps.

d. The total amount of vegetated wetlands which may be filled, graded, or excavated, in square feet, may not exceed the length of the activity along the shoreline in linear feet unless the District Engineer waives this criterion by making a written determination concluding that the project will result in minimal adverse effects.

e. If the proposed project results in impacts to existing wetland vegetation, then a written monitoring report may be required at the end of the first full growing season following planting, and after the second year of establishment. The monitoring should be undertaken between June and September of each year and should include at a minimum: The project location, the Corps project number, representative photos of the site, and a brief statement on the success of the project.

f. The District Engineer will require an Individual Department of the Army permit for any project which he/she determines to have greater than minimal individual or cumulative impacts.

g. Projects which include placement of sandy fill material may result in creation of suitable habitat for various federally listed threatened or endangered species. If this occurs and the permittee seeks to either add to or replenish the area previously filled, the Corps, will consult with the Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act to ensure work is not likely to adversely affect proposed or listed species or proposed or designated critical habitat. Specific requirements on the type of sand allowed for beach and dune work may be required.

6. Aquaculture or mariculture activities:

a. This authorization is limited to the bottom and suspended culturing and harvesting of bivalve mollusks in the intertidal and subaqueous areas of navigable waters. Activities covered include: deployment and maintenance of buoys, rafts, trays, oyster castles and other equipment associated with the activity, and work including temporary wet storage, and harvesting.

b. No aquaculture activity shall occur within beds of submerged aquatic vegetation or saltmarsh, nor shall such vegetation be damaged or removed unless the District Engineer waives this criterion by making a written determination concluding that the project will result in minimal adverse effects. Should an area become colonized by submerged aquatic vegetation or saltmarsh after an authorized aquaculture activity is installed, the activity shall be allowed to remain. However, no expansion into newly colonized areas is authorized by this regional permit. Information on the location of submerged aquatic vegetation can be found at: http://web.vims.edu/bio/sav/maps .

c. An aquaculture activity will not meet the terms for this RP if it will have more than minimal adverse effects on avian resources such as, but not limited to: shore birds, wading birds, or members of the waterfowl group. This includes nesting, feeding or resting activities by migratory birds identified at 50 CFR 10.13.

d. An aquaculture activity will not qualify for this RP if it will have more than minimal adverse effects on existing or naturally occurring beds or population of shellfish, marine worms or other invertebrates that could be used by man, other mammals, birds, reptiles, or predatory fish. Feeding and harvesting plans should be included in the PCN to evaluate impacts.

e. No aquaculture activity or vehicular access to the activity shall occur in such a way as to negatively impact coastal or wetland vegetation.

f. As-built drawings must be submitted with the certificate of compliance for all aquaculture projects.

g. The District Engineer will require an Individual Department of the Army permit for any project which he/she determines to have greater than minimal individual or cumulative impacts.

7. Boat ramps and accessory structures, including any fill or excavation for installation:

a. This activity covers all boat ramps (concrete or open-pile timber), whether private, public, commercial or government-owned. This RP also authorizes accessory structures including catwalks, pilings and small piers whose sole purpose is to make it easier to get boats into or out of the water. Permanent or semi-permanent mooring facilities are not covered.

b. This permit authorizes excavation and/or filling within the limits of the boat ramp only (e.g. for bedding). Dredging or filling for water access to the ramp is not covered under this regional permit and will require separate Department of the Army authorization. Authorization of the boat ramp does not imply that a future dredging proposal to provide access to the structure would be approved.

c. All boat ramps and accessory structures shall be located so as to eliminate or minimize impacts to special aquatic sites, including submerged aquatic vegetation (SAV), shellfish beds, oyster reefs and vegetated wetlands.

d. The pouring of concrete for the construction of boat ramps must be accomplished within a cofferdam unless the activity can be performed completely in the dry, such as during lake drawdown periods. The introduction of uncured concrete into surface waters is prohibited.

a. The District Engineer will require an Individual Department of the Army permit for any project which he/she determines to have greater than minimal individual or cumulative impacts.

VI. GENERAL CONDITIONS:

1. Navigation:

   a. No activity may cause more than a minimal adverse effect on navigation.

   b. Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the U.S. The U.S. Coast Guard may be contacted at the following address: Commander (oan), Fifth Coast Guard District, Federal Building, 431 Crawford Street, Portsmouth, Virginia 23704 or by telephone: (757) 398-6230.

   c. The permittee understands and agrees that if future operations by the United States require the removal, relocation, or other alteration of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his/her authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements: No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species which normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

3. Spawning Areas: Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas: Activities in waters of the U.S. that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds: No activity may occur in areas of concentrated shellfish populations.

6. Submerged Aquatic Vegetation (SAV) Beds: Activities in SAV beds must be avoided and minimized to the maximum extent practicable. Avoidance and minimization measures, such as relocating a structure and/or the implementation of a time-of-year restriction for work in waters, may be required to reduce impacts to the SAV habitat. Information regarding SAV may be found at the Virginia Institute of Marine Science's website at: http://web.vims.edu/bio/sav/.

7. Suitable Material: No activity may use unsuitable material (e.g. trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

8. Water Supply Intakes: No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public waters supply intake structures or adjacent bank stabilization.

9. Adverse Effects from Impoundments: If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

10. Management of Water Flows: To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound waters or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

11. Fills Within 100-Year Floodplains: The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

12. Equipment: Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

13. Soil Erosion and Sediment Controls: Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the U.S. during periods of low-flow or no-flow, or during low tides.

14. Invasive Species: Plant species listed by the most current version of Virginia Department of Conservation and Recreation's (DCR) Invasive Alien Plan List shall not be used for re-vegetation for activities authorized by these regional permits. The list of invasive plants in Virginia may be found at: http://www.dcr.virginia.gov/natural-heritage/invsppdflist. The DCR recommends the use of regional native species for re-vegetation as identified in the DCR Native Plants for Conservation, Restoration and Landscaping brochures: http://www.dcr.virginia.gov/natural-heritage/nativeplants#brochure or by using the DCR native plant finder: http://www.dcr.virginia.gov/natural-heritage/native-plants-finder.

15. Removal of Temporary Fills and Impacts: The soils of any temporarily impacted areas located in wetlands that are cleared, grubbed, and/or filled, must be restored once these areas are no longer needed for their authorized purpose, no later than completion of project construction, and not to exceed twelve (12) months after commencing the temporary impacts. To restore, temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations, the soil surface loosened by ripping or chisel plowing to a depth of 8-12", and then seeded using native wetland species. See *General Condition 14: Invasive Species* for more information on vegetation recommendations.

    Fill or dredged material into waters of the U.S. that are not removed within the 12 month period will be considered a permanent impact, unless otherwise determined by the Corps. This additional impact to waters of the U.S. may result in the Corps initiating a permit non-compliance action which may include, but not limited to, a restoration order, after-the-fact permitting, and/or compensatory mitigation.

16. Proper Maintenance: Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable RP conditions, as well as any activity-specific conditions added by the District Engineer to an RP authorization.

17. Single and Complete Project: The activity must be a single and complete project. The same RP cannot be used more than once for the same single and complete project. *For purposes of this RP, a single and complete project means the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility. A project is considered to have*

independent utility if it would be constructed absent the construction of other projects in the project area.

18. Wild and Scenic Rivers: Currently, there are no designated Wild and Scenic Rivers in the Commonwealth of Virginia. No RP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system, while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river has determined, in writing, that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

19. Tribal Rights: No RP activity may cause more than minimal adverse effects on tribal rights (including treaty rights), protected tribal resources, or tribal lands.

20. Endangered Species:

    a. No activity is authorized under this RP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under this RP which "may affect" a listed species or critical habitat, unless ESA Section 7 consultation addressing the effects of the proposed activity has been completed. Direct effects are the immediate effects on listed species and critical habitat caused by the RP activity. Indirect effects are those effects on listed species and critical habitat that are caused by the RP activity and are later in time, but still reasonably certain to occur.

    b. Federal permittees should follow their own procedures for complying with the requirements of the ESA. The Federal permittee must provide the District Engineer with the appropriate documentation to demonstrate compliance with those requirements. The District Engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

    c. Non-federal permittees shall submit a pre-construction notification to the District Engineer if any proposed or listed species or proposed or designated critical habitat may be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the District Engineer that the requirements of the ESA have been satisfied and that the activity is authorized. Information on the location proposed/listed species and proposed/designated critical habitat

can be obtained directly from the U.S. Fish and Wildlife (USFWS) online project review process at: https://www.fws.gov/northeast/virginiafield/endangered/projectreviews.html and from the National Marine Fisheries Service (NMFS) at: http://www.nmfs.noaa.gov/pr/species/.

The District Engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species or designated critical habitat and will notify the non-Federal permittee of the Corps' determination. In cases where the non-Federal permittee identified listed species or designated critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the permittee shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or designated critical habitat, or until Section 7 consultation has been completed.

If the District Engineer determines that the proposed activity may affect a listed species or designated critical habitat, the Corps will initiate consultation with the USFWS. The USFWS developed an online system to allow permittees and agencies to find information about sensitive resources that may occur within the vicinity of a proposed project. This system is named "Information, Planning and Conservation System," (IPaC), and is located at: https://ecos.fws.gov/ipac/.

Additional consultation may also be required with the NMFS for species or critical habitat under their jurisdiction, including sea turtles, marine mammals, Shortnose Sturgeon, and Atlantic Sturgeon. For additional information about their jurisdiction in Virginia, please visit: https://www.greateratlantic.fisheries.noaa.gov/protected/index.html.

d. As a result of formal or informal consultation with the USFWS or NMFS the District Engineer may add species-specific regional endangered species conditions to the RP.

e. Authorization of an activity by this RP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the USFWS or NMFS, the ESA prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

f. If the non-federal permittee has a valid ESA Section 10(a)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed RP activity, the non-federal permittee should provide a copy of that ESA Section 10(a)(1)(B) permit in the Joint Permit Application. The District Engineer will coordinate with the agency that issued the ESA Section 10(a)(1)(B) permit to determine whether a separate ESA Section 7 consultation is needed.

21. Migratory Birds and Bald and Golden Eagle Protection Act: The Bald Eagle (*Haliaeetus leucocephalus*) is no longer a federally listed threatened or endangered species; therefore, the Endangered Species Act provisions are not applicable to this species. The Bald and Golden Eagle Protection Act (BGEPA) does not require that a federal agency involved in permitting the proposed action conduct coordination. The permittee is responsible for obtaining any "take" permits required under the U.S. Fish and Wildlife Service's regulations governing compliance with the Migratory Bird Treaty Act or the BGEPA. The permittee should either obtain a "take" permit or a letter of concurrence from USFWS indicating that a permit is not necessary prior to initiating construction activities. You should contact USFWS concerning this matter at U.S. Fish and Wildlife Service, Virginia Field Office, 6669 Short Lane, Gloucester, VA 23061. Information on active bald eagle nests and concentration areas can be obtained in Step 6 of the U.S. Fish and Wildlife Service's online project review system available at: https://www.fws.gov/northeast/virginiafield/endangered/projectreviewprocess.html.

22. Essential Fish Habitat: The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297; 11 October 1996), requires all Federal agencies to consult with the NOAA Fisheries Service Habitat Conservation Division (NOAA HCD) on all actions, or proposed actions, permitted, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH). The EFH Designations within the Northeast Region (Maine to Virginia), dated March 1, 1999, has identified EFH for a number of species and their life stages within Virginia waters. If EFH consultation is required with NOAA HCD, the permittee shall not begin work until the Corps has provided notification that the EFH consultation has concluded.

23. Anadromous Fish: Authorizations associated with this RP shall not adversely affect documented spawning habitat or a migratory pathways for anadromous fish. Areas of anadromous fish use are indicated on the Virginia Department of Game and Inland Fisheries (VDGIF) information system at: http://vafwis.org/fwis/. If a project is located within an area documented as an anadromous fish use area (confirmed or potential), all in-stream work is prohibited from occurring between February 15 through June 30 of any given year or other time of year restriction (TOYR) specified by the VDGIF and/or the Virginia Marine Resources Commission (VMRC). Should the Norfolk District determine that the work is minimal and no TOYR is needed the District will initiate consultation with NOAA Fisheries Service for their concurrence.

A TOYR is not required for dredging activities in the Elizabeth River upstream of the Mid-Town Tunnel on the main-stem and the West Norfolk Bridge (Route 164, Western Freeway) on the Western Branch of the Elizabeth River.

24. Designated Critical Resource Waters and National Estuarine Research Reserves: This RP does not authorize the discharge of dredged or fill material into the Chesapeake Bay National Estuarine Research Reserve (Reserve) in Virginia. This Reserve is a multi-site system along a salinity gradient of the York River, which includes Sweet Hall Marsh, Taskinas Creek, Catlett Islands, and Goodwin Islands. Additional information may be found at: http://www.vims.edu/cbnerr/.

25. Trout Waters: Designated Trout Waters, as defined by the Virginia State Water Control Board and the Virginia Department of Game and Inland Fisheries (VDGIF), occurring specifically within the mountains of Virginia, are within the following river basins:

    - Potomac-Shenandoah Rivers
    - James River
    - Roanoke River
    - New River
    - Tennessee and Big Sandy Rivers
    - Rappahannock River

    The Virginia Department of Game and Inland Fisheries (VDGIF) recommends the following time-of-year restrictions (TOYR) for any in-stream work within waters identified as wild trout waters. The recommended TOYRs for trout species are:

    - Brook Trout: October 1 through March 31
    - Brown Trout: October 1 through March 31
    - Rainbow Trout: March 15 through May 15

    This requirement applies to all waters of the U.S. within the following counties and cities: Albemarle, Allegheny, Amherst, Augusta, Bath, Bedford, Bland, Botetourt, Bristol, Buchanan, Buena Vista, Carroll, Clarke, Covington, Craig, Dickenson, Floyd, Franklin, Frederick, Giles, Grayson, Greene, Henry, Highland, Lee, Loudoun, Madison, Montgomery, Nelson, Page, Patrick, Pulaski, Rappahannock, Roanoke City, Roanoke Co., Rockbridge, Rockingham, Russell, Scott, Shenandoah, Smyth, Staunton, Tazewell, Warren, Washington, Waynesboro, Wise, and Wythe.

    The Corps will coordinate the permit request with the Virginia Department of Environmental Quality (DEQ) and/or the VDGIF. Comments from DEQ and VDGIF will be fully considered before the Corps makes a final decision on the project. Additional information regarding trout waters can be found at: https://www.dgif.virginia.gov/.

26. Historic Properties:

a. In cases where the activity may affect properties listed, or eligible for listing on the National Register of Historic Places, the activity is not authorized until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

b. Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the Corps with the appropriate documentation to demonstrate compliance with those requirements. The Corps will review the documentation and determine whether it is sufficient to address Section 106 compliance for the RP activity, or whether additional Section 106 consultation is necessary.

c. Non-federal permittees must submit a statement to the Corps regarding the authorized activity's potential to cause effects to any historic properties listed, or determined to be eligible for listing on the National Register of Historic Places, including previously unidentified properties. The statement must say which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location or potential for the presence of historic resources can be sought from the Virginia Department of Historic Resources (VDHR) at: http://www.dhr.virginia.gov/ or Tribal Historic Preservation Officer (THPO), as appropriate, and the National Register of Historic Places. Where an permittee has identified historic properties which the proposed activity may have the potential to affect, the permittee shall not begin the activity until notified by the Corps that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

d. Prospective permittees should be aware that Section 110(k) of the NHPA (16 U.S.C. § 470(h)-2(k)) prevents the Corps from granting a permit or other assistance to an permittee who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effects created or permitted by the permittee. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, explaining the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the permittee, SHPO/ THPO, appropriate Indian tribes if the undertaking occurs on or affect historic properties on tribal lands or affects properties of interest

to those tribes, and other parties known to have legitimate interest in the impacts to the permitted activity on historic properties.

27. Discovery of Previously Unknown Remains and Artifacts: If you discover any previously unknown historic, cultural, or archaeological remains and artifacts while accomplishing activities authorized by this permit, you must immediately stop work and notify the Corps of what has been found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The Corps will initiate Federal, Tribal, and State coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

28. Mitigation: Mitigation in all its forms (avoiding, minimizing, or compensating for resource losses) may be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal. The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the U.S. to the maximum extent practicable at the project site (i.e., on site).

29. Use of Multiple Regional Permits: This RP may be combined with any Corps general permits (including Nationwide (NWP) or Regional Permits (RP)) for a single and complete project, as long as the acreage loss of waters of the U.S. authorized by the NWPs/RPs does not exceed the acreage limit of the NWP/RP with the highest specified acreage limit.

30. Transfer of Regional Permit Verifications: If the permittee sells the property associated with the RP verification, the permittee may transfer the verification to the new owner by submitting a letter to the appropriate Corps District Office to validate the transfer. A copy of the RP verification must be attached to the letter, and the letter must contain the following statement and signature:

    "When the structures or work authorized by the Regional Permit are still in existence at the time the property is transferred, the terms and conditions of this regional permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of the Regional Permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

    _____
    (Transferee)

    _____
    (Date)

31. Compliance Certification: A Certificate of Compliance, enclosed with the Corps' written authorization for the activity, must be completed and a copy retained for your records. The original Certificate of Compliance shall be mailed to, U. S.

Army Corps of Engineers, Regulatory Branch, 803 Front Street, Norfolk, Virginia 23510-1011, or to the Regulatory Field Office listed on the Certificate of Compliance, within 30 days of completion of the authorized activity.

32. Activities Affecting Structures or Works Built by the United States: If the RP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a Corps federally authorized Civil Works project, the activity that requires section 408 permission is not authorized by the RP until the appropriate Corps District office issues the section 408 permission to alter, occupy, or use the Corps Civil Works project, and the District Engineer issues a written RP verification.

    Contact a Norfolk District Regulatory Project Manager to assist in determining if your proposed activity might alter or temporarily or permanently occupy or use a Corps of Engineers Civil Works project.

    Locations of Norfolk District Civil Works projects can be found at: http://www.nao.usace.army.mil/Portals/31/docs/regulatory/RPSPdocs/RP-17_Corps_Project_Maps.pdf.

    For projects located within the Civil Works boundary of the Baltimore, Huntington, Nashville or Wilmington District, please contact a Norfolk District Project Manager for assistance.

33. Pre-Construction Notification: Prior to commencing the activity, prospective permittees ("permittees") must submit a Pre-construction Notification (PCN) to the District Engineer, unless otherwise specified in the RP, and must receive written notification from the Corps acknowledging that the project is authorized pursuant to this RP.

    Notification to the Corps must be in writing (the Joint Permit Application may also be used, as described below) and must include the following information:

    - Name, address and telephone number of the prospective permittee;
    - Name, address and telephone number of the property owner, if different from the prospective permittee;
    - Location of the project (including Tax Parcel ID Number, if available);
    - Vicinity map, aerial photograph, and/or drawing accurately showing the extent of proposed activity and the extent of waters of the U.S., including wetlands. Drawings, plans and/or sketches should contain sufficient detail to project an illustrative description of the proposed activity;
    - Identify the specific RP or RPs the prospective permittee wants to use to authorize the proposed activity;
    - A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expect to result from the RP activity, in acres, linear feet

or other appropriate unit of measure; a description of any proposed mitigation measures; and any other Corps permit used or intended to be used to authorize any part of the proposed project or any related activity.

- A delineation of special aquatic sites and other waters of the U.S. on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters of the U.S., but there may be a delay if the Corps does the delineation.
- If compensatory mitigation is required, the prospective permittee must submit a statement describing how any required compensatory mitigation will be provided. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan. In accordance with 33 CFR 332.3 (a) the Corps will consider what is environmentally preferable. Factors considered will be likelihood of success, sustainability, location relative to the impact site and significance within the watershed, and the costs of the compensatory mitigation project. The Corps will require the most appropriate and practicable mitigation pursuant to 33 CFR 320.4(r).

A JPA may be obtained by writing to the U.S. Army Corps of Engineers, Norfolk District, Regulatory Branch, 803 Front Street, Norfolk, Virginia 23510-1011; by telephoning the Norfolk District Regulator of the Day at (757) 201-7652 or via the following link to the Norfolk District Regulatory Branch website: http://www.nao.usace.army.mil/Missions/Regulatory/JPA/.

The Corps must determine if the PCN is complete. If the PCN is determined to be incomplete, the Corps will request the prospective permittee to provide the additional information necessary to make the request complete. The request must specify the information needed to make the PCN complete. As a general rule, the Corps will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the Corps will notify the prospective permittee that the PCN is still incomplete and the review process will not commence until all of the requested information has been received by the Corps. The prospective permittee shall not begin the activity until he or she is notified in writing by the Corps that the activity may proceed under the RP, subject to any additional conditions imposed by the Corps.

If, after reviewing the request, the Corps determines that the proposed activity would have more than minimal individual or cumulative adverse impacts on the aquatic environment or otherwise may be contrary to the public interest, then the Corps will notify the project proponent that the activity is not authorized by the regional permit and will provide instructions for seeking authorization under an Individual Permit. The Corps may revoke this Regional Permit for an individual activity by following the procedures set forth in 33 CFR 325.7.

34. Environmental Justice: Activities authorized under this RP must comply with Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”.

35. Inspections: The permittee must provide a copy of this permit and any verification letter to the contractor(s) and made available at the project site to any regulatory representative. The permittee shall allow the Corps to make periodic inspections at any time deemed necessary in order to assure that the activities being performed under authority of this permit are in accordance with the terms and conditions prescribed herein. The Corps reserves the right to require post-construction engineering drawings and/or surveys of any work authorized under this RP, as deemed necessary on a case-by-case basis.

VII. DISTRICT ENGINEER'S DECISION:

1. In reviewing the PCN for the proposed activity, the District Engineer will determine whether the activity authorized by the RP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If a project proponent requests authorization by a specific RP, the District Engineer should issue the RP verification for that activity if it meets the terms and conditions of that RP, unless he or she determines, after considering mitigation, that the proposed activity will result in more than minimal individual or cumulative adverse effects on the aquatic environment and other aspects of the public interest and require an Individual Permit for the proposed activity.

2. When making minimal adverse environmental effects determinations the District Engineer will consider the direct and indirect effects caused by the RP activity. He or she will also consider the cumulative adverse environmental effects caused by activities authorized by the RP and whether those cumulative adverse environmental effects are no more than minimal. The District Engineer will also consider site specific factors, such as the environmental setting in the vicinity of the RP activity, the type of resource that will be affected by the RP activity, the functions provided by the aquatic resources that will be affected by the RP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the RP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the District Engineer. The District Engineer may add case-specific special conditions to the RP authorization to address site-specific environmental concerns.

3. If the District Engineer determines that the adverse environmental effects of the proposed activity are more than minimal, then the District Engineer will notify the permittee that the activity does not qualify for authorization under the RP and instruct the permittee on the procedures to seek authorization under an Individual Permit or process to modify the proposed activity and/or the mitigation plan to reduce the adverse environmental effects so that they are no more than minimal. In addition, if the District Engineer determines on a case-by-case basis that concerns for the aquatic environment so indicate, the District Engineer may

exercise discretionary authority to override the Regional Permit and require an Individual Permit application and review.

VIII. ADDITIONAL INFORMATION:

1. District Engineers have the authority to determine if an activity complies with the terms and conditions of the RP.

2. Limits of This Authorization:
   a. Regional permits do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.
   b. Regional permits do not grant any property rights or exclusive privileges.
   c. Regional permits do not authorize any injury to the property or rights of others.
   d. Regional permits do not authorize interference with any existing or proposed Federal project (see General Condition 32).
   e. Regional permits do not authorize the impingement upon Federal Lands.
   f. Regional permits do not grant any Corps or Federal real estate rights. If real estate rights are needed from the Corps, you must contact the appropriate U.S. Army Corps of Engineers District's Real Estate Office.

3. Limits of Federal Liability: In issuing this RP, the Federal government does not assume any liability for the following:

   a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes;
   b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest;
   c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this RP;
   d. Design or construction deficiencies associated with the permitted work;
   e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Permittee's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision: The District Engineer may reevaluate the decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

   a. The permittee fails to comply with the terms and conditions of this permit.
   b. The information provided by the permittee in support of your PCN proves to have been false, incomplete, or inaccurate.
   c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Binding Effect: The provisions of the permit authorization shall be binding on any assignee or successor in interest of the original permittee.

7. Expiration: Unless further modified, suspended, or revoked, this RP will be in effect until September 5, 2023. Activities which have commenced (i.e. under construction) or are under contract to commence in reliance upon this RP will remain authorized provided the activity is completed within twelve (12) months of the date of the RP's expiration, modification, or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization. Activities completed under the authorization of the RP which was in effect at the time the activity was completed continue to be authorized by that RP.

5 SEPT 2018
Date

Patrick V. Kinsman, PE
Colonel, U.S. Army
Commanding

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
Street address: 1111 East Main Street, Suite 1400, Richmond, VA 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

August 22, 2018

Mr. William T. Walker
Chief, Regulatory Branch
U.S. Army Corps of Engineers
803 Front Street
Norfolk, Virginia 23510-1096

RE: Final Section 401 Certification of Regional Permits 18-RP-01, 18-RP-02, 18-RP-11, 18-RP-15, 18-RP-16, 18-RP-17, 18-RP-18, 18-RP-19, 18-RP-22 and Regional Permit General Conditions

Dear Mr. Walker:

Provided herein is the Commonwealth of Virginia's decision with regard to Section 401 Water Quality Certification for activities authorized by the U.S. Army Corps of Engineers (the Corps) 2018 Regional Permits RP-02, RP-15, RP-17, RP-18, RP-19, and RP-22 and applicable Regional Permit Conditions, as public noticed by the Corps on February 26, 2018, and for activities authorized by the U.S. Army Corps of Engineers (the Corps) 2018 Regional Permits RP-01 and RP-11 and applicable Regional Permit Conditions, as public noticed by the Corps on May 17, 2018.

Pursuant to 40 CFR 121.2 (a)(2) and (3), the Virginia Department of Environmental Quality (DEQ) on behalf of the State Water Control Board (the Board) has examined (i) the RPs and the Norfolk District Regional Permit Conditions and (ii) other decision documents provided by the Corps to base its certification. Accordingly, the Board finds that there is a reasonable assurance that the activities permitted under the Corps' regional permits, including the Norfolk District Regional Permit Conditions, will be conducted in a manner which will not violate applicable water quality standards, provided permittees comply with all applicable Section 401 conditions (see table attached herein).

Further, pursuant to Virginia Water Protection (VWP) Permit Regulation 9VAC25-210-130 H, the Board is issuing this final §401 Water Quality Certification as meeting the requirements of the VWP regulation after having advertised and accepted public comment for 30 days on our intent to provide this certification. The public comment period began on July 16, 2018 and ended on August 15, 2018. No comments were received.

Please be aware that the final review for consistency with Virginia's Coastal Resources Management Program (VCP) pursuant to the federal Coastal Zone Management Act of 1972, as amended, is not yet complete. Projects in the Tidewater area of Virginia may require additional coordination with the VCP prior to issuance of these regional permits until the federal consistency review is complete. A map depicting those localities within the coastal zone can be found at http://www.deq.virginia.gov/coastal/coastmap.html. Questions regarding federal consistency with VCP should be directed to Bettina Sullivan at (804) 698-4204 or bettina.sullivan@deq.virginia.gov.

The Commonwealth reserves its right to require an individual application for a permit or a certificate or otherwise take action on any specific project that could otherwise be covered under any of the Corps' regional, general, or programmatic general permits when it determines on a case-by-case basis that concerns for water quality and the aquatic environment so indicate.

Please do not hesitate to contact Dave Davis (804) 698-4105 or dave.davis@deq.virginia.gov if you have any questions regarding this Section 401 Water Quality Certification.

Sincerely,

David K. Paylor

Attachment: Commonwealth of Virginia Section 401 Water Quality Certification Actions Table – Norfolk District 2018 Regional Permits

cc: Ms. Bettina Sullivan, DEQ Office of Environmental Impact Review
Ms. Kim Prisco-Baggett, Norfolk District Army Corps of Engineers
Ms. Scharlene Floyd, Norfolk District Army Corps of Engineers
Mr. William Seib, Baltimore District Regulatory Branch
Mr. Tony Watkinson; Chief, Habitat Division, Virginia Marine Resources Commission
Regional VWP Managers

Commonwealth of Virginia Section 401 Water Quality Certification Actions Table – Norfolk District 2018 Regional Permits

Final §401 Certification (* indicates a change from existing certification)	Conditions
18-RP-01 Denied Certain Virginia Department of Transportation (VDOT) roadway and railway projects in waters of the United States, within the geographical limits of the Commonwealth of Virginia under the regulatory jurisdiction of the Norfolk District Army Corps of Engineers (Corps)	
18-RP-02 Unconditional 1 (Maintenance Dredging for Previously Authorized Projects)	
18-RP-02 *Conditional 2 (New Dredging in Navigable Waters) 3 (Navigationally-Related Dredging/Excavation of Non-tidal Waters Not Subject to the Exemption Under Section 404(f)(1)(c))	(1) Dredging shall not be used to create a deep space for water withdrawal. (2) Any compensatory mitigation shall meet the requirements in the Code of Virginia, Section 62. 1-44. 15:23 A through C, except in the absence of same river watershed alternatives in Hydrologic Unit Codes (HUC) 02040303 and 02040304, single family dwellings or locality projects may use compensatory mitigation in HUC 02080102, 02080108, 02080110, or 02080111 in Virginia.
18-RP-11 (new) Conditional Certain Virginia Department of Transportation (VDOT) roadway and railway projects that qualify for the conditions and thresholds of a Nationwide Permit (NWP) but require a Pre-Construction Notification (PCN) in accordance with General Condition 18(c)	VDOT shall copy DEQ-Office of Wetland and Stream Protection, Central Office, on all documentation meeting the requirements of Part IV Notification Requirements of the 18-RP-11.
18-RP-15 *Conditional Maintenance of existing drainage ditches	Deviations from the original configuration or filled area shall not change the character, scope, or size of the original design or approved alternative design.

Final §401 Certification (* indicates a change from existing certification)	Conditions
18-RP-17 and RP17 Certificate of Compliance Form *Conditional Installation and/or construction of open-pile piers, mooring structures/devices, certain covered boathouses/boatslips, boatlifts, osprey poles/platforms, accessory pier structures, and devices associated with shellfish gardening, for private use.	(1) The discharge shall not include structures such as pilings to construct a platform to mount a pump for water withdrawals unless otherwise excluded from surface water withdrawal permitting per 9VAC-25-210-310. (2) The impact(s) shall not exceed 2 acres of wetlands or 1, 500 linear feet of stream bed. (3) Any compensatory mitigation shall meet the requirements in the Code of Virginia, Section 62. 1-44. 15:23 A through C, except in the absence of same river watershed alternatives in Hydrologic Unit Codes (HUC) 02040303 and 02040304, single family dwellings or locality projects may use compensatory mitigation in HUC 02080102, 02080108, 02080110, or 02080111 in Virginia. (4) For water-based energy projects using similar structures, the discharge shall not include water withdrawals, such as the construction of an intake structure, weir, water diversion structure, or other structure transporting non-potable raw surface water.
18-RP-18 *Conditional Installation and/or construction of open-pile piers, mooring structures/devices, fender piles, covered boathouses/boatslips, boatlifts, osprey pilings/platforms, accessory pier structures, and devices associated with shellfish gardening, for private, commercial, community, and government use.	(1) The discharge shall not include structures such as pilings to construct a platform to mount a pump for water withdrawals unless otherwise excluded from surface water withdrawal permitting per 9VAC-25-210-310. (2) The impact(s) shall not exceed 2 acres of wetlands or 1, 500 linear feet of stream bed. (3) Any compensatory mitigation shall meet the requirements in the Code of Virginia, Section 62. 1-44. 15:23 A through C, except in the absence of same river watershed alternatives in Hydrologic Unit Codes (HUC) 02040303 and 02040304, single family dwellings or locality projects may use compensatory mitigation in HUC 02080102, 02080108, 02080110, or 02080111 in Virginia. (4) For water-based energy projects using similar structures, the discharge shall not include water withdrawals, such as the construction of an intake structure, weir, water diversion structure, or other structure transporting non-potable raw surface water.

Final §401 Certification (* indicates a change from existing certification)	Conditions
18-RP-19 Unconditional 1 (Living Shoreline Group 1: Non-structural activities that provide substrate necessary to support wetland vegetation and/or beach nourishment) and 2 (Living Shoreline Group 2: Sill structures with tidal marsh and/or beach nourishment)	
18-RP-19 Unconditional for activities conducted in tidal waters that are authorized by any applicable, required permits issued by the Virginia Marine Resources Commission *Conditional for the following activities conducted in non-tidal surface waters of Virginia: 3 (Low breakwaters and associated sandy fill material) 4 (Bulkheads, riprap, and associated backfill and/or excavation, including bulkhead repair and/or replacement) 5 (Groins, jetties, spurs and/or baffles and associated sandy fill material)	(1) Stabilization activities shall not be placed for the purpose of a stream diversion. (2) Stabilization activities shall not permanently impact more than 1,500 linear feet of any type of non-tidal stream bed. (3) For maintenance of bulkhead structures, the discharge shall not increase the capacity of an impoundment or reduce the quantity of instream flows downstream. (4) Any compensatory mitigation shall meet the requirements in the Code of Virginia, Section 62. 1-44. 15:23 A through C, except in the absence of same river watershed alternatives in Hydrologic Unit Codes (HUC) 02040303 and 02040304, single family dwellings or locality projects may use compensatory mitigation in HUC 02080102, 02080108, 02080110, or 02080111 in Virginia.
18-RP-19 *Conditional 6 (Aquaculture or mariculture activities)	(1) The activity shall comply with the conditions of any Virginia Pollutant Discharge Elimination System (VPDES) permit issued for the facility. (2) The associated activities shall not include a surface water withdrawal or diversion unless otherwise excluded from surface water withdrawal permitting per 9VAC-25-210-310. (3) Any compensatory mitigation shall meet the requirements in the Code of Virginia, Section 62. 1-44. 15:23 A through C, except in the absence of same river watershed alternatives in Hydrologic Unit Codes (HUC) 02040303 and 02040304, single family dwellings or locality projects may use compensatory mitigation in HUC 02080102, 02080108, 02080110, or 02080111 in Virginia.

Final §401 Certification (* indicates a change from existing certification)	Conditions
18-RP-19 Unconditional for activities conducted in tidal waters that are authorized by any applicable, required permits issued by the Virginia Marine Resources Commission *Conditional for the following activities conducted in non-tidal surface waters of Virginia: 7 (Boat ramps and accessory structures, including any fill or excavation for installation)	Construction of boat ramps in non-tidal waters that *do not* meet the following criteria require application to DEQ for consideration of a VWP permit: (a) The discharge into surface waters is 50 cubic yards or less of concrete, rock, crushed stone or gravel into forms, or in the form of pre-cast concrete planks or slabs, unless waived in writing by the Corps district engineer because the discharge will result in no more than minimal adverse environmental effects; (b) The boat ramp is 20 feet or less in width, unless waived in writing by the Corps district engineer because the discharge will result in no more than minimal adverse environmental effects; (c) The base material is crushed stone, gravel or other suitable material; (d) The excavation is limited to the area necessary for site preparation and all excavated material is removed to an area that has no surface waters; and, (e) No material is placed in special aquatic sites, including wetlands.

Final §401 Certification (* indicates a change from existing certification)	Conditions
18-RP-22 *Conditional 1 (Construction of piers, boat docks, jetties, breakwaters structures, dolphins, boat ramps and boathouses using materials commonly acceptable for their construction such as unsinkable flotation materials, pressure treated lumber, pilings, and concrete) 2 (Construction and backfilling of bulkheads and placement of riprap or appropriate bioengineering technique along eroding shorelines for shoreline stabilization and erosion control)	(1) Stabilization activities shall not be placed for the purpose of a stream diversion or impounding flow in an intermittent or perennial water body. (2) Activities shall not permanently impact more than 1,500 linear feet of any type of non-tidal stream bed or more than 1/10 of an acre non-tidal wetlands. (3) Construction of boat ramps that *do not* meet the following criteria require application to DEQ for consideration of a VWP permit: (a) The discharge into surface waters is 50 cubic yards or less of concrete, rock, crushed stone or gravel into forms, or in the form of pre-cast concrete planks or slabs, unless waived in writing by the Corps district engineer because the discharge will result in no more than minimal adverse environmental effects; (b) The boat ramp is 20 feet or less in width, unless waived in writing by the Corps district engineer because the discharge will result in no more than minimal adverse environmental effects; (c) The base material is crushed stone, gravel or other suitable material; (d) The excavation is limited to the area necessary for site preparation and all excavated material is removed to an area that has no surface waters; and, (e) No material is placed in special aquatic sites, including wetlands. (4) Deviations from the original configuration or filled area shall not change the character, scope, or size of the original design or approved alternative design. (5) The discharge shall not include water withdrawals, such as the construction of an intake structure, weir, water diversion structure, or other structure transporting non-potable raw surface water. (6) The discharge shall not include structures such as pilings to construct a platform to mount a pump for water withdrawals unless otherwise excluded from surface water withdrawal permitting per 9VAC-25-210-310. (7) Any compensatory mitigation shall meet the requirements in the Code of Virginia, Section 62. 1-44. 15:23 A through C.

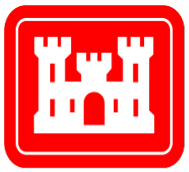
Final §401 Certification (* indicates a change from existing certification)	Conditions
18-RP-22 *Conditional 3 (Excavation of boat slips and channels (channelward of the normal high pool elevation) for recreational boating, where excavated material is placed in high ground)	(1) The dredging shall not be used to create a deep space for water withdrawal. (2) The discharge shall not increase the capacity of an impoundment or reduce the quantity of instream flows downstream. (3) Any compensatory mitigation shall meet the requirements in the Code of Virginia, Section 62. 1-44. 15:23 A through C.
18-RP-22 *Conditional 4 (Installation of submerged and aerial power lines and utility lines where U. S. Coast Guard requirements for aerial lines are met and pre-project elevation contours are restored)	(1) The activities shall not be associated with a surface water withdrawal or the transport of non-potable raw surface water, except for the purpose of hydrostatic testing and when the associated discharges are authorized by a VPDES permit, if required. (2) Activities shall not permanently impact more than 1,500 linear feet of any type of non-tidal stream bed or more than 2 acres of non-tidal wetlands. (3) Any compensatory mitigation shall meet the requirements in the Code of Virginia, Section 62. 1-44.15:23 A through C. (4) Temporary diversions of surface water associated with "pump-arounds" during the construction of utility crossings are specifically allowed.
18-RP-22 *Conditional 5 (Maintenance of existing water intake and outfall structures provided all State and Federal required authorization have been obtained)	(1) Deviations from the original configuration or filled area shall not change the character, scope, or size of the original design or approved alternative design. (2) The structure or maintenance shall not be associated with intake structures unless otherwise excluded from surface water withdrawal permitting per 9VAC-25-210-310. (3) The discharge shall not increase the capacity of an impoundment or reduce the quantity of instream flows downstream. (4) The Corps of Engineers shall provide DEQ an annual report of projects authorized by this Regional Permit that includes detailed information on physical changes to water withdrawal structures, such as the maintenance of an intake, dam, weir, or water diversion structure that are deviations from the original configuration, or are a change in the character, scope, or size of the original design, or where those deviations would otherwise reduce instream flows. (5) Any compensatory mitigation shall meet the requirements in the Code of Virginia, Section 62. 1-44. 15:23 A through C.

APPENDIX A-4
COASTAL ZONE MANAGEMENT ACT
FEDERAL CONSISTENCY DETERMINATION

CONTINUING AUTHORITIES PROGRAM, SECTION 14

EMERGENCY STREAMBANK AND SHORELINE PROTECTION

JAMES RIVER SHORELINE, NEWPORT NEWS



U.S. Army Corps
of Engineers
Norfolk District

COASTAL ZONE MANAGEMENT ACT
FEDERAL CONSISTENCY DETERMINATION

CONTINUING AUTHORITIES PROGRAM, SECTION 14, EMERGENCY STREAMBANK AND SHORELINE PROTECTION JAMES RIVER SHORELINE, NEWPORT NEWS, VIRGINIA

CONSISTENCY REVIEW: Information to support this Federal Consistency Determination (including maps and additional supporting information) can be found in the Continuing Authorities Program, Section 214, Emergency Streambank and Shoreline Protection James River Shoreline, Newport News, Virginia draft Integrated Feasibility Report/Environmental Assessment (IFR/EA) which will be available to the public in October 2020.

PROJECT DESCRIPTION: The U.S. Army Corps of Engineers is the lead federal agency for this feasibility study and the non-Federal sponsor is the City of Newport News.

The James River Shoreline, Newport News, Virginia feasibility study is authorized by Section 14 of the Flood Control Act of 1946, as amended (P.L.79-526), Emergency Streambank and Shore Protection. The purpose of the Section 14 program is to construct emergency streambank and shore protection to prevent natural erosion processes from damaging highways, bridge approaches, public works, churches, public and private non-profit hospitals, schools, water and sewer lines, and other public or non-profit facilities that offer public services to all, and known historic properties eligible or listed on the National Register of Historic Places. If an eligible facility is in imminent danger of failure, and after a request for a project has been received from a potential non-federal sponsor stating its desire to participate in a solution, the Corps will conduct a feasibility study to analyze the problem, develop a solution, and determine the feasibility of a solution.

The City of Newport News is located on the Lower Peninsula in eastern Virginia, adjacent to the Chesapeake Bay, and approximately 65 miles southeast of Richmond. The study area is located entirely within the City along the north bank of the James River, west of the James River Bridge (US-17/US-258). The project site is bounded on the south by the Government Ditch, to the north by North Avenue, and extends eastward to River Road. A vicinity map of the proposed project is identified in Figure 1-1.

An approximate 600-foot section of the riverbank along the James River is severely eroded by the combined effects of natural erosion processes; river flow, water level rise, and tidal, storm, and wind driven wave action. The resulting 25-foot high receding bluff is an imminent threat to existing public facilities, causing continual loss of land, threatening existing public facilities, causing continual loss of land threatening existing public utilities, including River Road, electric, gas, communications, public water and sewer lines, as well as creating dangerous conditions associated with the steep slope.

The purpose of the proposed project, which is identified as the Recommended Plan in the draft IFR/EA, is to conduct a shoreline stabilization project to create safer bank conditions to reduce

the public safety hazard resulting from the 25 foot bluff and to eliminate the current threat to existing public facilities.

The key objectives of the study include an integrated systematic approach to stabilize the eroding James River shoreline adjacent to River Road to reducing the risk of future erosion. Other objectives include preventing future erosion damages to public utilities, and to prevent future damage to the Government Ditch.

Figure 1-1. Vicinity map for the James River Shoreline Stabilization Project.

The proposed project consists of a longitudinal rock sill running the approximately 600-foot length of the project area and graded on a 1H:3V slope, 2,900 tons of VDOT class III riprap and 800 tons of VDOT number 1 stone, 4,300 cubic yards of fill, 1,600 square yards of geotextile filter

fabric, 35,000 square feet of seeding, and 700 cubic yards of debris removal. It is anticipated that the proposed project would be constructed in a manner to avoid the shoreline and existing residential pier on private property. The exact siting of the sill and advanced designs would be further developed during the Design/Implementation (DI) phase; however, it is anticipated that impacts would occur channelward of mean low water. Please refer to Attachment 1 for the 10% design level drawings.

The slope is anticipated to be seeded following placement of the slope stabilization blankets. Although the planting plan would be finalized in the DI Phase, the following type of grasses would likely be considered. Warm-season grasses generally require less maintenance and have a shorter growing season. Warm-season grasses such as Bermuda grass and zoysia grass are well adapted to the environmental conditions found in the Eastern Virginia/Southern Piedmont region and are likely to be considered good candidate grass types for vegetating the slope. Other warm-season grasses that may also warrant consideration include St. Augustine grass, however, vegetated plantings as opposed to seeding, would likely be required and may not be as cost effective. Fescue can also be established from seed and is suitable for low management conditions. To ensure the long-term stability of the slope and stone sill, it is not anticipated that trees would be re-planted on the adjacent upland following construction. Any additional native vegetation planted in associated with this project would not impede the existing scenic view of the James River.

PROPERTY CLASSIFICATION: The project site is characterized as a high bank shorelines where upland elevation is greater than 10 feet above mean low water. The majority of the project site is owned by the City of Newport News, however, there are several privately owned parcels within the project limits.

IMPACTS TO RESOURCES/USES OF THE COASTAL ZONE: See Summaries below.

DETERMINATION: Based upon evaluation of impacts analyzed in the Draft IFR/EA and in accordance with Section 307 of the Coastal Zone Management Act (CZMA) and the CZMA Federal Consistency Regulation – 15 C.F.R. Part 930, the Norfolk District, U.S. Army Corps of Engineers determined that the proposed project would be undertaken in a manner consistent to the maximum extent practicable with the enforceable policies of the Commonwealth of Virginia's Coastal Zone Management Program.

ENFORCEABLE POLICIES

The Virginia Coastal Zone Management Program (CZMP) contains the below enforceable policies (A-I).

A. 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 Virginia Marine Resources Commission (VMRC) (Virginia Code §28.2-200 through §28.2-713) and the Virginia Department of Game and Inland Fisheries (VDGIF) (Virginia Code §29.1-100 through §29.1-570).

Consistency Analysis

Implementation of the proposed project would result in temporary, negligible to minor adverse impacts to the nearshore estuarine environment including fishery resources. The proposed sill would be constructed primarily in the intertidal area with a portion of the stone sill constructed channelward of mean low water.

Fishes would be expected to avoid the area during in-water construction. Since there are no pile-driving activities associated with Alternative 1, acoustic underwater impacts to fish resources would be negligible and would be associated with vessel traffic such as work barges that may be necessary for construction. Vessel traffic is common to the James River and contributes to the existing ambient underwater noise environment.

Construction activities would temporarily increase turbidity immediately adjacent to the project site. However, Best Management Practices (BMPs) such as the use of a turbidity curtain if feasible, would be implemented. Additionally, the nearshore benthic environment is largely comprised of sandy material which would be expected to settle quickly from the water column following disturbance.

Public shellfish grounds managed by the Virginia Marine Resources Commission (VMRC) are located less than 0.75 miles from the project site and include an open harvest area for oysters in the Lower James River. Private leased oyster grounds are located in close proximity to the project site, and are located approximately 0.1 mile offshore. However, the proposed project would have no impacts to public shellfish grounds or private oyster grounds.

The existing Eastern oyster and Atlantic ribbed mussel resources attached to the existing debris along the intertidal shoreline would be removed along with debris removal during construction. However, their presence in the area indicates that settlement and attachment of the Eastern oyster to the stone sill is likely to occur once construction is complete.

The proposed project would be fully consistent with the Fisheries Management enforceable policy.

B. 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 to 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 Water Quality Division. The program is administered by the Virginia Marine Resource Commission (Virginia Code §28.2-1200 through §28.2-1213).

Consistency Analysis

The construction of the stone sill would occur channelward of mean low water on State-owned submerged land. The extent of construction of the stone sill channelward of mean low water would be determined during the DI Phase. Negligible to minor impacts to nearshore and subtidal habitats would occur during construction. A Joint Permit Application would be submitted for review and a subaqueous permit secured from the Virginia Marine Resources Commission for impacts to State-owned submerged land.

The proposed project would be fully consistent with the Subaqueous Lands Management enforceable policy.

C. Wetlands Management

The purpose of the wetlands management program is to preserve tidal wetlands, prevent their despoliation, and accommodate economic development in a manner consistent with wetlands preservation. The tidal wetlands program is administered by the VMRC (Virginia Code §28.2-1301 through §28.2-1320). The Virginia Water Protection Permit program administered by the DEQ includes protection of wetlands -- both tidal and non-tidal. This program is authorized by Virginia Code § 62.1-44.15.5 and the Water Quality Certification requirements of §401 of the Clean Water Act of 1972.

Consistency Analysis

The proposed project would impact tidal, non-vegetated wetlands. There are no vegetated wetlands present at the project site; therefore, there would be no anticipated impacts to vegetated wetlands. No wetland mitigation would be required for this project.

Implementation of the proposed project would be fully consistent with the Wetlands Management enforceable policy.

D. 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) for the City of Newport News.

Consistency Analysis
This project would not impact sand dunes; therefore this enforceable policy is not applicable.

E. 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*.).

Consistency Analysis
Construction activities would temporarily increase turbidity immediately adjacent to the project site. However, Best Management Practices (BMPs) such as the use of a turbidity curtain if feasible, would be implemented to reduce turbidity impacts. Additionally, the nearshore benthic environment is largely comprised of sandy material which would be expected to settle quickly from the water column following disturbance.

The proposed project would be fully consistent with the Non-point Source Pollution Control enforceable policy.

F. 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.

Consistency Analysis
The proposed project would not generate any point source discharges and a VPDES Individual Permit would not be required; therefore, this enforceable policy is not applicable.

G. 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).

Consistency Analysis
The proposed project involves no septic tanks; therefore, this enforceable policy is not applicable.

H. 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).

Consistency Analysis
There would be temporary, negligible to minor, emissions resulting from the use of diesel-fuel equipment during construction, potentially including vessels and barges and/or land-based construction equipment such as dump trucks and excavators. However, these short-term emissions would be below *de minimis* levels, and a General Conformity analysis would not be required.

The proposed project would be fully consistent with the Air Pollution Control enforceable policy.

I. Coastal Lands Management

State-local cooperative program administered by DEQ's Water Division and 84 localities in Tidewater, Virginia established pursuant to the Chesapeake Bay Preservation Act (Virginia Code §§ 62.1-44.15:67 through 62.1-44.15:79) and Chesapeake Bay Preservation Area Designation and Management Regulations (Virginia Administrative Code 9 VAC 25-830-10 *et seq*.)

Consistency Analysis
The proposed project would stabilize the existing eroding shoreline within the Resource Protection Area and would further minimize sedimentation into the James River during substantial precipitation events. Land disturbance during construction would be minimized to the extent

practicable. Additionally, construction of the proposed project would be consistent 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.

The proposed project would be fully consistent with the Coastal Lands Management enforceable policy.

Advisory Policies for Geographic Area of Particular Concern

a. Coastal Natural Resource Areas

These areas are vital to estuarine and marine ecosystems and/or are of great importance to areas immediately inland of the shoreline. Such areas receive special attention from the Commonwealth because of their conservation, recreational, ecological, and aesthetic values. These areas are worthy of special consideration in any planning or resources management process and include the following resources: Wetlands, aquatic spawning, nursery, feeding grounds, coastal primary sand dunes, barrier islands, significant wildlife, habitat areas, public recreation areas, sand and gravel resources, and underwater historic sites.

Construction of the proposed project would result in temporary, negligible to minor water quality impacts and localized disturbance or the nearshore environment. However, these impacts would no longer occur once construction is complete. Upon construction completion, the stabilized shoreline would potentially minimize sedimentation during high precipitation events.

b. Coastal Natural Hazard Areas

This policy covers areas vulnerable to continuing and severe erosion and areas susceptible to potential damage from wind, tidal, and storm related events including flooding. New buildings and other structures should be designed and sited to minimize the potential for property damage due to storms or shoreline erosion. The areas of concern are as follows: Highly erodible areas, coastal high hazard areas, including floodplains.

The proposed shoreline project would result in the stabilization of a highly eroded shoreline along the James River and would improve the existing site conditions and minimize future safety concerns.

c. Waterfront Development Areas

These areas are vital to the Commonwealth because of the limited number of areas suitable for waterfront activities. The areas of concern are as follows: commercial ports, commercial fishing piers, and community waterfront.

The project area is located in a residential neighborhood; therefore, there are no commercial ports, commercial fishing piers, or community waterfronts located in the project area.

Advisory Policies for Shorefront Access Planning and Protection

a. Virginia Public Beaches

Approximately 25 miles of public beaches are located in the cities, counties, and towns of Virginia exclusive of public beaches on state and federal land. These public shoreline areas will be maintained to allow public access to recreational resources.

The proposed project would not impact a public beachfront/recreational area; there is no public access to the existing shoreline.

b. Virginia Outdoors Plan (VOP)

Planning for coastal access is provided by the DCR in cooperation with other state and local government agencies. The Virginia Outdoors Plan (VOP), which is published by the Department, identifies recreational facilities in the Commonwealth that provide recreational access. The VOP also serves to identify future needs of the Commonwealth in relation to the provision of recreational opportunities and shoreline access. Prior to initiating any project, consideration should be given to the proximity of the project site to recreational resources identified in the VOP.

If site access by water is required for construction, temporary, minor impacts to recreational boating activities in the nearshore environment may occur. Small, recreational vessels would be expected to avoid the nearshore environment during construction. The project would stabilize the existing shoreline and would not permanently adversely impact recreational resources.

c. Parks, Natural Areas, and Wildlife Management Areas

Parks, wildlife management areas, and natural areas are provided for the recreational pleasure of the citizens of the Commonwealth and the nation by local, state, and federal agencies. The recreational values of these areas should be protected and maintained.

The proposed project would have no impacts to parks, natural areas, or wildlife management areas.

d. Waterfront Recreational Land Acquisitions

It is the policy of the Commonwealth to protect areas, properties, lands, or any estate or interest therein, of scenic beauty, recreational utility, historical interest, or unusual features which may be acquired, preserved, and maintained for the citizens of the Commonwealth.

This project does not limit the ability of the Commonwealth of Virginia in any way to acquire, preserve, or maintain waterfront recreational lands.

e. Waterfront Recreational Facilities

This policy applies to the provision of boat ramps, public landings, and bridges which provide water access to the citizens of the Commonwealth. These facilities shall be designed, constructed, and maintained to provide points of water access when and where practicable.

This project does not involve the design, construction, or maintenance of any boat ramps, public landings, or bridges.

g. Waterfront Historic Properties

The Commonwealth has a long history of settlement and development, and much of that history has involved both shorelines and near-shore areas. The protection and preservation of historic shorefront properties is primarily the responsibility of the Department of Historic Resources. Buildings, structures, and sites of historical, architectural, and/or archaeological interest are significant resources for the citizens of the Commonwealth. It is the policy of the Commonwealth and the Virginia CZM Program to enhance the protection of buildings, structures, and sites of historical, architectural, and archaeological significance from damage or destruction when practicable.

No waterfront historic properties would be affected by this project. Coordination is underway with the State Historic Preservation Officer (SHPO) as required by Section 106 of the National Historic Preservation Act.

Determination

Based upon the following information, data, and analysis, the U.S. Army Corps of Engineers, Norfolk District, finds that the Continuing Authorities Program, Section 14, Emergency Streambank and Shoreline Protection Project, as evaluated in the draft Integrated Feasibility Report/Environmental Assessment is consistent to the maximum extent practicable with the enforceable policies of the Virginia Coastal Zone Management Program.

Pursuant to 15 CFR Section 930.41, the Virginia Coastal Zone Management Program has 60 days from receipt of this letter in which to concur with or object to this Consistency Determination, or to request an extension under CFR section 930.41 (b). Virginia's concurrence will be presumed if its response is not received by the U.S. Army Corps of Engineers on the 60th day from receipt of this determination.

Susan E. Layton

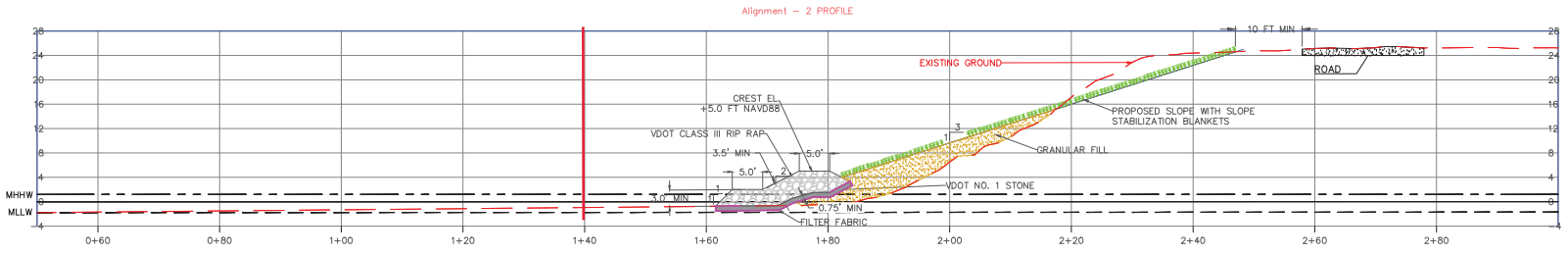
Digitally signed by Susan E. Layton
Date: 2020.09.29 12:11:13 -04'00'

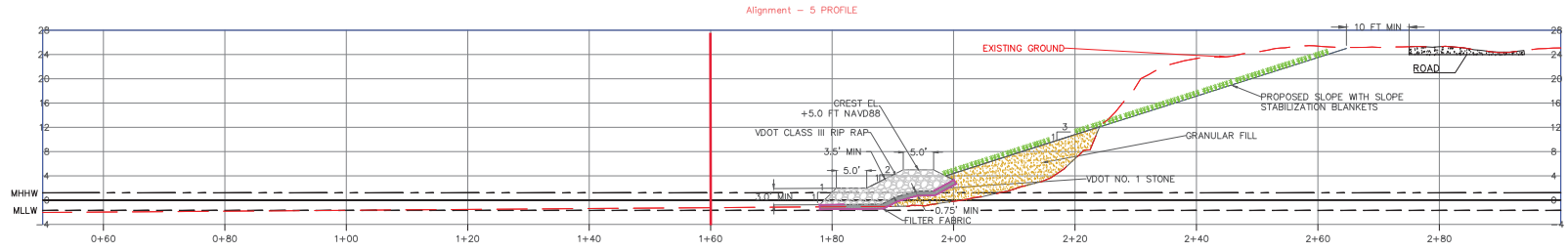
Date

Susan Layton
Chief, Planning and Policy
Norfolk District, USACE

DATUM DIAGRAM
1983–2001 NTDE
(SCALE 1"=1')

PROJECT SITE LOCATION (LONGITUDE: -76.460853, LATITUDE: 37.023014) NAVD88 – NOS MLW DATUM DIFFERENCE DERIVED BY NOAA VDATUM MODEL.





US Army Corps of Engineers®

MARK	DESCRIPTION	DATE

DESIGNED BY: K. MCELROY
DRAWN BY: L. MCELROY
CHECKED BY:
ISSUE DATE: 28 JANUARY 2020
SOLICITATION NO.:
CONTRACT NO.:
NAO FILE NO.:
SUBMITTED BY:
SIZE: ANSI D

U.S. ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
803 FRONT STREET
NORFOLK, VA 23510

CONTINUING AUTHORITIES PROGRAM (CAP)
JAMES RIVER SHORELINE STABILIZATION PROJECT

ALTERNATIVE 1

SHEET ID
C-002

ATTACHMENT 1 10% DESIGN

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
Street address: 1111 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 1105, Richmond, Virginia 23218
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Matthew J. Strickler
Secretary of Natural Resources

David K. Paylor
Director

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

November 20, 2020

U.S. Army Corps of Engineers
Norfolk District
Attn: Mr. Richard Harr
803 Front Street
Norfolk, Virginia 23510
Via email: richard.m.harr@usace.army.mil

RE: Draft Integrated Feasibility Report/Environmental Assessment and Federal Consistency Determination for the Emergency Streambank and Shoreline Protection, James River Shoreline, Newport News, Virginia, U.S. Army Corps of Engineers, DEQ 20-137F.

Dear Mr. Harr:

The Commonwealth of Virginia has completed its review of the Draft Integrated Feasibility Report/Environmental Assessment (EA) dated November 5, 2020 (received November 6, 2020) and Federal Consistency Determination (FCD) dated September 29, 2020 (received September 30, 2020) submitted by the U.S. Army Corps of Engineers Norfolk District for the above referenced project. The Department of Environmental Quality (DEQ) is responsible for coordinating Virginia's review of National Environmental Policy Act (NEPA) documents and responding to appropriate federal officials on behalf of the Commonwealth. DEQ is also responsible for coordinating Virginia's review of FCDs submitted pursuant to the Coastal Zone Management Act (CZMA) and providing the state's response. The following agencies and locality participated in the review of the EA and FCD:

Department of Environmental Quality
Department of Conservation and Recreation
Department of Wildlife Resources
Marine Resources Commission
Department of Health
Department of Historic Resources
Virginia Institute of Marine Science
City of Newport News

In addition, the Hampton Roads Planning District Commission was invited to comment on the proposal.

PROJECT DESCRIPTION

The U.S. Army Corps of Engineers (Corps) proposes to stabilize the streambank on a section of the James River in Newport News, Virginia. An approximate 600-foot section of the riverbank along the James River at River Road is severely eroded by the combined effects of natural erosion processes including river flow, water level rise, and tidal, storm, and wind driven wave action. The resulting 25-foot high receding bluff is an imminent threat to existing public facilities, causing continual loss of land, threatening existing public facilities, threatening existing public utilities, including River Road, electric, gas, communications, public water and sewer lines, as well as creating dangerous conditions associated with the steep slope. The majority of the project site is owned by the City of Newport News, however, there are several privately owned parcels within the project limits.

The Corps evaluated four alternatives including a No Action alternative. The Recommended Plan is Alternative 1-Rock Sill with Vegetated Slope. Alternative 1 consists of:

- installing a longitudinal rock sill running the length of the project area at a height of 5 feet (NAVD88);
- regrading the earthen slope berm to 1V:3H;
- removing 700 cubic yards of debris;
- placing 4,300 cubic yards of fill where needed;
- placing 1,600 square yards of geotextile filter fabric under 2,900 tons of VDOT Class III rip rap and 800 tons of VDOT number 1 stone; and
- seeding the vegetated slope with 35,000 square feet of seed to stabilize the earthen slope.

It is anticipated that the proposed project would be constructed in a manner to avoid the shoreline and existing residential pier on private property.

ENVIRONMENTAL IMPACTS AND MITIGATION

1. Water Quality and Wetlands. According to the EA (page 57), turbidity would increase along with total suspended solids in the nearshore environment during construction; however, turbidity impacts would be minimized by the use of turbidity curtains if determined feasible. Following construction completion, the existing water quality conditions would be expected to return to ambient conditions. Additionally, stabilization of the shoreline may slightly improve localized water quality by minimizing erosion and sedimentation impacts. The FCD (Appendix A-4, page 5) asserts that the proposed project would impact tidal, non-vegetated wetlands. There are no vegetated wetlands present at the project site; therefore, there would be no anticipated impacts to vegetated wetlands.

1(a) Agency Jurisdiction.

(i) Department of Environmental Quality

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.

(ii) Virginia Marine Resources Commission

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.

1(b) Agency Findings.

(i) Department of Environmental Quality

The VWP Permit Program at the DEQ Tidewater Regional Office (TRO) finds that 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.

(ii) Virginia Marine Resources Commission

VMRC indicates that tidal wetlands under its jurisdiction may be impacted by the Recommended Plan.

1(c) Requirements. Permanent and temporary impacts to jurisdictional waters will require permitting 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.* The permitting process is initiated upon the submission of a Joint Permit Application (JPA) to VMRC, which serves as the clearinghouse for JPA review process. VMRC will distribute the JPA to DEQ, Newport News Wetlands Board, and the Corps for review under applicable state, local and federal laws and regulations.

1(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.

1(e) CZMA Federal Consistency. The Recommended Plan is consistent to the maximum extent practicable with the wetlands management enforceable policy of the Virginia Coastal Zone Management (CZM) Program, provided any required permits and/or authorizations are obtained prior to construction (see Federal Consistency under the CZMA (pages 18 and 19) for additional information).

2. State Subaqueous Lands. The EA does not include a discussion of potential project impacts to state subaqueous lands. However, according to the Corp's FCD (EA, Appendix A-4, page 4), construction of the stone sill would occur channelward of mean low water on state-owned submerged land. A JPA would be submitted for review and a subaqueous permit secured from VMRC for impacts to state-owned submerged land.

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 placing a revetment at the toe of the existing slope (due to the long-term stability) would significantly reduce filling of subaqueous bottom.

2(c) Requirements. VMRC's eventual permit action and identification of specific permit conditions cannot be finalized until receipt of the required JPA and public interest permit review process. Any permit decision reached by the Commission will clarify the permit conditions that are necessary to insure project consistency with impacts to submerged lands.

2(d) CZMA Federal Consistency. The Recommended Plan will be consistent to the maximum extent practicable with the subaqueous lands management enforceable policy of the Virginia CZM Program provided the applicant obtains and complies with a permit issued by VMRC (see Federal Consistency under the CZMA (pages 18 and 19) for additional information).

3. Living Shorelines. According to the EA (page 36), a living shoreline alternative (Alternative 4-Living Shoreline with Vegetated Slope) was evaluated. Alternative 4 consists of regrading a portion of the slope to a 1V:4H, then transition to a 1V:10H for wetland planting, placement of filter fabric, and VDOT number 1 stone topped with VDOT Class III rip rap. Alternative 4 was screened from further consideration since it was found to have significantly higher costs than Alternative 1 (EA, page 37).

3(a) Agency Jurisdiction. During the 2020 Legislative Session, the Virginia General Assembly amended Title 28.2 of the Virginia Code to strengthen the Virginia Marine

Resources Commission's (VMRC) mandate to protect sensitive shorelines and wetlands. The amendment directs VMRC to approve only living shoreline approaches to shoreline stabilization unless those approaches are not suitable. VMRC shall stop granting permits allowing waterfront property owners to install a hardened shoreline unless the best available science shows that a living shoreline is unsuitable. In the event that a property qualifies for the exception, VMRC shall require the applicant to incorporate, to the maximum extent practicable, elements of living shoreline approaches.

3(b) Agency Findings. VMRC notes that its scientific advisors at the Virginia Institute of Marine Science (VIMS) suggest that this shoreline has experienced little or no erosion and questions the treatment of the site as a pending emergency (see VIMS comments attached). VIMS notes that data show long-term stability for the project shoreline, with minimal amounts of erosion and accretion since at least 1937 (Milligan *et al*. 2010). Therefore, further time can be afforded for refinement of the design to either incorporate living shoreline components or reduce direct impacts to subaqueous bottomland. The site is characterized by a high and steep bank with concrete rubble along much of the intertidal and nearshore area at the toe of the slope which creates an intertidal/nearshore area of low habitat value. However, the proposed project design only minimally increases the value of aquatic habitat. Modifying the slope and revetment design could create a living shoreline without compromising shoreline resilience. Unless alternatives analyses show these strategies to be infeasible, VMRC finds that the proposed design does not meet Virginia's new living shoreline requirements.

3(c) Recommendations. In light of the Commonwealth's new living shorelines legislation passed in 2020, VMRC and VIMS recommend consideration of either gapped breakwaters or larger cap rock along the length of the revetment to allow for aquatic faunal ingress/egress to a vegetated wetland constructed at the appropriate tidal elevations landward of the rock structure(s) and at the toe of a redesigned slope. If a living shoreline is shown to be impracticable, then placing the revetment at the toe of the existing bank should be considered to reduce the encroachment upon and filling of subaqueous bottomland. The long-term stability of this shoreline supports this as a likely viable option. The existing concrete rubble may be repurposed into revetment construction. It is further recommended that the project plans included in the JPA provide detailed information on how the project will tie-in to the shoreline along the existing pier and adjacent properties.

3(c) Requirements. VMRC's eventual permit action and the identification of specific permit conditions cannot be finalized until a JPA is received and the public interest permit review process is compete. Any permit decision reached by VMRC will clarify the permit conditions that are necessary to insure consistency with the living shoreline mandate.

For additional information contact VMRC, Jeff Madden at (757) 247-2276 or jeff.madden@mrc.virginia.gov and/or VIMS, Lyle Varnell at (804) 684-7764 or lyle@vims.edu.

4. Erosion and Sediment Control and Stormwater Management. The EA (page 57) states that turbidity would increase along with total suspended solids in the nearshore environment during construction; however, turbidity impacts would be minimized by the use of turbidity curtains if determined feasible. Additionally, the nearshore benthic environment is largely comprised of sand which would be expected to settle quickly from the water column following disturbance. Following construction completion, the existing water quality conditions would be expected to return to ambient conditions. Additionally, stabilization of the shoreline may slightly improve localized water quality by minimizing erosion and sedimentation impacts.

4(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).

4(b) Requirements.

(i) Erosion and Sediment Control and Stormwater Management Plans

The Corps 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 Chesapeake Bay Preservation Area would be regulated by *VESCL&R*. Accordingly, the Corps must prepare and implement erosion and sediment control (ESC) plans as individual projects are implemented to ensure compliance with state law and regulations. The ESC plans must be submitted to DEQ-TRO for review for compliance.

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 *VSWML&R*. Accordingly, the Corps must prepare and implement a Stormwater Management (SWM) plans as individual projects are implemented to ensure compliance with state law and regulations. The SWM plans must be submitted to DEQ-TRO for review for compliance.

The Corps 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 on Construction General Permit webpage. [Reference: Virginia Stormwater Management Act 62.1-44.15 *et seq*.; VSMP Permit Regulations 9 VAC 25-880 *et seq.*].

4(c) CZMA Federal Consistency. The Recommended Plan will be consistent to the maximum extent practicable with the nonpoint source pollution control enforceable policies of the Virginia CZM Program, provided the required permits and authorizations are obtained and complied with (see Federal Consistency Under the CZMA (pages 18 and 19) for additional information).

5. Air Emissions. According to the EA (pages 47 and 48), criteria pollutant air emissions would be produced from the combustion of fuels in heavy construction equipment. Particulate matter air emissions, such as fugitive dust, would potentially be produced from the ground-disturbing activities. Fugitive dust air emissions would vary depending on the work phase, level of activity, and prevailing weather conditions. Construction methods would incorporate best management practices (BMPs) to minimize fugitive dust emissions in accordance with 9 VAC 5060 *et seq*., including the use, where possible, the covering of open equipment for conveying materials; and

prompt removal of spilled or tracked dirt or other materials from the paved street and removal of dried sediments resulting from soil erosion.

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.

The Air Division regulates emissions of air pollutants from industries and facilities and implements programs designed to ensure that Virginia meets national air quality standards. The most common regulations associated with major State projects are:

- Open burning: 9 VAC 5-130 *et seq.*
- Fugitive dust control: 9 VAC 5-50-60 *et seq.*
- Permits for fuel-burning equipment: 9 VAC 5-80-1100 *et seq.*

5(b) Agency Findings. According to the DEQ Air Division, the project site is located in a designated ozone attainment and emission control area for volatile organic compounds (VOCs) and oxides of nitrogen (NO_x).

5(c) Recommendation. The Corps should take all reasonable precautions to limit emissions of VOCs and NO_x, principally by controlling or limiting the burning of fossil fuels.

5(d) Requirements.

(i) Fugitive Dust

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

If project activities include the open burning or use of special incineration devices for the disposal of land clearing debris, this activity must meet the requirements of 9 VAC 5-130-10 through 9 VAC 5-130-60 and 9 VAC 5-130-100of the *Regulations* for open burning, and it may require a permit. The *Regulations* provide for, but do not require, the local adoption of a model ordinance concerning open burning. The Corps should contact Newport News fire officials to determine what local requirements, if any, exist.

5(e) CZMA Federal Consistency. The Recommended Plan will be consistent to the maximum extent practicable with the air pollution control enforceable policy of the Virginia CZM Program, provided any required permits are obtained and complied with (see Federal Consistency under the CZMA (pages 18 and 19) for additional information).

6. Chesapeake Bay Preservation Areas. The EA does not discuss potential project impacts to Chesapeake Bay Preservation Areas. The FCD (Appendix A-4, page 6) states that the proposed project would stabilize the existing eroding shoreline within the Resource Protection Area and would further minimize sedimentation into the James River during substantial precipitation events. Land disturbance during construction would be minimized to the extent practicable. Additionally, construction of the proposed project would be consistent 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*.

6(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.

6(b) Chesapeake Bay Preservation Areas. DEQ-OWLGAP notes that, 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) as designated by the local government. 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.

RMA lands 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) Agency Findings. DEQ-OWLGAP finds that pursuant to 9 VAC 25-830-140(5)(a)(4) of the *Regulations*, shoreline erosion control projects are recognized as permitted modifications of the RPA. In order to maintain the functional value of the buffer area, existing trees and woody vegetation may be removed, necessary control techniques employed, and appropriate vegetation established to protect or stabilize the shoreline in accordance with the best available technical advice and applicable permit conditions or requirements.

6(c) Requirements. Land-disturbing activities in RPA and RMA must adhere to the general performance criteria of the *Regulations* (9 VAC 25-830-130), especially with respect to:

- minimizing land disturbance (including access and staging areas), and
- retaining indigenous vegetation and minimizing impervious cover.

For land disturbance over 2,500 square feet, the project must comply with the requirements of the *Virginia Erosion and Sediment Control Regulations* (9 VAC 25-840) and satisfy stormwater management criteria consistent with the water quality protection provisions of the *Virginia Stormwater Management Regulations* (9 VAC 25-870).

In addition to the general performance criteria, land disturbance, development, or redevelopment in locally designated RPAs shall be consistent with the development criteria in 9 VAC 25-830-140 of the *Regulations*, especially with respect to 9 VAC 25-830-140(1)(a) and -(6) that requires a water quality impact assessment (WQIA) for any proposed development within the RPA. The purpose of the WQIA is to identify the proposed impacts of land development or disturbance on water quality and lands in the RPA consistent with the goals and objectives of the Act, the *Regulations*, and local programs, and to determine specific measures for mitigation of those impacts.

6(d) CZMA Federal Consistency. The Recommended Plan will be consistent to the maximum extent practicable with the coastal lands management enforceable policy of

the Virginia CZM Program, provided all activities are conducted in accordance with the above conditions as administered by DEQ (see Federal Consistency Under the CZMA (pages 18 and 19) for additional information).

7. Floodplain Management. The EA (page 51) states that the implementation of Alternative 1 will have minor, permanent, and beneficial impacts to existing floodplain areas resulting from shoreline stabilization. While the public facilities, including River Road, electric, gas, communications, and public water and sewer lines, are at/near elevation 25 feet, NAVD88 and not located within the current effective FEMA 1- and 0.2-percent-annual-chance floodplains, without implementation of Alternative 1, they will over time possibly become at risk to damage associated with flooding.

7(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).

7(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 Navy is encouraged to reach out to the local floodplain administrator to ensure compliance with the local floodplain ordinance.

7(c) Recommendations. DCR recommends the Corps access the Virginia Flood Risk Information System (VFRIS) to find flood zone information.

8. Solid and Hazardous Wastes and Hazardous Materials. According to the EA (page 52), there is no evidence of environmental contamination in the region of impact (ROI); furthermore, there would be no anticipated releases of petroleum, hazardous, toxic, or radioactive waste with implementation of Alternative 1. The construction contract would include requirements to properly manage, store, and dispose of all fuels and materials generated by or used for the project.

8(a) Agency Jurisdiction. On behalf of the Virginia Waste Management Board, the DEQ Division of Land Protection and Revitalization (DEQ-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 (RCRA) and the Comprehensive Environmental Response Compensation Liability Act (CERCLA), 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, 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.

8(b) Agency Findings. 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 site. The search did not identify any waste sites within the project area which might impact the project.

8(c) Requirements.

(i) Solid and Hazardous Waste Management

Any soil that is suspected of contamination or wastes that are generated during construction 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. It is the applicant's responsibility to determine if a solid waste meets the criteria of a hazardous waste and be managed appropriately.

(ii) Petroleum Release

If evidence of a petroleum release is discovered during implementation of this project, the release must be reported to DEQ-TRO in accordance with Virginia Code §62.1-44.34.8 through 19 and 9 VAC 25-580-10 *et seq*. Petroleum-contaminated soils and groundwater must be handled in accordance with DEQ regulatory guidelines.

8(d) Recommendations. DEQ encourages the implementation of 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.

Questions and additional information regarding waste comments may be directed to DEQ-DLPR, Carlos Martinez at (804) 698-4575 or carlos.martinez@deq.virginia.gov.

9. 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. Contact the Department of Agriculture and Consumer Services at (804) 786-3501 for more information.

10. Natural Heritage Resources. The EA does not specifically address natural heritage resources. However, the EA (page 58) concluded that implementation of Alternative 1 would result in negligible to minor, temporary adverse impacts to wildlife.

10(a) Agency Jurisdiction.

(i) The Virginia Department of Conservation and Recreation's (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 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) The 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.

10(b) Agency Findings.

(i) Natural Heritage Resources

DCR-DNH searched its Biotics Data System (Biotics) for occurrences of natural heritage resources from the project area. According to the information currently in 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) State-listed Plant and Insect Species

DCR-DNH finds that the proposed activity will not affect any documented state-listed threatened and endangered plant or insect species.

(iii) State Natural Area Preserves

DCR finds that there are no State Natural Area Preserves under the agency's jurisdiction in the project vicinity.

10(c) Recommendation. Contact DCR-DNH to secure updated information on natural heritage resources if the scope of the project changes and/or six months passes before the project is implemented, since new and updated information is continually added to the Biotics Data System.

11. Wildlife Resources and Protected Species. According to the EA (page 55), the proposed action may affect, but is not likely to adversely affect the Atlantic sturgeon, shortnose sturgeon, leatherback sea turtle, Kemp's ridley sea turtle, hawksbill sea turtle, and loggerhead sea turtle which have the potential to occur in the ROI. In-water impacts associated with project construction would occur in the nearshore environment at shallow depths. The EA concludes that impacts to special status species would be less than significant with implementation of Alternative 1.

11(a) Agency Jurisdiction. The Virginia Department of Wildlife Resources (DWR) (formerly the Department of Game and Inland Fisheries), 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). DWR 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. DWR 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 DWR website.

11(b) Agency Findings.

(i) Atlantic Sturgeon

DWR documents the federal-listed Endangered Atlantic Sturgeon from the project area. The James River at this project site has been designated a Threatened and Endangered Species Water due to the presence of this species. The James River at this site also is designated a Confirmed Anadromous Fish Use Area due to the presence of other anadromous fish species.

(ii) Peregrine Falcon

DWR documents the state-listed Threatened Peregrine Falcon from the project area. They are known to nest on platforms/boxes located on the Route 17 bridge over the James River. However, based on the scope and location of the proposed work, DWR does not anticipate it to result in adverse impacts upon this species.

11(c) Recommendations.

(i) Anadromous Fish Species

The Corps 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 and August 1 through November 15 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 dam and pump-around for as limited a time as possible and return water to the stream free of sediment and excess turbidity.
- 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.

(iii) General Protection of Wildlife Resources

The following general recommendations should be considered to minimize project construction on wildlife resources:

- Adhere to a time-of-year restriction (TOYR) from March 15 through August 15 of any year, to protect resident and migratory songbird nesting from 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.
- Use native species for all plantings and use stabilization techniques that do not result in hardening of the shoreline which serves to impede habitat access by aquatic fauna.
- Employ stabilization techniques used for "living shoreline" development.

11(d) Conclusion. The Recommended Plan 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 (see Federal Consistency under the CZMA (pages 18 and 19) for additional information).

12. Historic and Archaeological Resources. According to the EA (page 49), the construction of the rock sill and associated vegetated slope to stabilize the shoreline would not result in impacts to known cultural resources, including historic building structures or known archeological sites. The Virginia Department of Historic Resources concurred with the Corp’s determination that no historic properties would be affected by the proposed undertaking on September 29, 2020.

12(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, 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 state and federal laws and how to submit an application for review: http://www.dhr.virginia.gov/StateStewardship/Index.htm.

12(b) Agency Findings. Pursuant to Section 106 of the National Historic Preservation Act, DHR has been in direct consultation with the Corps and its agents regarding this

project and the parties have reached consensus that the Recommended Plan (DHR File No. 2020-0430) will result in *no historic properties affected*.

For additional information, contact DHR, Sam Henderson at (804) 482-6088 or samantha.henderson@dhr.virginia.gov.

13. Water Supply. The EA does not indicate that the Recommended Plan would impact water supply sources.

13(a) Agency Jurisdiction. The 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.

13(b) Agency Findings. VDH-ODW finds there are no public groundwater wells within a 1-mile radius of the project site, no surface water intakes located within a 5-mile radius of the project site, and the project is not within the watershed of any public surface water intakes.

13(c) Conclusion. VDH-ODW concludes that there are no apparent impacts to public drinking water sources due to this project.

For additional information, contact VDH-ODW, Arlene Fields Warren at (804) 864-7781 or arlene.warren@vdh.virginia.gov.

14. Local Government Review.

14(a) Agency Jurisdiction. In accordance with CFR 930, Subpart A, § 930.6(b) of the *Federal Consistency Regulations*, DEQ, on behalf of the state, is responsible for securing necessary review and comment from other state agencies, the public, regional government agencies, and local government agencies, in determining the Commonwealth's concurrence or objection to a federal consistency certification.

14(b) Agency Findings. The City of Newport News supports the project and has no comments at this me.

For additional information, contact the City of Newport News, Craig Galant at (757) 926-8626 or galantcm@nnva.gov.

FEDERAL CONSISTENCY UNDER THE COASTAL ZONE MANAGEMENT ACT

Pursuant to the Coastal Zone Management Act of 1972, as amended, and federal consistency regulations (15 CFR Part 930, Sub-part C, § 930.30 *et seq*.), all federal agency activities affecting any coastal use or resource will be undertaken in a manner consistent to the maximum extent practicable with the enforceable policies of the Virginia Coastal Zone Management (CZM) Program. The Virginia CZM Program

consists of a network of programs administered by several agencies. DEQ coordinates the review of Federal Consistency Determinations with agencies administering the enforceable policies and advisory policies of the Virginia CZM Program. In order to be consistent with the Virginia CZM Program, all the applicable permits and approvals listed under the enforceable policies must be obtained prior to commencing the project.

A Federal Consistency Determination was submitted separately from the EA that includes an analysis of the enforceable policies of the Virginia CZM Program. Pursuant to 15 CFR §930.41(a), DEQ is allowed up to sixty days to conduct a coordinated review and respond to submitted consistency determinations. The sixty-day review period of the Corps' FCD began October 2, 2020 and ends November 24, 2020.

PUBLIC PARTICIPATION

In accordance with Title 15, Code of Federal Regulations (CFR), §930.2, the public was invited to participate in the review of the FCC. Public notice of the Proposed Action was published in OEIR's Program Newsletter and on the DEQ website from October 5, 2020 through October 30, 2020. No public comments were received in response to the notice.

FEDERAL CONSISTENCY ANALYSIS

According to information provided in the FCD and EA, the Recommended Plan would have no effect on the following enforceable policies: dunes management, point source pollution control, and shoreline sanitation. The resource agencies responsible for the administration of the enforceable policies of the Virginia CZM Program generally agree with the findings of the FCD. The Corps must ensure that the proposed action is consistent with the aforementioned policies. In addition, in accordance with 15 CFR, Subpart C, §930.39(c), DEQ encourages the Corps to consider project impacts on the advisory policies of the Virginia CZM Program.

FEDERAL CONSISTENCY CONCURRENCE

Based on our review of the FCD, EA and the comments and recommendations submitted by agencies administering the enforceable policies of the Virginia CZM Program, DEQ concurs that the Recommended Plan is consistent with the Virginia CZM Program, provided the Corps obtains and complies with all applicable permits and approvals associated with the enforceable policies of the Virginia CZM Program. If, prior to construction, the activities should change significantly and any of the enforceable policies of the Virginia CZM Program would be affected, pursuant to 15 CFR 930.46, the Corps must submit supplemental consistency determination to DEQ for review and concurrence. Other state approvals which may apply to this project are not included in this FCD. Therefore, the Corps must ensure that this project is constructed and operated in accordance with all applicable federal, state, and local laws and regulations.

REGULATORY AND COORDINATION NEEDS

1. Surface Waters and Wetlands. A VWP Permit from DEQ-TRO may be required for anticipated impacts to jurisdictional waters pursuant to Virginia Code §62.1-44.15:20 *et seq*. VMRC will clarify the permit conditions that are necessary to insure consistency with the state's living shoreline mandate. Tidal wetland impacts may require authorization from VMRC. The submission of a JPA to VMRC for any proposed impacts to jurisdictional waters will initiate reviews by DEQ, VMRC, Corps and the local wetlands board. For additional information and coordination, contact the DEQ-TRO VWP Permit program, Jeff Hannah at (757) 518-2146 or jeff.hannah@deq.virginia.gov and/or VMRC, Jeff Madden at (757) 247-2276 or jeff.madden@mrc.virginia.gov.

2. Subaqueous Lands Management. The Corps must coordinate with VMRC pursuant to Virginia Code §28.2-1200 through 1400, to obtain authorization for anticipated impacts to state subaqueous lands. For additional information and coordination, contact VMRC, Jeff Madden at (757) 247-2276 or jeff.madden@mrc.virginia.gov.

3. Nonpoint Source Pollution Control.

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) 493-1072 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) 493-1072 or courtney.smith@deq.virginia.gov.

4. Air Quality Regulation. This project may be subject to air quality regulations administered by DEQ. Guidance on minimizing the emission of volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) during construction may be obtained from DEQ-TRO staff. The following sections of Virginia Administrative Code may apply:

- fugitive dust and emissions control (9 VAC 5-50-60 *et seq*.); and
- open burning restrictions (9 VAC 5-130).

Contact local Newport News fire officials for information on any local requirements pertaining to open burning if applicable. For additional information and coordination,

contact DEQ-TRO, John Brandt at (757) 518-2010 or john.brandt@deq.virginia.gov.

5. Chesapeake Bay Preservation Areas. Project activities impacting RPA and RMA must comply with the *Regulations* (9 VAC 25-830-130 and 9 VAC 25-830-140) as administered by DEQ. In addition, land disturbance in RPAs shall be consistent with the development criteria in 9 VAC 25-830-140, with respect to 9 VAC 25-830-140(1)(a) and -(6) that requires a water quality impact assessment (WQIA) for development within the RPA. To ensure compliance with the *Regulations*, contact DEQ-OWLGAP, Amber Foster at (804) 698-4086 or amber.foster@deq.virginia.gov.

6. Floodplain Management. The Recommended Plan must comply with the Newport News floodplain ordinance. Local floodplain administrator contact information may be found in DCR's Local Floodplain Management Directory.

7. Solid and Hazardous Wastes.

7(a) Waste Management. All solid waste, hazardous waste, and hazardous materials must be managed in accordance with all applicable federal, state, and local environmental regulations. Contact DEQ-TRO, Sean Priest at (757) 518-2141 or sean.priest@deq.virginia.gov, for information on the 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.

7(b) Petroleum Contamination. If evidence of a petroleum release is discovered during implementation of the Proposed Action, contact the local fire marshal with any personal safety concerns and report the contamination to DEQ-TRO, Melinda Woodruff at (757) 518-2174 or melinda.woodruff@deq.virginia.gov (Virginia Code §62.1-44.34.8 through 9 and 9 VAC 25-580-10 *et seq.*).

8. Natural Heritage Resources. 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 passes before the Proposed Action is implemented, since new and updated information is continually added to the Biotics Data System.

9. Wildlife Resources. Contact DWR, Amy Ewing at (804) 367-2211 or amy.ewing@dwr.virginia.gov, on recommendations for the protection of aquatic and wildlife resources associated with the proposal.

Thank you for the opportunity to review and respond to the EA and FCD for the Emergency Streambank and Shoreline Protection, James River Shoreline, Newport News. Detailed comments of reviewing agencies are attached for your review. 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: Robbie Rhur, DCR
Amy Ewing, DWR
Emily Hein, VMRC
Roger Kirchen, DHR
Arlene Fields Warren, VDH
VIMS, Lyle Varnell
Craig Galant, Newport News
Ben McFarlane, HRPDC
Justine Woodward, Corps

DEPARTMENT OF ENVIRONMENTAL QUALITY
TIDEWATER REGIONAL OFFICE

Environmental Impact Review
Coordination Review

To: Office of Environmental Impact Review

From: Craig Nicol, Regional Director

Date: October 23, 2020

Project: ACOE Emergency Streambank, DEQ #20-137F

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)518-2141or jonathan.priest@deq.virginia.gov .

Stormwater:
A construction general permit (CGP) is required prior to commencement of land disturbing activities greater than 1 acre for the discharge of sediment from construction activities. An approved Erosion and Sediment Control Plan (<1 acre of land disturbance) or an approved Stormwater Management Plan (>1 acre of land disturbance) is required prior to commencement of any land disturbing activities. In addition, DEQ is the review authority for state and federal plan review and approval, within the Tidewater Region, 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. For additional information, contact Jeff Hannah, DEQ-TRO at (757)518-2146.

Water Permit Program (VPDES):

No comments as there does not appear to be any point source discharges of process water or wastewater associated with this project that would necessitate a VPDES permit.

Petroleum Storage Tank Program:

DEQ records do not indicate any reported petroleum releases along 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 Ms. Melinda Woodruff at (757) 518-2174. Petroleum-contaminated soils and ground water generated during implementation of this project must be properly characterized and disposed of properly.

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>

Fwd: NEW PROJECT ACOE Emergency Streambank, DEQ #20-137F

1 message

Henderson, Samantha <samantha.henderson@dhr.virginia.gov> Wed, Nov 4, 2020 at 4:34 PM
To: John Fisher <John.Fisher@deq.virginia.gov>

Dear Mr. Fisher:
Thank you for requesting comments from the Department of Historic Resources (DHR) on this project. Pursuant to Section 106 of the National Historic Preservation Act, DHR has been in direct consultation with *the US Army Corps of Engineers* and its agents regarding this project and the parties have reached consensus that the *James River Shoreline Stabilization* project (DHR File No. 2020-0430) will result in *no historic properties affected*. DHR has no further comment at this time.
Regards,
Sam Henderson, Archaeologist

Division of Review and Compliance

Commonwealth of Virginia

Fisher, John <john.fisher@deq.virginia.gov>

ESSLog# 40911_20-137F_JamesRiverShoreline_DWR_AME20201106

1 message

Ewing, Amy <amy.ewing@dwr.virginia.gov> Fri, Nov 6, 2020 at 10:35 AM
To: John Fisher <john.fisher@deq.virginia.gov>
Cc: Clinton Morgeson <clinton.morgeson@dwr.virginia.gov>

John,
We have reviewed the subject project that proposes to construct shoreline stabilization along the James River in Newport News. We document federal Endangered Atlantic Sturgeon from the project area. The James River at this project site has been designated a Threatened and Endangered Species Water due to the presence of this species. The James River at this site also is designated a Confirmed Anadromous Fish Use Area due to the presence of other Anadromous Fishes. To best protect these species from harm associated with instream work, we recommend that all such work associated with this shoreline stabilization adhere to a time of year restriction from February 15 through June 30 and August 1 through November 15 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. If a dam and pump-around must be used, we recommend it be used for as limited a time as possible and that water returned to the stream be free of sediment and excess turbidity. 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 state Threatened Peregrine Falcons from the project area. They are known to nest on platforms/boxes located on the Rt 17 bridge over the James River. 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 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.

We recommend use of native species for all plantings and use of stabilization techniques that do not result in hardening of the shoreline which serves to impede habitat access by aquatic fauna. We prefer stabilization techniques such as those employed during "living shoreline" development.

Assuming strict adherence to erosion and sediment control standards is maintained, we find this project to be consistent with the Fisheries Management Enforceable Policy of the Virginia Coastal Zone Management Program.

Thanks, Amy

Amy Martin Ewing
Environmental Services Biologist
Manager, Wildlife Information
P 804.367.2211
Department of Wildlife Resources
CONSERVE. CONNECT. PROTECT.
A 7870 Villa Park Drive, P.O. Box 90778, Henrico, VA 23228
www.VirginiaWildlife.gov

Commonwealth of Virginia

Fisher, John <john.fisher@deq.virginia.gov>

RE: NEW PROJECT ACOE Emergency Streambank, DEQ #20-137F

1 message

Galant, Craig M. <galantcm@nnva.gov> Wed, Oct 21, 2020 at 9:38 AM
To: "John.Fisher@deq.virginia.gov" <John.Fisher@deq.virginia.gov>, "Valerie.Fulcher@deq.virginia.gov" <Valerie.Fulcher@deq.virginia.gov>
Cc: "Bott, Louis J." <bottlj@nnva.gov>, "Stilley, Bryan" <stilleykb@nnva.gov>, "Emery, Marcelina M." <emerymm@nnva.gov>, "Clayton, Ralph L." <claytonrl@nnva.gov>, "Rohlf, Cynthia D." <rohlfcd@nnva.gov>

Mr. Fisher,

The City of Newport News supports the project and has no comments at this time.

Respectfully,

Craig M Galant, PE

Acting Director of Engineering

City of Newport News

2400 Washington Avenue, 8th Floor

Newport News, VA 23607

757.926.8626 office

757.503.2074 cell

Please see below/attached.

Commonwealth of Virginia

Fisher, John <john.fisher@deq.virginia.gov>

Re: NEW PROJECT ACOE Emergency Streambank, DEQ #20-137F

1 message

Warren, Arlene <arlene.warren@vdh.virginia.gov> Mon, Oct 26, 2020 at 8:26 AM
To: John Fisher <john.fisher@deq.virginia.gov>
Cc: rr Environmental Impact Review <eir@deq.virginia.gov>

Project Name: Emergency Streambank and Shoreline Protection, James River Shoreline, Newport News
Project #: 20-137F
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 to public water distribution systems or sanitary sewage collection systems **must be verified by the local utility.**

There are no public groundwater wells within a 1-mile radius of the project site.

There are no surface water intakes located within a 5-mile radius of the project site.

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

There are no apparent impacts to public drinking water sources due to this project.

The 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

109 Governor Street

Richmond, VA 23219

(804) 864-7781

October 23, 2020

Mr. John Fisher
Environmental Impact Review Coordinator
Virginia Department of Environmental Quality
P.O. Box 1105
Richmond, VA 23218

Dear Mr. Fisher:

In response to your request to assist DEQ in determining federal consistency the Virginia Institute of Marine Science has reviewed the preliminary plans for shoreline stabilization along the James River in Newport News, **DEQ #20-137F**, and offer the following recommendations.

Data show long-term stability for the project shoreline, with minimal amounts of erosion and accretion since at least 1937 (Milligan *et al*. 2010). Therefore, further time can be afforded for refinement of the design to either incorporate living shoreline components or reduce direct impacts to subaqueous bottomland. The site is characterized by a high and steep bank with concrete rubble along much of the intertidal and nearshore area at the toe of the slope which creates an intertidal/nearshore area of low habitat value. However, the proposed project design only minimally increases the value of aquatic habitat. Modifying the slope and revetment design could create a living shoreline without compromising shoreline resilience. We recommend consideration of either gapped breakwaters or larger cap rock along the length of the revetment to allow for aquatic faunal ingress/egress to a vegetated wetland constructed at the appropriate tidal elevations landward of the rock structure(s) and at the toe of a redesigned slope.

If a living shoreline is shown to be impracticable, then we further recommend consideration of placing the revetment at the toe of the existing bank to reduce the encroachment upon and filling of subaqueous bottomland. The long-term stability of this shoreline supports this as a likely viable option. The existing concrete rubble could possibly be repurposed into revetment construction.

We further recommend that the project plans included in the full joint permit application provide detailed information on how the project will tie-in to the shoreline along the existing pier and adjacent properties.

Thank you for the opportunity to provide comments, and we hope you find them constructive. Please contact me if you have questions or require further information.

Sincerely,

Lyle Varnell
Associate Director for Advisory Services

Reference

Milligan, D. A., O'Brien, K. P., Wilcox, C., & Hardaway, C. (2010) Shoreline Evolution: City of Newport News, Virginia James River and Hampton Roads Shorelines. Virginia Institute of Marine Science, William & Mary. https://doi.org/10.21220/V5ZB1W

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

November 20, 2020

Department of Environmental Quality
Office of Environmental Impact Review
Attn: John Fisher
P.O. Box 1105
Richmond, VA 23218

Re: Emergency Streambank and Shoreline Protection, James River Shoreline, Newport News

Dear Mr. Fisher

This will respond to the request for comments regarding the Coastal Zone Management Act Federal Consistency Determination for the Emergency Streambank and Shoreline Protection of the James River Shoreline project (DEQ # 20-137F) prepared by the Norfolk District, U.S Army Corps of Engineers, on behalf of the City of Newport News. Specifically, the USACE has proposed a shoreline stabilization project of approximately a 600-foot section of an eroded riverbank along the James River.

Please be advised that the VMRC, pursuant to §28.2-1200 et seq of the Code of Virginia, has jurisdiction over any encroachments in, on, or over the beds of the bays, ocean, rivers, streams, or creeks which are the property of the Commonwealth. 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.

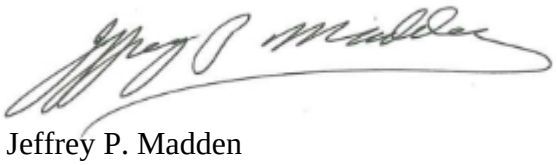
VMRC staff has reviewed the submittal and offers the following comments: Correspondence provided by our scientific advisors at VIMS suggests that this shoreline has experienced little or no erosion for at least the past 83 years, therefore, they question the documents treatment of the site as a pending emergency. Further in light of the Commonwealth's new living shorelines legislation passed in 2020, it is our and VIMS' opinion that the design could be modified to create a living shoreline using either gapped breakwaters, or a sill similar to the one proposed with either saddles or larger top stone to facilitate faunal ingress/egress. The slope could be modified to support wetlands vegetation at the proper tidal elevations. Another strategy could involve placing a revetment at the toe of the existing slope (due to the long-term stability) which would significantly reduce filling of subaqueous bottom. Unless alternatives analyses show these strategies to be infeasible, currently the proposed design does not meet Virginia's new living shoreline requirements.

Please be advised that the Commission's eventual permit action and identification of specific permit conditions cannot be finalized until our receipt of the required joint permit application and our public interest permit review process. Any permit decision reached by the Commission will clarify the permit conditions that are necessary to insure consistency with the submerged lands, tidal wetlands and marine

fishery elements of Virginia's Coastal Zone Management Program.

If you have any questions please contact me at 757-247-2276 or by email at jeff.madden@mrc.virginia.gov. Thank you for the opportunity to comment.

Sincerely,



Jeffrey P. Madden
Environmental Engineer, Habitat Management

JM/tlb
HM

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

Nathan Burrell
Deputy Director of Government and Community Relations

Thomas L. Smith
Deputy Director of Operations

MEMORANDUM

DATE: October 29, 2020

TO: John Fisher, DEQ

FROM: Roberta Rhur, Environmental Impact Review Coordinator

SUBJECT: DEQ 20-137F, ACOE: Emergency Streambank and Shoreline 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.

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@dwr.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

The remaining DCR divisions have no comments regarding the scope of this project. Thank you for the opportunity to comment.

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 and Federal Consistency Determination**
Project Sponsor: **Army Corps of Engineers**
Project Title: **Emergency Streambank and Shoreline Protection, James River Shoreline, Newport News**
Location: **City of Newport News**
Project Number: **DEQ #20-137F**

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: October 8, 2020**

MEMORANDUM

TO: John Fisher, DEQ/EIR Environmental Program Planner

FROM: Carlos A. Martinez, Division of Land Protection & Revitalization Review Coordinator

DATE: October 14, 2020

COPIES: Sanjay Thirunagari, Division of Land Protection & Revitalization Review Manager; file

SUBJECT: Environmental Impact Review: 20-137F Emergency Streambank and Shoreline Protection, James River Shoreline in the City of Newport News, Virginia.

The Division of Land Protection & Revitalization (DLPR) has completed its review of the Army Corps of Engineers' October 2, 2020 EIR for Emergency Streambank and Shoreline Protection, James River Shoreline in the City of 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 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 ACOE Emergency Streambank, DEQ #20-137F

1 message

Gavan, Lawrence <larry.gavan@deq.virginia.gov> Mon, Oct 5, 2020 at 10:44 AM
To: "Fisher, John" <john.fisher@deq.virginia.gov>

(a) Agency Jurisdiction. The DEQ administers the nonpoint source pollution control enforceable policy of the VCP through 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 Plan. The Applicant is responsible for submitting a project-specific erosion and sediment control (ESC) plan to the locality in which the project is located for review and approval pursuant to the local ESC requirements, if the project involves a land-disturbing activity of 10,000 square feet or more (2,500 square feet or more in a Chesapeake Bay Preservation Area). Depending on local requirements the area of land disturbance requiring an ESC plan may be less. The ESC plan must be approved by the locality prior to any land-disturbing activity at the project site. All regulated land-disturbing activities associated with the project, including on and off site access roads, staging areas, borrow areas, stockpiles, and soil intentionally transported from the project must be covered by the project specific ESC plan. Local ESC program requirements must be requested through the locality. [Reference: *Virginia Erosion and Sediment Control Law* §62.1-44.15 et seq.; *Virginia Erosion and Sediment Control Regulations* *9*VAC25-840-10 et seq.]

(c) Stormwater Management Plan. Depending on local requirements, a Stormwater Management (SWM) plan may be required. Local SWM program requirements must be requested through the locality. [Reference: *Virginia Stormwater Management Act* §62.1-44.15 et seq.; *Virginia Stormwater Management* (*VSMP*) *Permit Regulations* *9*VAC25-870-10 et seq.]

(d) 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 operator or owner of a construction project involving land-disturbing activities 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 (SWPPP). 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
(Reference: VSWML 62.1-44.15 et seq.; VSMP Permit Regulations 9VAC 25-880 et seq.)

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, U.S. Army Corps of Engineers

FROM: Amber Foster, DEQ Principal Environmental Planner

DATE: October 10, 2020

SUBJECT: Emergency Streambank and Shoreline Protection, James River Shoreline, Newport News

We have reviewed the information to support the Federal Consistency Determination 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 U.S. Army Corps of Engineers (USACE) is the lead federal agency for this feasibility study and the non-Federal sponsor is the City of Newport News. The study area is located entirely within the City of Newport News along the north bank of the James River, west of the James River Bridge (US-17/US-258). The project site is bound on the south by the Government Ditch, to the north by North Avenue, and extends eastward to River Road.

An approximate 600-foot section of the riverbank along the James River has been severely eroded by the combined effects of natural erosion processes, river flow, water level rise, and tidal, storm, and wind driven wave action. The resulting 25-foot high receding bluff is an

imminent threat to existing public facilities, causing continual loss of land, threatening existing public facilities, causing continual loss of land threatening existing public utilities, including River Road, electric, gas, communications, public water and sewer lines, as well as creating dangerous conditions associated with the steep slope.

The purpose of the proposed project, which has been identified as the Recommended Plan in the draft Integrated Feasibility Report/Environmental Assessment (IFR/EA), is to conduct a shoreline stabilization project to create safer bank conditions to reduce the public safety hazard resulting from the 25 foot bluff and to eliminate the current threat to existing public facilities. The majority of the project site is owned by the City of Newport News; however, there are several privately owned parcels within the project limits.

The proposed project would stabilize the existing eroding shoreline within the RPA and would further minimize sedimentation into the James River during substantial precipitation events. The project as proposed consists of the installation of an approximately 600-foot longitudinal rock sill graded on a 1:3 slope. It is anticipated that the proposed project would be constructed in a manner to avoid the shoreline and an existing residential pier on private property. The exact siting of the sill and advanced designs will be further developed during the Design / Implementation (DI) phase; however, it is anticipated that impacts would occur channelward of mean low water.

Pursuant to the *Coastal Zone Management Act of 1972*, as amended, federal activities affecting Virginia's coastal resources or coastal uses must be consistent with Virginia's Coastal Zone Management Program (CZM Program). These activities must be conducted in a manner "consistent to the maximum extent practicable" with the enforceable policies of the Virginia CZM Program. Those enforceable policies are administered through the *Chesapeake Bay Preservation Act* (Act) and Regulations.

Pursuant to 9 VAC 25-830-140(5)(a)(4) of the Regulations, shoreline erosion control projects are recognized as permitted modifications of the RPA. In order to maintain the functional value of the buffer area, existing trees and woody vegetation may be removed, necessary control techniques employed, and appropriate vegetation established to protect or stabilize the shoreline in accordance with the best available technical advice and applicable permit conditions or requirements.

Projects that include land disturbing activity in RPA and RMA must adhere to the general performance criteria of the Regulations (9 VAC 25-830-130), especially with respect to minimizing land disturbance (including access and staging areas), retaining indigenous vegetation and minimizing impervious cover. For land disturbance over 2,500 square feet, the project must comply with the requirements of the *Virginia Erosion and Sediment Control Regulations,* 9 VAC 25-840. Additionally, stormwater management criteria consistent with the water quality protection provisions of the *Virginia Stormwater Management Regulations*, 9 VAC 25-870, shall be satisfied.

In addition to the general performance criteria, land disturbance, development, or redevelopment in locally designated RPAs shall be consistent with the development criteria in § 9 VAC 25-830-

140 of the Regulations, especially with respect to 9 VAC 25-830-140(1)(a) and -(6) that requires a water quality impact assessment (WQIA) for any proposed development within the Resource Protection Area. The purpose of the WQIA is to identify the proposed impacts of land development or disturbance on water quality and lands in the RPA consistent with the goals and objectives of the Act, the Regulations, and local programs, and to determine specific measures for mitigation of those impacts.

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.

APPENDIX A-5
COORDINATION

CONTINUING AUTHORITIES PROGRAM, SECTION 14

EMERGENCY STREAMBANK AND SHORELINE PROTECTION

JAMES RIVER SHORELINE, NEWPORT NEWS

U.S. Army Corps
of Engineers
Norfolk District

Responses to Comments Received on the Draft Integrated Feasibility Report/Environmental Assessment for the Emergency Streambank and Shoreline Protection, James River Shoreline, Newport News, Virginia

Commenter	Date Received	Comment	Response
Commonwealth of Virginia, Department of Environmental Quality, Ms. Bettina Rayfield	November 20, 2020	Federal Consistency Concurrence Response, Appendix A-4	Thank you for providing the concurrence response to the Coastal Zone Management Federal Consistency Determination. The Corps will obtain and comply with all applicable permits and approvals associated with the enforceable policies of the Virginia CZM Program. A Joint Permit Application will be submitted to the Virginia Marine Resources Commission, and applicable permits/approvals will be secured prior to construction. If, prior to construction, the activities should change significantly and any of the enforceable policies of the Virginia CZM Program would be affected, the Corps would submit supplemental consistency determination to DEQ for review and concurrence pursuant to 15 CFR 930.46. The recommendations provided in the concurrence response will be incorporated as part of the project to the extent practicable. In response to VMRC's comments on page 6, the USACE evaluated a living shoreline approach as an alternative in the Integrated Feasibility Report/EA. The living shoreline alternative considered, would have a footprint that would extend further channelward than the Preferred Alternative, the stone sill and vegetated slope. Additionally, a minimum of 10 ft

			must be maintained from the top of the bank slope and the adjacent roadway. Grading the bank further landward to accommodate a living shoreline would not be considered feasible due to the constraints of the site. As designs advance in the next phase, further geotechnical studies and evaluations will be conducted to determine the exact siting of the stone sill. The USACE will continue to engage with VMRC as designs advance. Impacts to State-owned submerged land will be minimized to the extent practicable. During the Design and Implementation Phase, design refinements will be conducted for the project based on new field investigation and analyses as discussed in Chapter 12 of the Engineering Appendix. The project will comply with the requirements of the Virginia Erosion and Sediment Control Regulations (9 VAC 25-840) and satisfy stormwater management criteria consistent with the water quality protection provisions of the Virginia Stormwater Management Regulations (9 VAC 25-870).
Environmental Protection Agency, Ms. Carrie Traver	December 7, 2020	Comments in PDF Format are also provided in Appendix A-5. We recommend that the final Study and Finding of No Significant Impact (FONSI) address whether there has been specific outreach to affected property owners. If	Chapter 9 in the Final Integrated Report/EA has been updated to reflect the coordination that occurred during the release of the draft Integrated Feasibility Report/EA. Property owners adjacent to the project site were notified via certified mail of the release of the draft report. A

		outreach has not been conducted, we recommend developing an outreach plan and incorporating mitigation measures (e.g. access, noise mitigation measures, etc.) for homeowners as appropriate. 1.2 PURPOSE AND SCOPE The stated purpose of the proposed action is to stabilize the existing shoreline along the 600-foot section of the James River and prevent future erosion resulting from the combined effects of storm surge, sea level rise, and stormwater runoff. While the erosion processes and sea level rise are described in detail, the role and specific sources of stormwater runoff did not appear to be addressed in the study. If uncontrolled stormwater is contributing to the instability, we recommend that stormwater management be discussed and incorporated into the project plans. 5.4 DESIGN AND CONSTRUCTION CONSIDERATIONS Based on the information provided, we concur that additional studies, including geotechnical exploration be performed during the design phase. We also recommend reviewing the completed studies and projects (as discussed in Section 1.5) along the James River to inform the final design. 5.5 While equipment and operation would vary during construction, the typical noise indicated for backhoes and loaders is 80 and 85 decibels approximately 50 feet from the source. The EA	virtual public meeting was held on November 19, 2020 with participation by residents along River Road. Further outreach will be conducted in conjunction with the City of Newport News as designs advance in the next phase of the project. 1.2 PURPOSE AND SCOPE The current feasibility study includes a 10% design level. Stormwater management will be further discussed and incorporated into the project plans, as determined necessary, as designs advance in the next phase of the project. 5.4 DESIGN AND CONSTRUCTION CONSIDERATIONS Other completed projects along the James River were given consideration during the development of the alternatives, including the bank stabilization and living shoreline project constructed by the City of Newport News in 2016 at the Mariners Museum (Kettle Pond) approximately 1-2 miles upstream of the proposed project site. No noise-related concerns were raised by the public, including adjacent property owners, during the public review of the draft Integrated Feasibility Report/EA or during the virtual public meeting conducted on November 19, 2020. There are currently no proposed noise mitigation measures proposed. All noise levels

		states that the homes located along River Road are approximately 60-70 feet from the project site. We recommend that the temporary noise impacts be further evaluated to support the conclusion that these impacts would be less than significant. As the construction is in close proximity to residences, noise mitigation measures may be appropriate. We recommend working with potentially impacted homeowners to address impacts of construction noise on residents, especially children or others who may be sensitive to noise. 6.11 OCCUPATIONAL HEALTH AND SAFETY While this section focuses on occupational health, public safety considerations clearly factor into the purpose of the project. We recommend discussing the project's potential benefits and any negative effects on public safety in both the long term (project life) and short-term (construction), including how construction hazards will be addressed (e.g. fencing, signage, etc.). 6.15 VEGETATION, WETLANDS, AND SUBMERGED VEGETATION We note that the EA indicates full compliance with Executive Order 13112 but does not appear to include a discussion of the project's potential to spread or reduce invasive species, including the Phragmites australis identified in the project area (Section 2.3.15). We recommend measures to prevent introducing or	would be in compliance with federal, state, and local noise regulations. 6.11 OCCUPATIONAL HEALTH AND SAFETY The project will improve the existing site conditions by replacing the steep, eroded slope with a stable, 3:1 slope which would improve the long-term safety of the site. The placement of signage may be considered by the City of Newport News following completion of the project. During the construction of the project, the contractor would be required to ensure the safety of the site and may utilize methods such as fencing and/or signage as determined necessary. 6.15 VEGETATION, WETLANDS, AND SUBMERGED LANDS Additional text has been added to Section 6.15 to address this comment and ensure compliance with Executive Order 13112. The native seed species/types will be identified during the design phase of the project. Potential species were identified during the feasibility phase and as part of the Final Integrated Feasibility Report/EA. 6.18 TRANSPORTATION As stated in Chapter 5.4, Design and Construction Considerations, the Contractor shall take into consideration the ability of property owners to access their properties at all times. Additionally, traffic control may need to be taken into

		spreading invasive species during construction be added to the applicable plans. 6.18 TRANSPORTATION It is noted that portions of River Road adjacent to the project site may be temporarily closed during construction, which could affect access to residential property. We recommend stating if measures will be taken to ensure property access. 6.19 CUMULATIVE IMPACTS Section 6.19 notes that if the existing stone protection is not maintained by the private property owner, this could increase the vulnerability of the proposed rock sill to failure. We recommend clarifying if there is an agreement in place for maintenance or if it will be sought. 6.2 AIR QUALITY Under the general conformity rule, reasonably foreseeable emissions associated with all operational and construction activities, both direct and indirect, should be quantified and compared to the annual de minimis levels for those pollutants in nonattainment or maintenance for that area. Section 6.2 concludes that impacts to air quality would be less than significant; however, no analysis of emissions was found in the EA. We recommend that this analysis be included in the appendices.	consideration by the Contractor. The roadway shall have enough space to allow emergency vehicles to access the properties. 6.19 CUMULATIVE IMPACTS The Real Estate Plan is included in Appendix B and includes preliminary estimates of impacts and potential required property rights and interests. 6.2 AIR QUALITY Emissions resulting from the use of diesel-fuel equipment during construction, such as dump trucks and excavators would be temporary and only occur during the construction of the project. As required by the Virginia DEQ, fugitive dust would 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. There are no additional operational air quality impacts associated with the project only negligible to minor, temporary impacts associated with construction. Therefore, impacts to air quality would be less than significant. The USACE has determined that no additional analysis of emissions is necessary. 6.6 FISHERY RESOURCES AND ESSENTIAL FISH HABITAT During the Design and Implementation Phase, further details will be available regarding monitoring necessary to ensure

		6.6 FISHERY RESOURCES AND ESSENTIAL FISH HABITAT As indicated, minimizing turbidity is important to minimize potential effects to resources such as Essential Fish Habitat and shellfish grounds. The EA states that Best Management Practices (BMPs) such as the use of a turbidity curtain would be implemented if feasible to reduce turbidity during construction. We suggest stating when this would be evaluated. If a turbidity curtain is not feasible, we recommend that other BMPs be identified. We also recommend identifying the monitoring that will be done to maintain all erosion and sediment control measures both during and after construction. As discussed in the ENGINEERING APPENDIX (Appendix C) -12.0 Preconstruction Engineering and Design (PED) Consideration, updated surveys during PED are critical to develop accurate construction plans and specifications and ensure the success of the project. Such surveys include an updated topographic and bathymetric survey, an evaluation of the current condition of the existing pier and the existing rock sill on the private property, and conditions of any additional private piers or structures that may be constructed. We recommend that Final IFR/EA list the additional surveys that will be conducted for final design. We note that the draft FONSI includes this statement: “Comments from state and federal agency review did not result in any changes to the final IFR/EA.” While we assume that this is	erosion and sediment controls are maintained both during and after construction. Additionally, the feasibility of using a turbidity will also be further evaluated. Section 12 of the Engineering Appendix (Appendix C) included in the Final Integrated Feasibility Report/EA identifies the recommended Design and Implementation Phase considerations which include updated topographic and bathymetric surveys, another geotechnical exploration, and re-examination of existing pier assumptions. The language is the draft FONSI is language from the template. All comments received on the draft Integrated Feasibility Report/EA have been considered and incorporated as appropriate.

		language from the template, we hope that all comments will be fully considered and incorporated as appropriate. .	
Department of Conservation and Recreation Division of Natural Heritage, Tyler Meader	December 7, 2020	Please see PDF in A-5.	Thank you for your comments.
U.S. Fish and Wildlife Service	March 25, 2021	However, the Service would like the Corps to reconsider the potential for a greener shoreline. Under Alternatives Considered but Dismissed, breakwaters were mentioned. For fish and wildlife resources, segmented breakwaters would offer a greener shoreline instead of a rock sill with Alternative 4. Because of the ability to reduce erosion, improve marine habitat and spawning area, improve water quality, and even potential to filter stormwater and groundwater runoff, the Service recommends an alternative with living shoreline and to consider including oyster reef structures and/or segmented breakwater to promote submerged land habitat quality and provide the most benefits for fish and wildlife resources.	Breakwaters were not carried forward as a reasonable alternative due to the following: 1) required modeling that would likely put the cost over the cost limit allowed for CAP Section 14; 2) breakwaters do not reduce wind erosion; and 3) breakwaters could impact the existing piers and the additional real estate cost associated with those impacts would likely put the cost over the cost limit allowed for CAP Section 14. The USACE evaluated a living shoreline approach as an alternative in the Integrated Feasibility Report/EA. The living shoreline alternative considered, would have a footprint that would extend further channelward than the Preferred Alternative, the stone sill and vegetated slope. Additionally, a minimum of 10 ft must be maintained from the top of the bank slope and the adjacent roadway. Grading the bank further landward to accommodate a living shoreline would not be considered feasible due to the

			constraints of the site. As designs advance in the next phase, further geotechnical studies and evaluations will be conducted to determine the exact siting of the stone sill.
Sharon and Brent Mathison	December 3, 2020	First of all, thank you to you and the city for making these needed improvements. We do have a few questions/concerns: 1. We want to retain our water rights to the river. We purchased this home and the price reflects this. We were very close to pier approval. We halted this as word of improvements became known. 2. What is the timeline? Paperwork indicates several years and that doesn't work well for us since we have a boat and want a place to put it soon. 3. How much work will be done from water vs land? 4. We have a tree we want protected. 5. We have paver patio and driveway and fence. We don't want disrupted. 6. We have stairs existing to water will those remain intact? 7. We have been working on grass will this and plantings be fixed upon completion?	(Note: A copy of this comment/response is also provided in PDF following this table.) The easement we are looking obtain is the bank protection easement. This will not impact your riparian rights, but it could impact your ability to build a dock. The verbiage for the Bank Protection Easement is as follows: BANK PROTECTION EASEMENT. A perpetual and assignable easement and right-of-way in, on, over and across the land hereinafter described for the location, construction, operation, maintenance, alteration, repair, rehabilitation and replacement of a bank protection works, and for the placement of stone, riprap and other materials for the protection of the bank against erosion; together with the continuing right to trim, cut, fell, remove and dispose therefrom all trees, underbrush, obstructions, and other vegetation; and to remove and dispose of structures or obstructions within the limits of the right-of-way; and to place thereon dredged, excavated or other fill material, to shape and grade said land to desired

		8. What is $25,000 real-estate allocation for? 9. Is it possible to start the slope further from road than 10 feet? This would maximize our property. It is our understanding that our property went out another 25 feet. Essentially to recap. Mainly, we don't want to give up our water rights or have a disruption to our view. If these are possible we will be in support of project. Thanks, Sharon and Brent Mathison	slopes and contour, and to prevent erosion by structural and vegetative methods and to do any other work necessary and incident to the project; together with the right of ingress and egress for such work; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however to existing easements for public roads and highways, public utilities, railroads and pipelines. The approval of the Final CAP Decision Document as of today is scheduled for February 26, 2021. If the alternative identified in the feasibility study is approved by the North Atlantic Division (NAD) and the City of Newport News, the Norfolk District will then execute a Project Partnership Agreement, prepare plans and specifications, then manages construction of the project. This ultimately depends on the contractor of how they can and will approach the project. The primary constructability issue for this project is site access. Access by water will be difficult as the project site is in shallow water. Access and staging by land will also be difficult as there is limited space available at the top of the slope bank on which to stage and stockpile materials and equipment without

			impacting the adjacent roadway. Construction in tight quarters tends to take longer, which increases costs, and may be more dangerous for the workers. Impacts to the roadways will need to be managed to ensure that the adjacent private property owners maintain access to their properties and driveways. A solution to this issue is potentially providing an offsite staging area to the contractor, one that is somewhat nearby the site where most of the required equipment and materials can be staged which can be moved to the site as needed for construction. Therefore, at the site the contractor will only require smaller stockpiles. We have not selected which trees have to be removed. The design phase will select which trees need to be removed. Trees within 10-15 feet of the structure will need to be removed to protect the integrity of the project. The City of Newport News has related to the Norfolk District on January 19, 2021 that the paver patio, driveway, and fence that an Encroachment Agreement will need to be executed between the homeowner and the City. The City also stated that the stairway would need to be removed for the project and would be in contact with the homeowner to discuss a resolution.

			The City of Newport News related to the Norfolk District on January 19, 2021 that the City Attorney had met with the previous owner and the previous homeowner's Attorney. The City related to the Norfolk District that and extensive tile search was conducted. The City found evidence that the property line went to mean low water (MLW) along the 15-foot strip. Virginia Marine Resources Commission (VMRC) was then consulted regarding a permit for the construction of the pier that has not been built as of today. We would need to know where these planting are to be able to answer this question and this can be evaluated in the design phase. This is for the Federal Administrative costs, to work with the NFS to ensure the proper Real Estate interests are acquired for the project, certify the lands available and execute the authorization for entry for construction. The start of the slope will be evaluated in the Engineering design. The project will be required to minimize environmental impacts.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 30, 2021

SUBJECT: Continuing Authorities Program, Section 14, Emergency Streambank and Shoreline Protection, James River Shoreline Newport News, Virginia Response to Comments on Draft Integrated Feasibility Report/Environmental Assessment

Ms. Bettina Rayfield
Virginia Department of Environmental Quality
Office of Environmental Impact Review
P.O. Box 1105
Richmond, VA 23218-1105

Dear Ms. Rayfield:

The U.S. Army Corps of Engineers (USACE) Norfolk District has received your comments, dated November 20, 2020 concerning the Draft Integrated Feasibility Report/Environmental Assessment and Federal Consistency Determination for the Emergency Streambank and Shoreline Protection, James River Shoreline, Newport News, Virginia, DEQ 20-137F. All comments submitted during the public comment period were carefully reviewed to better inform USACE during the development of the Final Integrated Feasibility Report/Environmental Assessment.

The USACE will obtain and comply with all applicable permits and approvals associated with the enforceable policies of the Virginia CZM Program. A Joint Permit Application will be submitted to the Virginia Marine Resources Commission (VMRC), and applicable permits/approvals will be secured prior to construction. If, prior to construction, the activities should change significantly and any of the enforceable policies of the Virginia Coastal Zone Management Program would be affected, the USACE would submit a supplemental consistency determination to DEQ for review and concurrence pursuant to 15 CFR 930.46. The recommendations provided in the concurrence response will be incorporated as part of the project to the extent practicable.

In response to the VMRC's comments on page 6, the USACE evaluated a living shoreline approach as an alternative in the Integrated Feasibility Report/EA. The living shoreline alternative considered, would have a footprint that would extend further channelward than the Preferred Alternative, the stone sill and vegetated slope. Additionally, a minimum of 10 feet must be maintained from the top of the bank slope and the adjacent roadway. Grading the bank further landward to accommodate a

living shoreline would not be considered feasible due to the constraints of the site. As designs advance in the next phase, further geotechnical studies and evaluations will be conducted to determine the exact siting of the stone sill. The USACE will continue to engage with VMRC as designs advance. Impacts to State-owned submerged land will be minimized to the extent practicable. During the Design and Implementation Phase, design refinements will be conducted for the project based on new field investigation and analyses as discussed in Chapter 12 of the Engineering Appendix.

The project will comply with the requirements of the Virginia Erosion and Sediment Control Regulations (9 VAC 25-840) and satisfy stormwater management criteria consistent with the water quality protection provisions of the Virginia Stormwater Management Regulations (9 VAC 25-870).

Thank you for your comments on the Draft Integrated Feasibility Report/Environmental Assessment. Please do not hesitate to contact me at (757) 201-7728 or via email at justine.r.woodward@usace.army.mil if you have any questions.

Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 30, 2021

SUBJECT: Continuing Authorities Program, Section 14, Emergency Streambank and Shoreline Protection, James River Shoreline Newport News, Virginia Response to Comments on Draft Integrated Feasibility Report/Environmental Assessment

Ms. Carrie Traver
U.S. Environmental Protection Agency, Region 3
1650 Arch Street – 3RA12
Philadelphia, PA 19103

Dear Ms. Traver:

The U.S. Army Corps of Engineers (USACE) Norfolk District has received your comments, dated December 7, 2020 concerning the Draft Integrated Feasibility Report/Environmental Assessment (EA) for the Emergency Streambank and Shoreline Protection, James River Shoreline, Newport News, Virginia. All comments submitted during the public comment period were carefully reviewed to better inform USACE during the development of the Final Integrated Feasibility Report/Environmental Assessment. Below are responses to your comments:

We recommend that the final Study and Finding of No Significant Impact (FONSI) address whether there has been specific outreach to affected property owners. If outreach has not been conducted, we recommend developing an outreach plan and incorporating mitigation measures (e.g. access, noise mitigation measures, etc.) for homeowners as appropriate.

Chapter 9 in the Final Integrated Report/EA has been updated to reflect the coordination that occurred during the release of the Draft Integrated Feasibility Report/EA. Property owners adjacent to the project site were notified via certified mail of the release of the draft report. A virtual public meeting was held on November 19, 2020 with participation by residents along River Road. Further outreach will be conducted in conjunction with the City of Newport News as designs advance in the next phase of the project.

The stated purpose of the proposed action is to stabilize the existing shoreline along the 600-foot section of the James River and prevent future erosion resulting from the combined effects of storm surge, sea level rise, and stormwater runoff. While the erosion processes and sea level rise are described in detail, the role and specific

sources of stormwater runoff did not appear to be addressed in the study. If uncontrolled stormwater is contributing to the instability, we recommend that stormwater management be discussed and incorporated into the project plans.

The current feasibility study includes a 10% design level. Stormwater management will be further discussed and incorporated into the project plans, as determined necessary, as designs advance in the next phase of the project.

Based on the information provided, we concur that additional studies, including geotechnical exploration be performed during the design phase. We also recommend reviewing the completed studies and projects (as discussed in Section 1.5) along the James River to inform the final design.

Other completed projects along the James River were given consideration during the development of the alternatives, including the bank stabilization and living shoreline project constructed by the City of Newport News in 2016 at the Mariners Museum (Kettle Pond) approximately 1-2 miles upstream of the proposed project site.

While equipment and operation would vary during construction, the typical noise indicated for backhoes and loaders is 80 and 85 decibels approximately 50 feet from the source. The EA states that the homes located along River Road are approximately 60-70 feet from the project site. We recommend that the temporary noise impacts be further evaluated to support the conclusion that these impacts would be less than significant. As the construction is in close proximity to residences, noise mitigation measures may be appropriate. We recommend working with potentially impacted homeowners to address impacts of construction noise on residents, especially children or others who may be sensitive to noise.

No noise-related concerns were raised by the public, including adjacent property owners, during the public review of the Draft Integrated Feasibility Report/EA or during the virtual public meeting conducted on November 19, 2020. There are currently no proposed noise mitigation measures proposed. All noise levels would be in compliance with federal, state, and local noise regulations.

While this section focuses on occupational health, public safety considerations clearly factor into the purpose of the project. We recommend discussing the project's potential benefits and any negative effects on public safety in both the long term (project life) and short-term (construction), including how construction hazards will be addressed (e.g. fencing, signage, etc.).

The project will improve the existing site conditions by replacing the steep, eroded slope with a stable, 3:1 slope which would improve the long-term safety of the site. The

placement of signage may be considered by the City of Newport News following completion of the project. During the construction of the project, the contractor would be required to ensure the safety of the site and may utilize methods such as fencing and/or signage as determined necessary.

We note that the EA indicates full compliance with Executive Order 13112 but does not appear to include a discussion of the project's potential to spread or reduce invasive species, including the Phragmites australis identified in the project area (Section 2.3.15). We recommend measures to prevent introducing or spreading invasive species during construction be added to the applicable plans.

Additional text has been added to Section 6.15 to address this comment and ensure compliance with Executive Order 13112. The native seed species/types will be identified during the design phase of the project. Potential species were identified during the feasibility phase and as part of the Final Integrated Feasibility Report/EA.

It is noted that portions of River Road adjacent to the project site may be temporarily closed during construction, which could affect access to residential property. We recommend stating if measures will be taken to ensure property access.

As stated in Chapter 5.4, Design and Construction Considerations, the Contractor shall take into consideration the ability of property owners to access their properties at all times. Additionally, traffic control may need to be taken into consideration by the Contractor. The roadway shall have enough space to allow emergency vehicles to access the properties.

Section 6.19 notes that if the existing stone protection is not maintained by the private property owner, this could increase the vulnerability of the proposed rock sill to failure. We recommend clarifying if there is an agreement in place for maintenance or if it will be sought.

The Real Estate Plan is included in Appendix B and includes preliminary estimates of impacts and potential required property rights and interests.

Under the general conformity rule, reasonably foreseeable emissions associated with all operational and construction activities, both direct and indirect, should be quantified and compared to the annual de minimis levels for those pollutants in nonattainment or maintenance for that area. Section 6.2 concludes that impacts to air quality would be less than significant; however, no analysis of emissions was found in the EA. We recommend that this analysis be included in the appendices.

Emissions resulting from the use of diesel-fuel equipment during construction, such as dump trucks and excavators would be temporary and only occur during the construction of the project. As required by the Virginia Department of Environmental Quality (DEQ), fugitive dust would 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. There are no additional operational air quality impacts associated with the project only negligible to minor, temporary impacts associated with construction. Therefore, impacts to air quality would be less than significant. The USACE has determined that no additional analysis of emissions is necessary.

As indicated, minimizing turbidity is important to minimize potential effects to resources such as Essential Fish Habitat and shellfish grounds. The EA states that Best Management Practices (BMPs) such as the use of a turbidity curtain would be implemented if feasible to reduce turbidity during construction. We suggest stating when this would be evaluated. If a turbidity curtain is not feasible, we recommend that other BMPs be identified. We also recommend identifying the monitoring that will be done to maintain all erosion and sediment control measures both during and after construction.

During the Design and Implementation Phase, further details will be available regarding monitoring necessary to ensure erosion and sediment controls are maintained both during and after construction. Additionally, the feasibility of using a turbidity will also be further evaluated.

As discussed in the ENGINEERING APPENDIX (Appendix C) -12.0 Preconstruction Engineering and Design (PED) Consideration, updated surveys during PED are critical to develop accurate construction plans and specifications and ensure the success of the project. Such surveys include an updated topographic and bathymetric survey, an evaluation of the current condition of the existing pier and the existing rock sill on the private property, and conditions of any additional private piers or structures that may be constructed. We recommend that Final IFR/EA list the additional surveys that will be conducted for final design. We note that the draft FONSI includes this statement: "Comments from state and federal agency review did not result in any changes to the final IFR/EA." While we assume that this is language from the template, we hope that all comments will be fully considered and incorporated as appropriate.

Section 12 of the Engineering Appendix (Appendix C) included in the Final Integrated Feasibility Report/EA identifies the recommended Design and Implementation Phase considerations which include updated topographic and bathymetric surveys, another geotechnical exploration, and re-examination of existing pier assumptions.

The language is the draft FONSI is language from the template. All comments received on the Draft Integrated Feasibility Report/EA have been considered and incorporated as appropriate.

Thank you for your comments on the Draft Integrated Feasibility Report/EA. Please do not hesitate to contact me at (757) 201-7728 or via email at justine.r.woodward@usace.army.mil if you have any questions.

Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

(Comments received from Sharon and Brent Mathison via email on December 3, 2020)

First of all, thank you to you and the city for making these needed improvements.

We do have a few questions/concerns:

1. We want to retain our water rights to the river. We purchased this home and the price reflects this. We were very close to pier approval. We halted this as word of improvements became known.

The easement we are looking obtain is the bank protection easement. This will not impact your riparian rights, but it could impact your ability to build a dock. The verbiage for the Bank Protection Easement is as follows:

BANK PROTECTION EASEMENT.
A perpetual and assignable easement and right-of-way in, on, over and across the land hereinafter described for the location, construction, operation, maintenance, alteration, repair, rehabilitation and replacement of a bank protection works, and for the placement of stone, riprap and other materials for the protection of the bank against erosion; together with the continuing right to trim, cut, fell, remove and dispose therefrom all trees, underbrush, obstructions, and other vegetation; and to remove and dispose of structures or obstructions within the limits of the right-of-way; and to place thereon dredged, excavated or other fill material, to shape and grade said land to desired slopes and contour, and to prevent erosion by structural and vegetative methods and to do any other work necessary and incident to the project; together with the right of ingress and egress for such work; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however to existing easements for public roads and highways, public utilities, railroads and pipelines.

2. What is the timeline? Paperwork indicates several years and that doesn't work well for us since we have a boat and want a place to put it soon.

The approval of the Final CAP Decision Document as of today is scheduled for February 26, 2021. If the alternative identified in the feasibility study is approved by the North Atlantic Division (NAD) and the City of Newport News, the Norfolk District will then execute a Project Partnership Agreement, prepare plans and specifications, then manages construction of the project.

3. How much work will be done from water vs land?

This ultimately depends on the contractor of how they can and will approach the project. The primary constructability issue for this project is site access. Access by water will be difficult as the project site is in shallow water. Access and staging by land will also be difficult as there is limited space available at the top of the slope bank on which to stage and stockpile materials and equipment without impacting the adjacent roadway. Construction in tight quarters tends to take longer, which increases costs, and may be more dangerous for the workers. Impacts to the roadways will need to be managed to ensure that the adjacent private property owners maintain access to their properties and driveways. A solution to this issue is potentially providing an offsite staging area to the contractor, one that is somewhat nearby the site where most of the required equipment and materials can be staged which can be moved to the site as needed for construction. Therefore, at the site the contractor will only require smaller stockpiles.

4. We have a tree we want protected.

We have not selected which trees have to be removed. The design phase will select which trees need to be removed. Trees within 10-15 feet of the structure will need to be removed to protect the integrity of the project.

5. We have paver patio and driveway and fence. We don't want disrupted.

The City of Newport News has related to the Norfolk District on January 19, 2021 that the paver patio, driveway, and fence that an Encroachment Agreement will need to be executed between the homeowner and the City. The City also stated that the stairway would need to be removed for the project and would be in contact with the homeowner to discuss a resolution.

6. We have stairs existing to water will those remain in-tact?

The City of Newport News related to the Norfolk District on January 19, 2021 that the City Attorney had met with the previous owner and the previous homeowner's Attorney. The City related to the Norfolk District that and extensive tile search was conducted. The City found evidence that the property line went to mean low water (MLW) along the 15-foot strip. Virginia Marine Resources Commission (VMRC) was then consulted regarding a permit for the construction of the pier that has not been built as of today.

7. We have been working on grass will this and plantings be fixed upon completion?

We would need to know where these planting are to be able to answer this question and this can be evaluated in the design phase.

8. What is $25,000 real-estate allocation for?

This is for the Federal Administrative costs, to work with the NFS to ensure the proper Real Estate interests are acquired for the project, certify the lands available and execute the authorization for entry for construction.

9. Is it possible to start the slope further from road than 10 feet? This would maximize our property. It is our understanding that our property went out another 25 feet.

The start of the slope will be evaluated in the Engineering design. The project will be required to minimize environmental impacts.

Essentially to recap. Mainly, we don't want to give up our water rights or have a disruption to our view. If these are possible, we will be in support of project.

Thanks,

Sharon and Brent Mathison

Woodward, Justine R CIV USARMY CENAO (USA)

From: Traver, Carrie <Traver.Carrie@epa.gov>
Sent: Monday, December 7, 2020 5:16 PM
To: Woodward, Justine R CIV USARMY CENAO (USA)
Cc: Rudnick, Barbara; Nevshehirlian, Stepan
Subject: [Non-DoD Source] RE: CAP 14 Emergency Streambank and Shoreline Stabilization James River, Newport News draft Feasibility Report/Environmental Assessment

Dear Justine,

Thank you for providing the notice that The U.S. Army Corps of Engineers, Norfolk District has prepared a draft Integrated Feasibility Report (IFR) and Environmental
Assessment (EA or Study) to evaluate the impacts associated with Section 14 Emergency Streambank and Shoreline Protection, James River Shoreline, Newport News, Virginia. The Feasibility Study is authorized by the Continuing Authorities Program (CAP), Section 14 of the Flood Control Act of 1946, as amended.

In response, the U.S. Environmental Protection Agency (EPA) is providing recommendations for your consideration in the development of the Final EA and Finding of No Significant Impact in compliance with the National Environmental Policy Act (NEPA) of 1969, the Council of Environmental Quality regulations implementing NEPA (40 CFR 1500-1508), and Section 309 of the Clean Air Act.

The Recommended Plan would stabilize the bank with a rock sill and vegetated slope. As described in the Draft Real Estate Plan, the proposed action will impact 8 parcels of land, 5 of which are privately owned. Easements from 4 parcels are needed for the bank protection work and maintenance and one may be used for the temporary work area. There are also existing and proposed private facilities (e.g. piers) that may be impacted. As described, the willingness of the property owners to work with the federal and nonfederal sponsors may affect the implementation of the project and/or cost. These property owners may also have concerns about the projects impacts or have requests to minimize impacts. For example, while it is not anticipated that trees would be replanted on the adjacent upland following construction, certain property owners may want replacement of their trees. We recommend that the final Study and Finding of No Significant Impact (FONSI) address whether there has been specific outreach to affected property owners. If outreach has not been conducted, we recommend developing an outreach plan and incorporating mitigation measures (e.g. access, noise mitigation measures, etc.) for homeowners as appropriate.

We have several additional comments, listed by section:

1.2 PURPOSE AND SCOPE
The stated purpose of the proposed action is to stabilize the existing shoreline along the 600-foot section of the James River and prevent future erosion resulting from the combined effects of storm surge, sea level rise, and stormwater runoff. While the erosion processes and sea level rise are described in detail, the role and specific sources of stormwater runoff did not appear to be addressed in the study. If uncontrolled stormwater is contributing to the instability, we recommend that stormwater management be discussed and incorporated into the project plans.

5.4 DESIGN AND CONSTRUCTION CONSIDERATIONS
Based on the information provided, we concur that additional studies, including geotechnical exploration be performed during the design phase. We also recommend reviewing the completed studies and projects (as discussed in Section 1.5) along the James River to inform the final design.

6.10 NOISE AND VIBRATION

While equipment and operation would vary during construction, the typical noise indicated for backhoes and loaders is 80 and 85 decibels approximately 50 feet from the source. The EA states that the homes located along River Road are approximately 60-70 feet from the project site. We recommend that the temporary noise impacts be further evaluated to support the conclusion that these impacts would be less than significant.

As the construction is in close proximity to residences, noise mitigation measures may be appropriate. We recommend working with potentially impacted homeowners to address impacts of construction noise on residents, especially children or others who may be sensitive to noise.

6.11 OCCUPATIONAL HEALTH AND SAFETY

While this section focuses on occupational health, public safety considerations clearly factor into the purpose of the project. We recommend discussing the project's potential benefits and any negative effects on public safety in both the long term (project life) and short-term (construction), including how construction hazards will be addressed (e.g. fencing, signage, etc.)

6.15 VEGETATION, WETLANDS, AND SUBMERGED VEGETATION

We note that the EA indicates full compliance with Executive Order 13112 but does not appear to include a discussion of the project's potential to spread or reduce invasive species, including the *Phragmites australis* identified in the project area (Section 2.3.15). We recommend measures to prevent introducing or spreading invasive species during construction be added to the applicable plans.

As described in Section 4, 5.5, 6.1 and other sections, a native vegetated seed mix will be planted on the slope. We concur that planting native, noninvasive species is an important aspect of the project, as a riverbank location can further spread invasive species. However, Section 6.15 describes the likely planting plan to include nonnative warm season grasses, including Bermuda grass and zoysia. Fescue is also listed as potential vegetation; fescue can be native or nonnative, with some species invasive in Virginia. We recommend that potential native plants or seed mixes be identified.

6.18 TRANSPORTATION

It is noted that portions of River Road adjacent to the project site may be temporarily closed during construction, which could affect access to residential property. We recommend stating if measures will be taken to ensure property access.

6.19 CUMULATIVE IMPACTS

Section 6.19 notes that if the existing stone protection is not maintained by the private property owner, this could increase the vulnerability of the proposed rock sill to failure. We recommend clarifying if there is an agreement in place for maintenance or if it will be sought.

6.2 AIR QUALITY

Under the general conformity rule, reasonably foreseeable emissions associated with all operational and construction activities, both direct and indirect, should be quantified and compared to the annual de minimis levels for those pollutants in nonattainment or maintenance for that area. Section 6.2 concludes that impacts to air quality would be less than significant; however, no analysis of emissions was found in the EA. We recommend that this analysis be included in the appendices.

6.6 FISHERY RESOURCES AND ESSENTIAL FISH HABITAT

As indicated, minimizing turbidity is important to minimize potential effects to resources such as Essential Fish Habitat and shellfish grounds. The EA states that Best Management Practices (BMPs) such as the use of a turbidity curtain would be implemented if feasible to reduce turbidity during construction. We suggest stating when this would be evaluated. If a turbidity curtain is not feasible, we recommend that other BMPs be identified. We also recommend identifying the monitoring that will be done to maintain all erosion and sediment control measures both during and after construction.

OTHER

- As discussed in the ENGINEERING APPENDIX (Appendix C) -12.0 Preconstruction Engineering and Design (PED) Consideration, updated surveys during PED are critical to develop accurate construction plans and specifications and ensure the success of the project. Such surveys include an updated topographic and bathymetric survey, an evaluation of the current condition of the existing pier and the existing rock sill on the private property, and conditions of any additional private piers or structures that may be constructed. We recommend that Final IFR/EA list the additional surveys that will be conducted for final design.
- We note that the draft FONSI includes this statement: "Comments from state and federal agency review did not result in any changes to the final IFR/EA." While we assume that this is language from the template, we hope that all comments will be fully considered and incorporated as appropriate.
- We found Figures 2-19, 20 and 21 in Section 2.4.2 to be very helpful in illustrating the specific alternatives considered.

We appreciate your coordination with our office. I would appreciate if you would email a copy of (or link to) the Final EA when available. Please feel free to contact me if you would like to discuss this project or others.

Thank you,
Carrie

Carrie Traver
Life Scientist
Office of Communities, Tribes, & Environmental Assessment
U.S. Environmental Protection Agency, Region 3
1650 Arch Street – 3RA12
Philadelphia, PA 19103
215-814-2772
traver.carrie@epa.gov

From: Woodward, Justine R CIV USARMY CENAO (USA) <Justine.R.Woodward@usace.army.mil>
Sent: Friday, November 06, 2020 2:33 PM
To: Rudnick, Barbara <Rudnick.Barbara@epa.gov>
Cc: Traver, Carrie <Traver.Carrie@epa.gov>
Subject: CAP 14 Emergency Streambank and Shoreline Stabilization James River, Newport News draft Feasibility Report/Environmental Assessment

Hi Barbara and Carrie,

Please see the attached notification letter for the release of the CAP 14 Emergency Streambank and Shoreline Protection, James River, Newport News Draft Integrated Feasibility Report and Environmental Assessment.

You should also receive a DoD SAFE link to download the draft report files. If you have any questions, please don't hesitate to contact me. Have a great weekend!

Regards,
Justine

Justine Woodward
Biologist
Environmental Analysis Section
Norfolk District, U.S. Army Corps of Engineers
803 Front Street
Norfolk, VA 23510

757-201-7728

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

Nathan Burrell
Deputy Director of Government and Community Relations

Thomas L. Smith
Deputy Director of Operations

December 7, 2020

Justine Woodward
USACE-Norfolk District
803 Front Street
Norfolk, VA 23510

Re: James River Newport News Shoreline CAP 14 Emergency Streambank and Shoreline Protection

Dear Ms. Woodward:

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.

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 Virginia Department of Conservation and Recreation (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 Wildlife Resources (VDWR) 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 https://vafwis.dgif.virginia.gov/fwis/ or contact Ernie Aschenbach at 804-367-2733 or Ernie.Aschenbach@dwr.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
Natural Heritage Locality Liaison

Samantha J. Henderson
Project Review Archaeologist
Review and Compliance Division
Virginia Department of Historic Resources
2801 Kensington Avenue | Richmond, VA 23221
(804) 482-6088 | samantha.henderson@dhr.virginia.gov

DHR is currently teleworking. Please consider contacting me via email rather than via a phone call as I am not at my desk.

Woodward, Justine R CIV USARMY CENAO (USA)

From: Caitlin Rogers <caitlin.rogers@catawba.com>
Sent: Monday, December 14, 2020 12:21 PM
To: Woodward, Justine R CIV USARMY CENAO (USA)
Subject: [Non-DoD Source] Emergency Streambank and Shoreline Protection

Ms. Woodward,

The Catawba THPO have no concerns with this project. If you need anything else let me know. Thanks

Caitlin

Caitlin Rogers
Catawba Indian Nation
Tribal Historic Preservation Office
1536 Tom Steven Road
Rock Hill, SC 29730

803-328-2427 ext. 226
*** Please note that my email has changed to Caitlin.Rogers@catawba.com ***

Please Note: We CANNOT accept Section 106 forms via e-mail, unless requested. Please send us hard copies. Thank you for your understanding

From:	Terry Clouthier
To:	Woodward, Justine R CIV USARMY CENAO (USA)
Cc:	Layton, Susan E CIV (USA)
Subject:	[Non-DoD Source] RE: CAP 14 Emergency Streambank and Shoreline Stabilization James River, Newport News draft EA
Date:	Monday, November 23, 2020 2:26:47 PM

Good Afternoon Ms. Woodward,

My office will not be providing comments for the draft EA. Unless an inadvertent find is made during construction, we have no objections or comments on this project. If an inadvertent find is made – please contact my office as recommended in our September 30 letter.

Feel free to email if you have any questions

Sincerely,

Terry Clouthier
Pamunkey Indian Tribe
Cultural Resource Director

From: Woodward, Justine R CIV USARMY CENAO (USA) <Justine.R.Woodward@usace.army.mil>
Sent: Friday, November 6, 2020 3:38 PM
To: Terry Clouthier <terry.clouthier@pamunkey.org>
Subject: CAP 14 Emergency Streambank and Shoreline Stabilization James River, Newport News draft EA

Dear Mr. Clouthier,

Please see attached correspondence regarding the public release of the CAP 14 Emergency Streambank and Shoreline Protection, James River, Newport News, VA Draft Integrated Feasibility Report and Environmental Assessment. A hard copy of the letter has also be sent via certified mail.

Please don't hesitate to contact me if you have any questions.

Regards,
Justine

Justine Woodward
Biologist
Environmental Analysis Section
Norfolk District, U.S. Army Corps of Engineers
803 Front Street
Norfolk, VA 23510
757-201-7728

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 9, 2020

Ms. Barbara Rudnick
NEPA Program Manager
Office of Communities, Tribes & Environmental Assessment
1650 Arch Street #3RA10
Philadelphia, Pennsylvania 19103-2029

Dear Ms. Rudnick:

The U.S. Army Corps of Engineers (USACE) Norfolk District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

The approximate 600 linear foot section of shoreline is located west of the James River Bridge and between Government Ditch and North Avenue immediately adjacent to River Road and is severely eroded resulting from the combined effects of natural erosion processes, tidal storm and wave action, and stormwater runoff. The 25-foot high receding bluff is an imminent threat to existing public facilities and River Road as a result of the continued erosion. The following website has been established for the project: www.nao.usace.army.mil/About/Projects/JamesRiverNewportNewsShoreline/.

The joint feasibility study/Environmental Assessment (EA) will consider alternative shoreline stabilization measures and evaluate the impacts to the human and natural environment pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA) and the Council of Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations 1500 – 1508).

The USACE requests comments to determine the scope of content to be included in the draft feasibility study/EA. Comments may include, but are not limited to, the range of resources areas to be analyzed, potential alternatives, and data needs.

To submit scoping comments, please contact: Justine Woodward by email: justine.r.woodward@usace.army.mil; or telephone: (757) 201-7728. Please submit comments by May 11, 2020.

Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

Enclosure 1

Enclosure 1. Study Area for James River Shoreline Stabilization Project.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 9, 2020

Ms. Christine Vaccaro
Protected Resources Division
NOAA Fisheries, Greater Atlantic Region
55 Great Republic Drive
Gloucester, MA 01930-2276

Dear Ms. Vaccaro:

The U.S. Army Corps of Engineers (USACE) Norfolk District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

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To submit scoping comments, please contact: Justine Woodward by email: justine.r.woodward@usace.army.mil; or telephone: (757) 201-7728. Please submit comments by May 11, 2020.

Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 9, 2020

Mr. David O'Brien
Fisheries Biologist
NOAA Fisheries Service
P.O. Box 1346
Gloucester Point, VA 23062-1346

Dear Mr. O'Brien:

The U.S. Army Corps of Engineers (USACE) Norfolk District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

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To submit scoping comments, please contact: Justine Woodward by email: justine.r.woodward@usace.army.mil; or telephone: (757) 201-7728. Please submit comments by May 11, 2020.

Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

Enclosure 1

Enclosure 1. Study Area for James River Shoreline Stabilization Project.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 9, 2020

Ms. Allison Lay
Virginia Marine Resources Commission
Building 96, 380 Fenwick Rd
Ft. Monroe, VA 23651-1064

Dear Ms. Lay:

The U.S. Army Corps of Engineers Norfolk (USACE) District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

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To submit scoping comments, please contact: Justine Woodward by email: justine.r.woodward@usace.army.mil; or telephone: (757) 201-7728. Please submit comments by May 11, 2020.

Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

Enclosure 1

Enclosure 1. Study Area for James River Shoreline Stabilization Project.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 9, 2020

Amy Ewing
Virginia Department of Game and Inland Fisheries
P.O. Box 90778
Henrico, VA 23228-0778

Dear Ms. Ewing:

The U.S. Army Corps of Engineers (USACE) Norfolk District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

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The USACE requests comments to determine the scope of content to be included in the draft feasibility study/EA. Comments may include, but are not limited to, the range of resources areas to be analyzed, potential alternatives, and data needs.

To submit scoping comments, please contact: Justine Woodward by email: justine.r.woodward@usace.army.mil; or telephone: (757) 201-7728. Please submit comments by May 11, 2020.

Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

Enclosure 1

Enclosure 1. Study Area for James River Shoreline Stabilization Project.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 9, 2020

Rene Hypes
Virginia Department of Conservation and Recreation
Division of Natural Heritage
600 East Main Street, 24th Floor
Richmond, VA 23219

Dear Ms. Hypes:

The U.S. Army Corps of Engineers (USACE) Norfolk District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

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To submit scoping comments, please contact: Justine Woodward by email: justine.r.woodward@usace.army.mil; or telephone: (757) 201-7728. Please submit comments by May 11, 2020.

Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

Enclosure 1

Enclosure 1. Study Area for James River Shoreline Stabilization Project.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 9, 2020

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

Dear Ms. Fulcher:

The U.S. Army Corps of Engineers (USACE) Norfolk District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

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The USACE requests comments to determine the scope of content to be included in the draft feasibility study/EA. Comments may include, but are not limited to, the range of resources areas to be analyzed, potential alternatives, and data needs.

To submit scoping comments, please contact: Justine Woodward by email: justine.r.woodward@usace.army.mil; or telephone: (757) 201-7728. Please submit comments by May 11, 2020.

Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

Enclosure 1

Enclosure 1. Study Area for James River Shoreline Stabilization Project.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 9, 2020

Samantha Henderson
Virginia Department of Historic Resources
2801 Kensington Avenue
Richmond, VA 23221-2470

Dear Ms. Henderson:

The U.S. Army Corps of Engineers (USACE) Norfolk District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

The approximate 600 linear foot section of shoreline is located west of the James River Bridge and between Government Ditch and North Avenue immediately adjacent to River Road and is severely eroded resulting from the combined effects of natural erosion processes, tidal storm and wave action, and stormwater runoff. The 25-foot high receding bluff is an imminent threat to existing public facilities and River Road as a result of the continued erosion. The following website has been established for the project: www.nao.usace.army.mil/About/Projects/JamesRiverNewportNewsShoreline/.

The joint feasibility study/Environmental Assessment (EA) will consider alternative shoreline stabilization measures and evaluate the impacts to the human and natural environment pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA) and the Council of Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations 1500 – 1508).

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To submit scoping comments, please contact: Justine Woodward by email: justine.r.woodward@usace.army.mil; or telephone: (757) 201-7728. Please submit comments by May 11, 2020.

Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

Enclosure 1

Enclosure 1. Study Area for James River Shoreline Stabilization Project.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 9, 2020

Mr. Troy Andersen
Supervisory Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
6669 Short Lane
Gloucester, VA 23061- 4410

Dear Mr. Andersen:

The U.S. Army Corps of Engineers (USACE) Norfolk District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

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The USACE requests comments to determine the scope of content to be included in the draft feasibility study/EA. Comments may include, but are not limited to, the range of resources areas to be analyzed, potential alternatives, and data needs.

To submit scoping comments, please contact: Justine Woodward by email: justine.r.woodward@usace.army.mil; or telephone: (757) 201-7728. Please submit comments by May 11, 2020.

Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

Enclosure 1

Enclosure 1. Study Area for James River Shoreline Stabilization Project.

From:	Fulcher, Valerie
To:	Kotur Narasimhan; Carlos Martinez; Lawrence Gavan; Daniel Moore; Holly Sepety; Nicol, Craig; rr dgif-ESS Projects; Roberta Rhur; odwreview (VDH); Michelle Henicheck; Allison Lay; Ben McFarlane; Everett Skipper
Cc:	Woodward, Justine R CIV USARMY CENAO (USA)
Subject:	[Non-DoD Source] NEW SCOPING REQUEST-Shoreline Stabilization, James River, City of Newport News
Date:	Monday, April 13, 2020 2:21:20 PM
Attachments:	James River Stabilization - Scoping Response.pdf DEQ_JRNN_Shoreline Stabilization_Scoping letter 20200409.pdf

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

Shoreline Stabilization, James River, City of Newport News

If you choose to make comments, please send them directly to the project sponsor (Justine.R.Woodward@usace.army.mil <mailto:Justine.R.Woodward@usace.army.mil>) and copy the DEQ Office of Environmental Impact Review: eir@deq.virginia.gov <mailto:eir@deq.virginia.gov> . We will coordinate a review when the environmental document is completed.

DEQ-OEIR's scoping response is also attached.

If you have any questions regarding this request, please email our office at eir@deq.virginia.gov <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 <mailto:Valerie.Fulcher@deq.virginia.gov>

Blockedhttp://www.deq.virginia.gov/Programs/EnvironmentalImpactReview.aspx

For program updates and public notices please subscribe to Constant Contact:
Blockedhttps://lp.constantcontact.com/su/MVcCump/EIR

From: Traver, Carrie
To: Woodward, Justine R CIV USARMY CENAO (USA)
Cc: Rudnick, Barbara
Subject: [Non-DoD Source] James River Shoreline Stabilization Project NEPA Scoping Notice
Date: Thursday, May 7, 2020 4:30:14 PM

Dear Justine:

The U.S. Environmental Protection Agency (EPA) received notice that U.S. Army Corps of Engineers (USACE) Norfolk District and the City of Newport News are conducting a feasibility study and preparing an Environmental Assessment (EA or Study) for a shoreline stabilization project along the north bank of the James River in the City of Newport News. The EA is being done in compliance with the National Environmental Policy Act (NEPA) of 1969, Section 309 and CEQ regulations implementing NEPA. Thank you for notifying us. We have several recommendations for your consideration in the development of the EA:

Purpose and Need
According to the April 9, 2020 letter, an approximately 600-foot section of riverbank along the James River is severely eroded and the 25-foot high receding bluff is an imminent threat to existing public utilities (including electric, gas, communications, public water and sewer lines) and River Road. The notice and website indicate that the erosion is caused by several processes, include river flow, stormwater runoff, water level rise, and tidal, storm and wind driven wave action.

As part of the Study, we recommend that the specific sources and cause of erosion be further discussed, including if there is a dominant process or processes driving or accelerating erosion, any previous stabilization measures in the vicinity or other efforts to reduce impacts from these erosional processes, and predicted water level rise scenarios. We recommend this detailed discussion to inform the selection of potential alternatives as well as the preferred alternative.

Alternatives
The notice indicates that several alternatives were considered, and the final array of alternatives includes: a Rock Sill with Vegetated Berm, Stone Revetment, Stone Revetment with Vegetated Berm, or a Living Shoreline, along with the no the action alternative. Generally, 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 thoroughly evaluated. To support your study, evaluation of other recent studies of shoreline stabilization in Virginia may be helpful.

Potential measures that address the sources of degradation and enhance long-term stability of the restoration effort may also warrant consideration in the Study (e.g. additional stormwater controls.)

Impacts
Biological Resources - Wildlife, Vegetation, and Aquatic Resources
We recommend that the EA provide an assessment of the habitat resources and species present in the study area, including: fauna, such as birds, fish, shellfish, and other aquatic species; submerged aquatic vegetation (SAV); species of special concern including Atlantic Sturgeon; wetlands; tidal flats, and any other rare and/or high value resource types present in the study area.

The EA should include a discussion of positive or adverse impacts to fauna and their habitat, including disturbance, sedimentation, and noise during construction, disturbance to submerged aquatic vegetation, and contribution to or amelioration of water quality impairments. Permanent or temporary impacts for construction should be evaluated.

We suggest that the EA include consideration of minimization measures, including time of year restrictions, avoidance of potential impacts to sensitive life stages (migration, spawning, nesting, etc.) and best management practices to mitigate noise, sedimentation and other impacts.

We recommend that correspondence regarding potential impacts to state and federal threatened and endangered

species, including consultation with National Marine Fisheries Service, US Fish and Wildlife Service, and state agencies be documented in the Study.

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

Human environment -Social, Economic, and Community Impacts
We suggest that potential temporary or permanent impacts to boating, fishing, and other recreational or commercial uses be assessed; if necessary, minimization measures should explored.

We also recommend that noise, traffic, emissions, safety, impacts on properties, and other potential impacts from construction of the project on the local community be evaluated.

Cultural Resources
As you are aware, Section 106 of the NHPA requires federal agencies to take into consideration the impact that the action may have on historic properties that are listed or are eligible for inclusion on the National Register of Historic Places. We recommend consultation with the State Historic Preservation Office (SHPO) throughout the planning process and that the EA identify any potential impacts to historic resources and engagement with Native American tribes to identify any potential resources of concern. We also recommend that this coordination with the SHPO and tribes be fully 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 in the area.

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

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 <mailto:traver.carrie@epa.gov>

-----Original Message-----
From: Woodward, Justine R CIV USARMY CENAO (USA) <Justine.R.Woodward@usace.army.mil <mailto:Justine.R.Woodward@usace.army.mil> >
Sent: Thursday, April 09, 2020 11:21 AM
To: Rudnick, Barbara <Rudnick.Barbara@epa.gov <mailto:Rudnick.Barbara@epa.gov> >
Subject: James River Shoreline Stabilization Project NEPA Scoping Notice

Good Morning Ms. Rudnick,

Please see the attached NEPA scoping request for a shoreline stabilization project on north bank of the James River

in Newport News, Virginia. Please provide a read receipt since a hard copy will not be sent due to the current circumstances. If you have any questions or require any additional information, please let me know.

Regards,
Justine

Justine Woodward
Biologist
Environmental Analysis Section
Norfolk District, U.S. Army Corps of Engineers
803 Front Street
Norfolk, VA 23510
757-201-7728

From: Christine Vaccaro - NOAA Federal
To: Woodward, Justine R CIV USARMY CENAO (USA)
Subject: [Non-DoD Source] Re: James River Shoreline Stabilization Project NEPA Scoping Notice
Date: Wednesday, April 15, 2020 2:22:52 PM

Hi Justine,

Please see a few comments below re: this project.

The James River, in the area of your proposed study/project, supports several listed species including Atlantic sturgeon, shortnose sturgeon, and 4 species of sea turtles that may utilize the lower James River. Atlantic sturgeon spawn in the James River, and this portion of the lower river may serve as a staging area for spawning adults. No early life stages are expected to be present in the brackish conditions in the vicinity of the project site, but juveniles, sub-adults and adults may be present. Only adult shortnose sturgeon are currently expected to use the James River, and sea turtles are transient in the area. Please see our website for additional information about the life stages of species that may occur, including literature citations that may help inform your analysis.

Blockedhttps://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-species-critical-habitat-information-maps-greater

The tables and mapper will be most helpful.

Based on the alternatives you list for construction activities related to this project, several stressors may occur (which could impact listed species) and should be considered in your project design and subsequent analyses. Information about putting together a strong stressor based analysis is also provided on our website: Blockedhttps://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-consultation-technical-guidance-greater-atlantic

Based on the information provided, the stressors you should be most focused on are noise (from potential pile driving), turbidity, habitat modification, and vessel traffic. Although, because details of the project are not given at this time, other stressors may also apply. Additionally, because you have several alternatives for the action, if one is not decided on by the time you produce an EA, you should include all potential alternatives in your analysis and analyze all potential effects that may occur as a result of the proposed action alternatives.

We hope this information will be helpful during the development of your BA. Please do not hesitate to reach out if you have questions.

Cheers,
Chris

Chris Vaccaro
Fisheries Biologist
Protected Resources Division
NOAA Fisheries, Greater Atlantic Region
Gloucester, MA
Phone: 978-281-9167
Email: christine.vaccaro@noaa.gov <mailto:christine.vaccaro@noaa.gov>

For additional ESA Section 7 information and Critical Habitat guidance, please see:
Blockedwww.greateratlantic.fisheries.noaa.gov/protected/section7
<Blockedhttp://www.greateratlantic.fisheries.noaa.gov/protected/section7>

On Thu, Apr 9, 2020 at 11:19 AM Woodward, Justine R CIV USARMY CENAO (USA)
<Justine.R.Woodward@usace.army.mil <mailto:Justine.R.Woodward@usace.army.mil> > wrote:

Good Morning Ms. Vaccaro,

Please see the attached NEPA scoping request for a shoreline stabilization project on north bank of the James River in Newport News. Please provide a read receipt since a hard copy will not be sent due to the current circumstances. If you have any questions or require any additional information, please let me know.

Regards,
Justine

Justine Woodward
Biologist
Environmental Analysis Section
Norfolk District, U.S. Army Corps of Engineers
803 Front Street
Norfolk, VA 23510
757-201-7728

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

May 14, 2020

U. S. Army Corps of Engineers
Attn: Justine Woodward
803 Front Street
Norfolk, VA 23510

Re: Feasibility Study
James River Shoreline Stabilization Project

Dear Ms. Woodward:

This will respond to the request for comments regarding the feasibility study for the James River Shoreline Stabilization Project, prepared by The U.S. Army Corps of Engineers, on behalf of the City of Newport News. Specifically, the City of Newport News has proposed to stabilize approximately 600 linear feet of shoreline along River Road between North Avenue and Government Ditch along the James River in Newport News, Virginia.

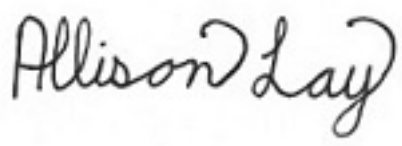
We reviewed the provided project documents and found the proposed project will be within the jurisdictional areas of the Virginia Marine Resources Commission (VMRC) and may require a permit from this agency. Per Section 104.1 of Title 28.2 of the Code of Virginia, living shorelines are the preferred alternative for stabilizing shorelines in the Commonwealth. A living shoreline approach should be considered during the feasibility study. The project area has a large fetch, and a breakwater system may be appropriate to consider for stabilizing this shoreline.

A private oyster ground lease is located approximately 300 feet from the shoreline. If any impacts are proposed within the oyster ground lease, the lease holder's concerns will be taken into consideration before a permit will be issued. Additionally, there is a pier located within the project area. Any riparian property owners within the project area will need to sign the application before it is submitted to us. Additionally, adjacent property owners to the project area will be given the opportunity to comment on the project before a permit will be issued.

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
Environmental Engineer, Habitat Management

AEL
HM

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

May 8, 2020

Justin Woodward
USACE-Norfolk District
803 Front Street
Norfolk, VA 23510

Re: James River Shoreline Stabilization NEPA Scoping Request

Dear Ms. Woodward:

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.

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 Virginia Department of Conservation and Recreation (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
Natural Heritage Locality Liaison

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. Strickler
Secretary of Natural Resources

David K. Paylor
Director
(804) 698-4000

MEMORANDUM

TO: Justine Woodward, U.S. Army Corps of Engineers

CC: DEQ Office of Environmental Impact Review, eir@deq.virginia.gov

FROM: Amber Foster, DEQ Principal Environmental Planner

DATE: April 16, 2020

SUBJECT: Scoping Request: Shoreline Stabilization, James River, City of Newport News

We have reviewed the scoping request 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 U.S. Army Corps of Engineers (USACE) Norfolk District and the City of Newport News are conducting a feasibility study to stabilize 600 linear feet of shoreline along the north bank of the James River located west of the James River Bridge and between Government Ditch and North Avenue immediately adjacent to River Road in the City of Newport News. The USACE is the lead federal agency and the City of Newport News is the non-federal sponsor for the study.

The joint feasibility study/Environmental Assessment (EA) will consider alternative shoreline stabilization measures that include rock sill with vegetated berm, stone revetment, stone revetment with vegetated berm, and living shoreline (stone toe and/or rock sill, vegetative erosion control, earthen berm).

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. This includes the development of a water quality impact analysis (WQIA) for encroachment or impacts to the RPA, the minimization of land disturbance (including area of access and material staging), retaining existing vegetation, and minimizing impervious cover. In addition, Federal actions are also required to be consistent 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.

From:	Warren, Arlene
To:	Woodward, Justine R CIV USARMY CENAO (USA)
Cc:	rr Environmental Impact Review
Subject:	[Non-DoD Source] Re: NEW SCOPING REQUEST-Shoreline Stabilization, James River, City of Newport News
Date:	Tuesday, April 14, 2020 9:31:41 AM

Project Name: NEW SCOPING REQUEST-Shoreline Stabilization

Project #: N/A

UPC #: N/A

Location: James River, 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.

There are no public groundwater wells within a 1-mile radius of the project site.

There are no surface water intakes located within a 5-mile radius of the project site.

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

There are no apparent impacts on public drinking water sources due to this project.

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

109 Governor Street

Richmond, VA 23219

(804) 864-7781

On Mon, Apr 13, 2020 at 2:20 PM Fulcher, Valerie <valerie.fulcher@deq.virginia.gov <mailto:valerie.fulcher@deq.virginia.gov> > wrote:

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

Shoreline Stabilization, James River, City of Newport News

If you choose to make comments, please send them directly to the project sponsor (Justine.R.Woodward@usace.army.mil <mailto:Justine.R.Woodward@usace.army.mil>) and copy the DEQ Office of Environmental Impact Review: eir@deq.virginia.gov <mailto:eir@deq.virginia.gov> . We will coordinate a review when the environmental document is completed.

DEQ-OEIR's scoping response is also attached.

If you have any questions regarding this request, please email our office at eir@deq.virginia.gov <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 <mailto:Valerie.Fulcher@deq.virginia.gov>

Blockedhttp://www.deq.virginia.gov/Programs/EnvironmentalImpactReview.aspx

For program updates and public notices please subscribe to Constant Contact:
Blockedhttps://lp.constantcontact.com/su/MVcCump/EIR

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 8, 2020

Brent and Sharon Mathison
9304 River Rd
Newport News, VA 23601-4519

Dear Mr. and Mrs. Mathison:

The U.S. Army Corps of Engineers Norfolk (USACE) District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

The approximate 600 linear foot section of shoreline is located west of the James River Bridge and between Government Ditch and North Avenue immediately adjacent to River Road and is severely eroded resulting from the combined effects of natural erosion processes, tidal storm and wave action, and stormwater runoff. The 25-foot high receding bluff is an imminent threat to existing public facilities and River Road as a result of the continued erosion. The following website has been established for the project: www.nao.usace.army.mil/About/Projects/JamesRiverNewportNewsShoreline/.

The joint feasibility study/Environmental Assessment (EA) will consider alternative shoreline stabilization measures and evaluate the impacts to the human and natural environment pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA) and the Council of Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations 1500 – 1508).

The USACE requests comments to determine the scope of content to be included in the draft feasibility study/EA. Comments may include, but are not limited to, the range of resources areas to be analyzed, potential alternatives, and data needs.

To submit scoping comments, please contact: Justine Woodward by email: justine.r.woodward@usace.army.mil; or telephone: (757) 201-7728. Please submit comments by May 11, 2020.

Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

Enclosure 1

Enclosure 1. Study Area for James River Shoreline Stabilization Project.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 8, 2020

Eric and Katherine Feldl
9306 River Rd
Newport News, VA 23601-4519

Dear Mr. and Mrs. Feldl:

The U.S. Army Corps of Engineers Norfolk (USACE) District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

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To submit scoping comments, please contact: Justine Woodward by email: justine.r.woodward@usace.army.mil; or telephone: (757) 201-7728. Please submit comments by May 11, 2020.

Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

Enclosure 1

Enclosure 1. Study Area for James River Shoreline Stabilization Project.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 8, 2020

Christopher Ellis and Denise Gillman
9400 River Rd
Newport News, VA 23601-4519

Dear Mr. Ellis and Ms. Gillman:

The U.S. Army Corps of Engineers Norfolk (USACE) District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

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Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 8, 2020

Ralph and Carole Robinson
9406 River Rd
Newport News, VA 23601-4519

Dear Mr. and Mrs. Robinson:

The U.S. Army Corps of Engineers Norfolk (USACE) District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

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Sincerely,

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Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 8, 2020

John Newell
9408 River Rd
Newport News, VA 23601-4519

Dear Mr. Newell:

The U.S. Army Corps of Engineers Norfolk (USACE) District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

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Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 8, 2020

Dana Leaphart
9410 River Rd
Newport News, VA 23601-4519

Dear Ms. Leaphart:

The U.S. Army Corps of Engineers Norfolk (USACE) District and the City of Newport News are conducting a feasibility study authorized by Section 14 of the Flood Control Act of 1946 as amended for a shoreline stabilization project along the north bank of the James River in the City of Newport News (Enclosure 1). The USACE is the lead federal agency and the City of Newport News is the nonfederal sponsor for the study.

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Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 8, 2020

Ryan Sykes
9412 River Rd
Newport News, VA 23601-4519

Dear Mr. Sykes:

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Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 8, 2020

Donald and Sandra Britt
P.O. Box 1171
Newport News, VA 23601-4519

Dear Mr. and Mrs. Britt:

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Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 8, 2020

Joy Tomlin
P.O. Box 1171
Newport News, VA 23601-4519

Dear Ms. Tomlin:

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Sincerely,

Justine Woodward

Justine Woodward
Biologist, Environmental Analysis Section
Planning and Policy Branch

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 8, 2020

John and Ann Pizzano
9506 River Road
Newport News, VA 23601-4519

Dear Mr. and Mrs. Pizzano:

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 8, 2020

Princeton Investors LLC
9508 River Road
Newport News, VA 23601-4519

Dear Sir or Madam:

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 8, 2020

Vo Chinh and Thao Khau
9605 River Rd
Newport News, VA 23601-4519

Dear Sir or Madam:

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Planning and Policy Branch

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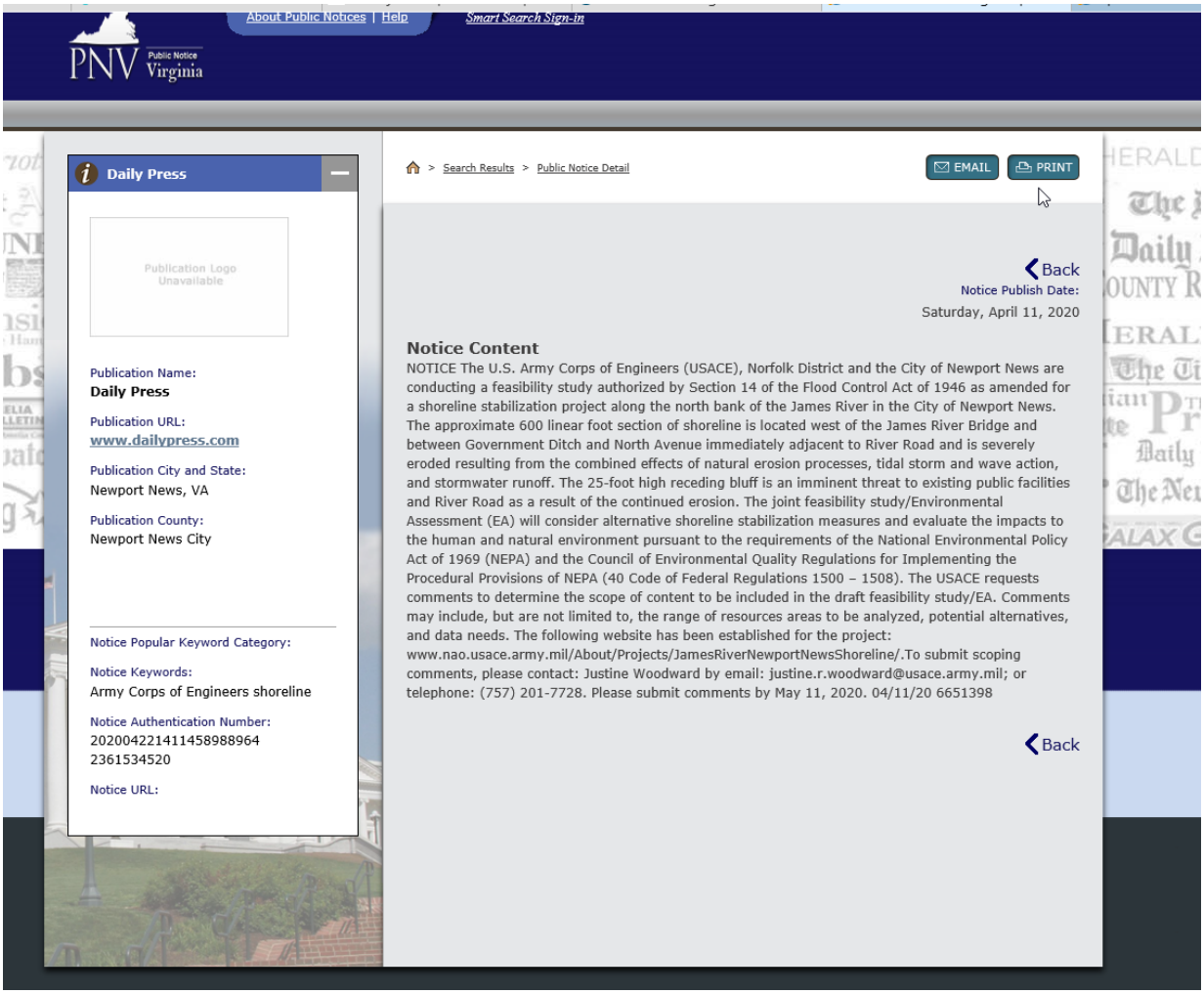

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Saturday, April 11, 2020

Notice Content

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Back

From: Eric Feldl
To: Woodward, Justine R CIV USARMY CENAO (USA)
Cc: katy feldl
Subject: [Non-DoD Source] Re: James River Newport News Shoreline CAP 14 at 9306 River Rd
Date: Thursday, April 16, 2020 6:45:16 PM

Thanks Justine

Eric

On Thursday, April 16, 2020, 5:17:07 PM EDT, Woodward, Justine R CIV USARMY CENAO (USA) <justine.r.woodward@usace.army.mil> wrote:

Good Afternoon Mr. Feldl,

Thank you for your inquiry. As part of the study we are in the scoping phase which involves requesting comments from the public and federal and state resource agencies. We are fully aware that the viewshed is important to the residents along River Road and that has been taken into consideration as part of the study. The alternatives may possibly consider vegetation at the top of the bank to assist with reducing stormwater runoff; however the type of vegetation at this time is unknown. We will be developing a planting plan that will be incorporated into the draft EA to be released this summer for public review and comment. Notification will be provided to the public, including adjacent residents, and we will also make the information available on the website.

Once again, thank you for the information you have provided and for your inquiry.

Regards,

Justine

Justine Woodward

Biologist

Environmental Analysis Section

Norfolk District, U.S. Army Corps of Engineers

803 Front Street

Norfolk, VA 23510

757-201-7728

-----Original Message-----

From: Eric Feldl [mailto:ekfeldl@yahoo.com <mailto:ekfeldl@yahoo.com>]

Sent: Sunday, April 12, 2020 4:21 PM

To: Woodward, Justine R CIV USARMY CENAO (USA) <Justine.R.Woodward@usace.army.mil <mailto:Justine.R.Woodward@usace.army.mil> >

Cc: katy feldl <kfeldl@yahoo.com <mailto:kfeldl@yahoo.com> >

Subject: [Non-DoD Source] re: James River Newport News Shoreline CAP 14 at 9306 River Rd

Justine,

We received your letter regarding the above project and have some questions. I have reviewed the website and final array of alternatives A1, A2, A3, and A4 you provided.

Our water view is very important to us and is the reason we purchased our house.

For A1, A2, A4:

I'm assuming that a "berm" would be raised vegetation or earth above the current ground level. Is that correct? If so, how high would those be? We are not fans of the shrubs that are located at the top of the shoreline of the Huntington Beach Park because they obstruct the view from the field to the water.

For A2 Stone Revetment

I'm assuming that this would be stone "riprap" placed on the hill and that this option would not impede our view. Is that correct?

We have riparian rights on our property. It's important to us that we are able to maintain our current unobstructed water view. This is our primary concern.

We also intend to file a permit for stairs at the waterfront with a deck and/or boat dock in the future. We would prefer a solution that doesn't prohibit that.

Any clarification and details you can provide about the options listed would be greatly appreciated.

Thanks

Eric

9306 River Rd, Newport News VA 23601

(757) 329-2076

APPENDIX A-6
ESSENTIAL FISH HABITAT ASSESSMENT
NATIONAL MARINE FISHERIES SERVICE

CONTINUING AUTHORITIES PROGRAM, SECTION 14

EMERGENCY STREAMBANK AND SHORELINE PROTECTION

JAMES RIVER SHORELINE, NEWPORT NEWS

U.S. Army Corps
of Engineers
Norfolk District

EFH ASSESSMENT WORKSHEET

General Project Information

Date Submitted: September 18, 2020

Project/Application Number:

Project Name: Emergency Streambank and Shoreline Protection James River

Project Sponsor/Applicant: U.S. Army Corps of Engineers, Norfolk District

Federal Action Agency (if state agency acting as delegated):

Fast-41 or One Federal Decision Project: ☐ Yes ☑ No

Action Agency Contact Name: Justine Woodward

Contact Phone: 757-201-7728 Contact Email: justine.r.woodward@usace.army.mil

Latitude: 37.023014 Longitude: -76.460853

Address, City/Town, State:

9300-9500 block of River Road, Newport News, Virginia 23601

Body of Water: James River

Project Purpose:

The purpose of the proposed project is to stabilize an approximate 600-foot section of riverbank that is severely eroded and poses an imminent threat to public facilities.

Project Description:

The proposed project would stabilize the existing, eroding shoreline and includes the construction of a continuous rock sill with a crest elevation of +5 ft NAVD88, crest width of 5 ft, and the establishment of a 1V:3H vegetated slope. It is estimated that this alternative will require approximately 2,900 tons of VDOT Class III riprap, 800 tons of VDOT No. 1 Stone, 4300 CY of fill, 1600 SY of geotextile filter fabric, 700 CY of existing debris removal, and 35,000 SF of soil stabilization blankets. It is anticipated that the proposed project would be constructed to avoid the existing private pier. Impacts associated with the placement of stone may occur up to 10 ft channelward of mean low water; however, this will be confirmed by additional survey data anticipated to be collected during the next phase of the project, the Preconstruction, Engineering, and Design (PED) Phase. It is unknown if construction will occur from the water or land due to the existing site constraints.

Anticipated Duration of In-Water Work or Start/End Dates:

Construction is anticipated to start in 2021; however, the month is unknown.

Habitat Description

EFH includes the biological, chemical, and physical components of the habitat. This includes the substrate and associated biological resources (e.g., benthic organisms, submerged aquatic vegetation, shellfish beds, salt marsh wetlands), the water column, and prey species.

Is the project in designated EFH[2]? ☑ Yes ☐ No

Is the project in designated HAPC[2]? ☐ Yes ☑ No

Is this coordination under FWCA only? ☐ Yes ☑ No

Total area of impact to EFH (indicate sq ft or acres): 6,000 square feet

Total area of impact to HAPC (indicate sq ft or acres): 0 square feet

Current water depths: 1-2 ft MLW Salinity: 14-15 ppt Water temperature range: 35-80F

Sediment characteristics[3]: sand

What habitat types are in or adjacent to the project area and will they be permanently impacted? Select all that apply. Indicate if impacts will be temporary, if site will be restored, or if permanent conversion of habitat will occur. A project may occur in overlapping habitat types.

	Habitat Type	**Total impact (sq ft/acres)**	**Impacts are temporary**	**Restored to pre-existing conditions**	**Permanent conversion of all or part of habitat**
☐	Marine				
☐	Estuarine				
☑	Riverine (tidal)	32,445 sf	temporary impacts during construction	water column impacts to be restored	permanent impacts where stone sill will be constructed
☐	Riverine (non-tidal)				
☑	Intertidal	20,445 sf	No	No	Yes
☑	Subtidal	6,000 sf	No	No	Yes
☑	Water column	6,000 sf	Yes	Yes	No
☐	Salt marsh/ Wetland (tidal)				
☐	Wetland (non-tidal)				

[2] Use the tables on pages 7-9 to list species with designated EFH or the type of designated HAPC present.
[3] The level of detail is dependent on your project – e.g., a grain size analysis may be necessary for dredging.

	Habitat Type	Total impact (sq ft/acres)	Impacts are temporary	Restored to pre-existing conditions	Permanent conversion of all or part of habitat
☐	Rocky/hard bottom[4]:				
☑	Sand	6,000 sf	No	No	Yes
☐	Shellfish beds or oyster reefs				
☐	Mudflats				
☐	Submerged aquatic vegetation (SAV)[5], macroalgae, epifauna				
☐	Diadromous fish (migratory or spawning habitat)				

Indicate type(s) of rocky/hard bottom habitat (pebble, cobble, boulder, bedrock outcrop/ledge) and species of SAV:

N/A. There is no SAV present on site.

Project Effects

Select all that apply	Project Type/Category
☐	Hatchery or Aquaculture
☐	Agriculture
☐	Forestry
☐	Military (e.g., acoustic testing, training exercises)
☐	Mining (e.g., sand, gravel)
☐	Restoration or fish/wildlife enhancement (e.g., fish passage, wetlands, beach renourishment, mitigation bank/ILF creation)

[4] Indicate type(s). The type(s) of rocky habitat will help you determine if the area is cod HAPC.
[5] Indicate species. Provide a copy of the SAV report and survey conducted at the site, if applicable.

Select all that apply	Project Type/Category
☐	Infrastructure/transportation (e.g., culvert construction, bridge repair, highway, port)
☐	Energy development/use
☐	Water quality (e.g., TMDL, wastewater, sediment remediation)
☐	Dredging/excavation and disposal
☐	Piers, ramps, floats, and other structures
☑	Bank/shoreline stabilization (e.g., living shoreline, groin, breakwater, bulkhead)
☐	Survey (e.g., geotechnical, geophysical, habitat, fisheries)
☐	Other

Select all that apply	Potential Stressors Caused by the Activity	Select all that apply and if temporary or permanent		Habitat alterations caused by the activity
☐	Underwater noise	Temp	Perm	
☑	Water quality/turbidity/ contaminant release	☐	☐	Water depth change
☑	Vessel traffic/barge grounding	☐	☐	Tidal flow change
☐	Impingement/entrainment[6]	☐	☑	Fill
☐	Prevent fish passage/spawning	☐	☑	Habitat type conversion
☑	Benthic community disturbance			Other:
☑	Impacts to prey species			Other:

[6] Entrainment is the voluntary or involuntary movement of aquatic organisms from a water body into a surface diversion or through, under, or around screens and results in the loss of the organisms from the population. Impingement is the involuntary contact and entrapment of aquatic organisms on the surface of intake screens caused when the approach velocity exceeds the swimming capability of the organism.

Details: project impacts and mitigation

The level of detail that you provide should be commensurate with the magnitude of impacts associated with the proposed project. Attach supplemental information if necessary.

Describe how the project would impact each of the habitat types selected above. Include temporary and permanent impact descriptions and direct and indirect impacts.

The proposed stone sill would be constructed in the intertidal area and nearshore subtidal area and would transition to a 1V:3H vegetated slope on the adjacent upland. Minor, adverse impacts to nearshore benthic resources would be permanent due to placement of the stone on top of the existing sand substrate. The Eastern oyster and Atlantic ribbed mussel resources attached to the existing debris along the shoreline would be removed. However, their presence in the area indicates that settlement and attachment of the Eastern oyster to the stone sill is likely to occur once construction is complete. The placement of stone would occur up to approximately 10 feet channelward of mean low water.

What specific measures will be used to avoid impacts, including project design, turbidity controls, acoustic controls, and time of year restrictions? If impacts cannot be avoided, why not?

Please see attached sheet for complete response.

What specific measures will be used to minimize impacts?

Please see attached sheet for complete response.

Is compensatory mitigation proposed? ☐ Yes ☑ No

If no, why not? If yes, describe plans for mitigation and how this will offset impacts to EFH. Include a conceptual compensatory mitigation and monitoring plan, if applicable.

Please see attached sheet for complete response.

Federal Action Agency's EFH determination (select one)	
☐	There is no adverse effect[7] on EFH or EFH is not designated at the project site. EFH Consultation is not required. This is a FWCA-only request.
☑	The adverse effect[7] on EFH is not substantial. This means that the adverse effects are no more than minimal, temporary, or can be alleviated with minor project modifications or conservation recommendations. This is a request for an abbreviated EFH consultation.
☐	The adverse effect[7] on EFH is substantial. This is a request for an expanded EFH consultation. We will provide more detailed information, including an alternatives analysis and NEPA document, if applicable.

EFH and HAPC designations[8]

Use the EFH mapper to determine if EFH may be present in the project area and enter all species and lifestages that have designated EFH. Optionally, you may review the EFH text descriptions linked to each species in the EFH mapper and use them to determine if the described habitat is present. We recommend this for larger projects to help you determine what your impacts are.

Species	**EFH is designated/mapped for:**				**Habitat present based on text description (optional)**
	EFH: eggs	**EFH: larvae**	**EFH: juvenile**	**EFH: adults/ spawning adults**	
Atlantic butterfish	☐	☐	☑	☑	☐
Black sea bass	☐	☐	☑	☑	☐
Bluefish	☐	☐	☑	☑	☐
Summer flounder	☐	☑	☑	☑	☐

[7] An **adverse effect** is any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

[8] Within the Greater Atlantic Region, EFH has been designated by the New England, Mid-Atlantic, and South Atlantic Fisheries Management Councils and NOAA Fisheries.

Species	EFH is designated/mapped for:				Habitat present based on text description (optional)
	EFH: eggs	EFH: larvae	EFH: juvenile	EFH: adults/ spawning adults	
Windowpane flounder	☐	☐	☑	☐	☐
Atlantic sea herring	☐	☐	☑	☑	☐
Red hake	☑	☑	☑	☑	☐
Clearnose skate	☐	☐	☑	☑	☐
Winter skate	☐	☐	☐	☑	☐
Little skate	☐	☐	☐	☑	☐
Sandbar shark	☐	☐	☑	☐	☐
Sand tiger shark	☐	☐	☐	☑	☐
Striped bass	☐	☐	☐	☐	☑
Blueback herring	☐	☐	☐	☐	☑
Alewife	☐	☐	☐	☐	☑
American shad	☐	☐	☐	☐	☑
Hickory shad	☐	☐	☐	☐	☑
White perch	☐	☐	☐	☐	☑
Yellow perch	☐	☐	☐	☐	☑
American Eel	☐	☐	☐	☐	☑
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

HAPCs

Select all that are in your action area.

☐	Summer flounder: SAV[9]	☐	Alvin & Atlantis Canyons
☐	Sandbar shark	☐	Baltimore Canyon
☐	Sand Tiger Shark (Delaware Bay)	☐	Bear Seamount
☐	Sand Tiger Shark (Plymouth-Duxbury-Kingston Bay)	☐	Heezen Canyon
☐	Inshore 20m Juvenile Cod	☐	Hudson Canyon
☐	Great South Channel Juvenile Cod	☐	Hydrographer Canyon
☐	Northern Edge Juvenile Cod	☐	Jeffreys & Stellwagen
☐	Lydonia Canyon	☐	Lydonia, Gilbert & Oceanographer Canyons
☐	Norfolk Canyon (Mid-Atlantic)	☐	Norfolk Canyon (New England)
☐	Oceanographer Canyon	☐	Retriever Seamount
☐	Veatch Canyon (Mid-Atlantic)	☐	Toms, Middle Toms & Hendrickson Canyons
☐	Veatch Canyon (New England)	☐	Washington Canyon
☐	Cashes Ledge	☐	Wilmington Canyon

[9] Summer flounder HAPC is defined as all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH. In locations where native species have been eliminated from an area, then exotic species are included. Use local information to determine the locations of HAPC.

What specific measures will be used to avoid impacts, including project design, turbidity controls, acoustic controls, and time of year restrictions? If impacts cannot be avoided, why not?

The project has been designed to minimize subaqueous impacts to the extent practicable. Given the existing site conditions, including the approximate 25-foot receding bluff, the current bank requires a combination of fill and grading to achieve the desired 1V:3H slope. The exact siting of the sill will not be finalized until the Preconstruction, Engineering, and Design Phase; however, based on the current 10% design-level drawings, a maximum encroachment of 10 feet channelward of mean low water is anticipated.

There are no pile driving activities associated with the proposed action; therefore, no acoustic controls are proposed. The width of the James River at the project site is approximately 4.6 miles, and given the shallow depths of water which range from approximately 1-2 feet at mlw, no time of year restrictions are currently proposed.

The proposed project has the potential to temporarily displace federally managed fish species with EFH designations and their prey which are likely to utilize the nearshore environment where the project is proposed. However, once ambient conditions are restored following construction completion they would be expected to return.

What specific measures will be used to minimize impacts?

During construction, a turbidity curtain would be used if determined feasible at the site to minimize turbidity impacts during construction. Silt fences and construction matting may also be used in areas near the road at the top of the slope if necessary. Ambient conditions would be restored following construction completion.

Is compensatory mitigation proposed? If not, why not? IF yes, describe plans for mitigation and how this will offset impacts to EFH. Include a conceptual compensatory mitigation and monitoring plan, if applicable.

There is no compensatory mitigation proposed. There are no vegetated wetlands or Submerged Aquatic Vegetation (SAV) in the vicinity of the project site. The placement of Class III riprap stone would occur in intertidal and subtidal areas on top of the existing sandy substrate. The project designs are currently at a 10%; and the exact siting of the sill would be determined during the next phase of the project, the Preconstruction, Engineering, and Design (PED) Phase. At the southern extent of the project site, there are existing shellfish resources, including the Eastern oyster (*Crassostrea virginica*), and Atlantic ribbed mussels (*Geukensia demissa*) established on the existing concrete debris. The debris would be removed if determined to be within the footprint of the project during the PED Phase. The presence of the oysters in the area suggests that the stone material is likely to provide suitable habitat for oyster settlement in the future.

View of James River at northern extent of project site. Image taken 12/06/2019.

View looking towards southeast of project site. Image taken 12/06/2019.

Existing debris along James River shoreline. Image taken 12/06/2019.

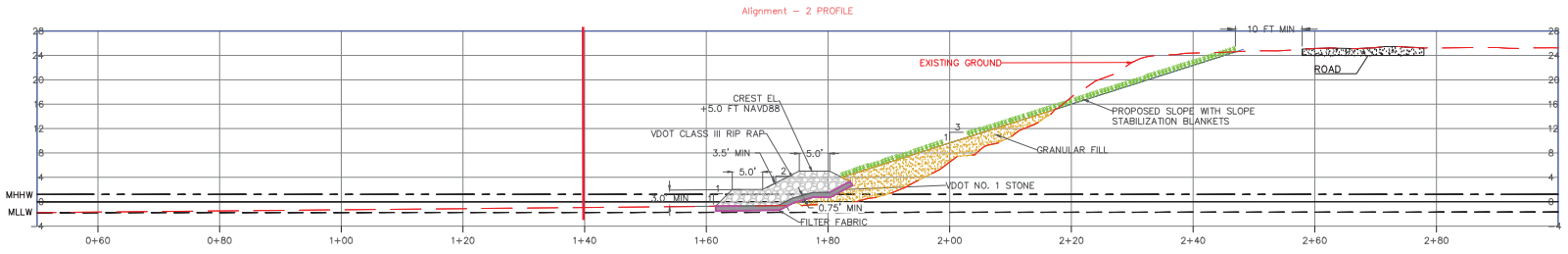
Eastern oyster and Atlantic ribbed mussels observed during low tide.

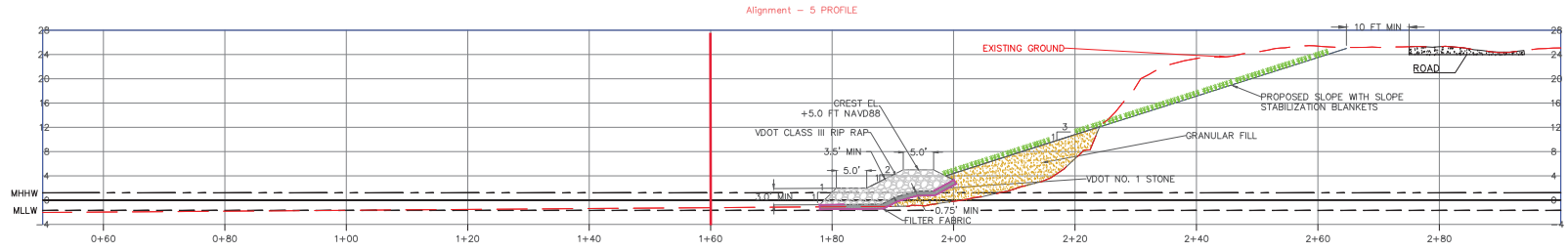
Image taken 12/06/2019.

View of southeastern extent of project site. Image taken 12/06/2019.

DATUM DIAGRAM
1983–2001 NTDE
(SCALE 1"=1')

PROJECT SITE LOCATION (LONGITUDE: -76.460853, LATITUDE: 37.023014) NAVD88 – NOS MLW DATUM DIFFERENCE DERIVED BY NOAA VDATUM MODEL.





US Army Corps of Engineers®

MARK	DESCRIPTION	DATE

DESIGNED BY: K. MCELROY
DRAWN BY: L. MCELROY
CHECKED BY:
ISSUE DATE: 28 JANUARY 2020
SOLICITATION NO.:
CONTRACT NO.:
NAO FILE NO.:
SUBMITTED BY:
SIZE: ANSI D

U.S. ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
803 FRONT STREET
NORFOLK, VA 23510

CONTINUING AUTHORITIES PROGRAM (CAP)
JAMES RIVER SHORELINE STABILIZATION PROJECT

ALTERNATIVE 1

SHEET ID
C-002

ATTACHMENT 1 10% DESIGN

EFH Data Notice: Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional Fishery Management Councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

Greater Atlantic Regional Office
Atlantic Highly Migratory Species Management Division

Query Results

Degrees, Minutes, Seconds: Latitude = 37º1'13" N, Longitude = 77º32'24" W
Decimal Degrees: Latitude = 37.02, Longitude = -76.46

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

*** W A R N I N G ***

Please note under "Life Stage(s) Found at Location" the category "ALL" indicates that all life stages of that species share the same map and are designated at the queried location.

EFH

Show	Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
			Little Skate	Adult	New England	Amendment 2 to the Northeast Skate Complex FMP
			Atlantic Herring	Juvenile Adult	New England	Amendment 3 to the Atlantic Herring FMP
			Red Hake	Adult Eggs/Larvae/Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP
			Winter Skate	Adult	New England	Amendment 2 to the Northeast Skate Complex FMP

Show	Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
			Clearnose Skate	Adult Juvenile	New England	Amendment 2 to the Northeast Skate Complex FMP
			Windowpane Flounder	Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP
			Sandbar Shark	Juvenile Neonate	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
			Sand Tiger Shark	Adult	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
			Bluefish	Adult Juvenile	Mid-Atlantic	Bluefish
			Atlantic Butterfish	Adult Juvenile	Mid-Atlantic	Atlantic Mackerel, Squid,& Butterfish Amendment 11
			Summer Flounder	Larvae Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
			Black Sea Bass	Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass

HAPCs

Show	Link	Data Caveats	HAPC Name	Management Council
			Summer Flounder	MAFMC

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data. **For links to all EFH text descriptions see the complete data inventory: open data inventory -->

Mid-Atlantic Council HAPCs,
No spatial data for summer flounder SAV HAPC.

From: David OBrien - NOAA Federal
To: Woodward, Justine R CIV USARMY CENAO (USA)
Subject: [Non-DoD Source] NAO District, James River Shoreline Stabilization, Newport News, VA
Date: Tuesday, September 29, 2020 4:32:20 PM

Hello Justine,

I am doing well and hope that you are too.

I have reviewed the coordination materials you sent regarding the proposed James River shoreline stabilization project, located along the James River in the City of Newport News, Virginia. As you know, the James River is designated as essential fish habitat (EFH) for 12 federally managed species and is also designated an anadromous fish use area by the Virginia Department of Wildlife Resources (DWR). Numerous species of anadromous fish use the lower James River as a migration corridor to upriver spawning areas.

The proposed shoreline stabilization project will address approximately 600 ln. ft. of eroding shoreline and approximately 25 ft. high bank located along River Rd., between North Avenue downriver to the drainage ditch located immediately upriver of Lake Biggins. At this early phase of the design (10%), you have stated the Class III armor revetment is anticipated to extend no more than 10 ft. channelward of mean low water, which would result in impacts to approximately. 20,445 sq. ft. of nonvegetated intertidal and 6,000 sq. ft. of subaqueous bottom habitat, both designated as EFH.

We acknowledge that efforts to minimize impacts to the marine environment while protecting the City's threatened infrastructure will likely require some habitat conversion and trade-offs. However, in order to minimize impacts to the extent practicable, we recommend aligning the toe of the revetment as far landward as possible to achieve the desired 3:1 slope of the graded bank and 10 ft. minimum buffer width between the top of bank and River Road. We support the proposed use of a turbidity curtain to the extent practicable to contain resuspended sediment and sediment runoff during construction. In addition, we recommend maintaining all erosion and sediment control measures throughout construction and beyond, including installation of a silt fence at the toe of the graded bank, until native vegetation can be established on the graded bank to prevent sediment from entering the river. Also, salvaging existing concrete rubble currently supporting oysters (Crassostrea virginica) and ribbed mussels (Geukensia demissa) to be incorporated into the structure as a veneer layer at the toe would be desirable from a habitat perspective.

Provided our recommendations above are adopted into the final design, NOAA Fisheries Service concurs with your determination that although impacts and habitat conversion resulting from the proposed 600 ft. shoreline stabilization project will occur, the impacts will not substantially adversely affect essential fish habitat (EFH). We are of the opinion that given the scope of the construction, limited channelwood encroachment (10 ft.) relative to the width of the James River (4.3 miles) at the project site, a time of year restriction to help protect the migration of anadromous fish is not warranted. However, if channelward encroachment or impacts to EFH increase during the

Preconstruction, Engineering and Design (PED) Phase, we ask that you reinitiate EFH consultation with my office. Also, I would appreciate notification when the draft feasibility report/EA is made available in early October.

Please note this EFH determination does not address threatened and endangered species under the purview of NOAA Fisheries Service. We understand you are coordinating with our Protected Resources Division regarding federally listed sea turtles, shortnose and Atlantic sturgeon known to the project area.

Thank you for the opportunity to comment on this project. Please feel free to contact me if you have any questions.

Take care and stay well,
Dave

David L. O'Brien
Fisheries Biologist
NOAA Fisheries Service
P.O. Box 1346
1370 Greate Rd.
Gloucester Point, VA 23062
804-684-7828
david.l.obrien@noaa.gov <mailto:david.l.obrien@noaa.gov>

NOTICE: I am teleworking until further notice. I will be checking my phone messages regularly and will return calls as quickly as possible. Please stay well.

On Fri, Sep 18, 2020 at 12:31 PM Woodward, Justine R CIV USARMY CENAO (USA) <Justine.R.Woodward@usace.army.mil <mailto:Justine.R.Woodward@usace.army.mil> > wrote:

> Good Afternoon Dave,
>
> I hope you are doing well! Please see the attached EFH Assessment worksheet for a proposed shoreline stabilization project along the James River in Newport News. I am also coordinating with the Protected Resources Division for Atlantic and shortnose sturgeon and four species of sea turtles. Please note, we are currently preparing to release the draft feasibility report/EA in early October to the public.
>
> If you require any additional information necessary to support the EFH consultation, please let me know. If you have any other questions or concerns, please don't hesitate to contact me. I look forward to hearing from you.
>
> Have a good weekend!
>
> Regards,
> Justine
>
> Justine Woodward
> Biologist
> Environmental Analysis Section
> Norfolk District, U.S. Army Corps of Engineers
> 803 Front Street
> Norfolk, VA 23510

757-201-7728

From: Woodward, Justine R CIV USARMY CENAO (USA)
To: "David OBrien - NOAA Federal"
Subject: RE: [Non-DoD Source] NAO District, James River Shoreline Stabilization, Newport News, VA
Date: Friday, October 2, 2020 11:56:00 AM

Dave,

If any project changes occur during the Design phase that would result in additional impacts to EFH, we will certainly coordinate with you. Thank you!

Regards,
Justine

Justine Woodward
Biologist
Environmental Analysis Section
Norfolk District, U.S. Army Corps of Engineers
803 Front Street
Norfolk, VA 23510
757-201-7728

-----Original Message-----
From: David OBrien - NOAA Federal [mailto:david.l.obrien@noaa.gov]
Sent: Friday, October 2, 2020 10:59 AM
To: Woodward, Justine R CIV USARMY CENAO (USA) <Justine.R.Woodward@usace.army.mil>
Subject: Re: [Non-DoD Source] NAO District, James River Shoreline Stabilization, Newport News, VA

Hi Justine,

Thanks for getting back to me with your response.

Again, please let me know if project changes during the PED phase would result in additional impacts to EFH.

Best regards,
Dave

David L. O'Brien
Fisheries Biologist
NOAA Fisheries Service
P.O. Box 1346
1370 Greate Rd.
Gloucester Point, VA 23062
804-684-7828
david.l.obrien@noaa.gov <mailto:david.l.obrien@noaa.gov>

NOTICE: I am teleworking until further notice. I will be checking my phone messages regularly and will return calls as quickly as possible. Please stay well.

On Thu, Oct 1, 2020 at 4:42 PM Woodward, Justine R CIV USARMY CENAO (USA) <Justine.R.Woodward@usace.army.mil <mailto:Justine.R.Woodward@usace.army.mil> > wrote:

> Good Afternoon Dave,

Thank you for your comments regarding this proposed project After some additional coordination with our engineers, we offer the following comments in response:

The City determined the requirement for the 10' buffer from the edge of the project to the road. The design is as close to the road as possible. The slopes established for the alternative designs are the most stable and constructible slopes given the information provided for our geotechnical slope stability analysis. It is possible there may be more available geotechnical information during the design phase that would allow us to adjust the slope slightly, but at this point with the information we have available, the slopes provided in the report are the most stable.

Additionally, we do not plan on using the existing rubble, and it will be removed from the site. The stone material that will be used to construct the project will be higher quality and of the appropriate Class III sizing and shape for the proposed structure. During the design phase, we will consider the possibility of relocating some of the material with existing shellfish resources attached, if feasible, to provide the habitat benefit. Lastly, erosion and sediment control measures will be maintained during the duration of the project including a wire-supported silt fence, until final stabilization has been achieved on all applicable portions of the site.

I did also want to let you know that we received concurrence from Brian Hopper on 09/21/20 regarding our NLAA determination for listed species that have the potential to be in the area. Lastly, I will be sure to provide you notification when the draft report/EA is released for public review.

Once again, thank you for your comments. Stay safe and I look forward to future coordination!

Regards,
Justine

Justine Woodward
Biologist
Environmental Analysis Section
Norfolk District, U.S. Army Corps of Engineers
803 Front Street
Norfolk, VA 23510
757-201-7728

-----Original Message-----
From: David OBrien - NOAA Federal [mailto:david.l.obrien@noaa.gov <mailto:david.l.obrien@noaa.gov>]
Sent: Tuesday, September 29, 2020 4:31 PM
To: Woodward, Justine R CIV USARMY CENAO (USA) <Justine.R.Woodward@usace.army.mil <mailto:Justine.R.Woodward@usace.army.mil> >
Subject: [Non-DoD Source] NAO District, James River Shoreline Stabilization, Newport News, VA

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the lower James River as a migration corridor to upriver spawning areas.

The proposed shoreline stabilization project will address approximately 600 ln. ft. of eroding shoreline and approximately 25 ft. high bank located along River Rd., between North Avenue downriver to the drainage ditch located immediately upriver of Lake Biggins. At this early phase of the design (10%), you have stated the Class III armor revetment is anticipated to extend no more than 10 ft. channelward of mean low water, which would result in impacts to approximately. 20,445 sq. ft. of nonvegetated intertidal and 6,000 sq. ft. of subaqueous bottom habitat, both designated as EFH.

We acknowledge that efforts to minimize impacts to the marine environment while protecting the City's threatened infrastructure will likely require some habitat conversion and trade-offs. However, in order to minimize impacts to the extent practicable, we recommend aligning the toe of the revetment as far landward as possible to achieve the desired 3:1 slope of the graded bank and 10 ft. minimum buffer width between the top of bank and River Road. We support the proposed use of a turbidity curtain to the extent practicable to contain resuspended sediment and sediment runoff during construction. In addition, we recommend maintaining all erosion and sediment control measures throughout construction and beyond, including installation of a silt fence at the toe of the graded bank, until native vegetation can be established on the graded bank to prevent sediment from entering the river. Also, salvaging existing concrete rubble currently supporting oysters (Crassostrea virginica) and ribbed mussels (Geukensia demissa) to be incorporated into the structure as a veneer layer at the toe would be desirable from a habitat perspective.

Provided our recommendations above are adopted into the final design, NOAA Fisheries Service concurs with your determination that although impacts and habitat conversion resulting from the proposed 600 ft. shoreline stabilization project will occur, the impacts will not substantially adversely affect essential fish habitat (EFH). We are of the opinion that given the scope of the construction, limited channelwood encroachment (10 ft.) relative to the width of the James River (4.3 miles) at the project site, a time of year restriction to help protect the migration of anadromous fish is not warranted. However, if channelward encroachment or impacts to EFH increase during the Preconstruction, Engineering and Design (PED) Phase, we ask that you reinitiate EFH consultation with my office. Also, I would appreciate notification when the draft feasibility report/EA is made available in early October.

Please note this EFH determination does not address threatened and endangered species under the purview of NOAA Fisheries Service. We understand you are coordinating with our Protected Resources Division regarding federally listed sea turtles, shortnose and Atlantic sturgeon known to the project area.

Thank you for the opportunity to comment on this project. Please feel free to contact me if you have any questions.

Take care and stay well,
Dave

David L. O'Brien
Fisheries Biologist

NOAA Fisheries Service
P.O. Box 1346
1370 Greate Rd.
Gloucester Point, VA 23062
804-684-7828
david.l.obrien@noaa.gov <mailto:david.l.obrien@noaa.gov> <mailto:david.l.obrien@noaa.gov > >

NOTICE: I am teleworking until further notice. I will be checking my phone messages regularly and will return calls as quickly as possible. Please stay well.

On Fri, Sep 18, 2020 at 12:31 PM Woodward, Justine R CIV USARMY CENAO (USA) <Justine.R.Woodward@usace.army.mil <mailto:Justine.R.Woodward@usace.army.mil> <mailto:Justine.R.Woodward@usace.army.mil > > > wrote:

Good Afternoon Dave,

I hope you are doing well! Please see the attached EFH Assessment worksheet for a proposed shoreline stabilization project along the James River in Newport News. I am also coordinating with the Protected Resources Division for Atlantic and shortnose sturgeon and four species of sea turtles. Please note, we are currently preparing to release the draft feasibility report/EA in early October to the public.

If you require any additional information necessary to support the EFH consultation, please let me know. If you have any other questions or concerns, please don't hesitate to contact me. I look forward to hearing from you.

Have a good weekend!

Regards,
Justine

Justine Woodward
Biologist
Environmental Analysis Section
Norfolk District, U.S. Army Corps of Engineers
803 Front Street
Norfolk, VA 23510
757-201-7728

APPENDIX A-7
NATIONAL HISTORIC PRESERVATION ACT SECTION 106
CONSULTATION DOCUMENTATION

CONTINUING AUTHORITIES PROGRAM, SECTION 14

EMERGENCY STREAMBANK AND SHORELINE PROTECTION

JAMES RIVER SHORELINE, NEWPORT NEWS

U.S. Army Corps
of Engineers
Norfolk District

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

August 28, 2020

SUBJECT: Continuing Authorities Program, Section 14, Emergency Streambank and Shoreline Protection, James River Shoreline Newport News, Virginia

Terry Clouthier
Cultural Resource Director
Pamunkey Indian Tribe
1054 Pocahontas Trail
King William, VA 23086-2114

Dear Mr. Clouthier:

The U.S. Army Corps of Engineers, Norfolk District (Corps), is studying an emergency streambank and shoreline protection project along the James River, Newport News, Virginia. The City of Newport News requested the Corps, Norfolk District to evaluate structural and non-structural measures that could be implemented as part of a Federal project under Section 14, Emergency Streambank and Shoreline Protection, of the Continuing Authorities Program (CAP). The focus of this study is to mitigate erosion along the James River in the vicinity of River Road, adjacent to the Government Ditch, which is threatening various public work utilities.

An approximate 600-foot section of the riverbank along the James River is severely eroded by the combined effects of natural erosion processes; river flow, water level rise, and tidal, storm, and wind driven wave action. The resulting 25-foot high receding sandy bluff is an imminent threat to existing public facilities, causing continual loss of land threatening existing public utilities, including River Road, electric, gas, communications, public water and sewer lines, as well as creating dangerous conditions associated with the steep slope. The project involves the stabilization of approximately 600 linear feet eroding riverbank along the James River with the construction of a longitudinal rock sill running the length of the project area at a height of 5-feet (NAVD88); earthen sloped berm graded on a 1:3 slope; 2,900 tons of Virginia Department of Transportation (VDOT) Class III riprap and 800 tons of VDOT No. 1 stone; 4,300 cubic yards of fill; 1,600 square yards of geotextile filter fabric; 35,000 square feet of seeding; and 700 cubic yards of debris removal.

Pursuant to Section 106 of the National Historic Preservation Act (54 USC 306108), and it's implementing regulations (36 CFR Part 800), the Corps has determined that the Project constitutes an undertaking as defined in 36 CFR 800.16(y) and is initiating consultation. As part of the project consultation, the Corps has identified the area of potential effects (APE) for the undertaking to encompass all areas of

proposed ground disturbance, including beach placement, access, staging, and construction (Figure 1). The feasibility study for the project is ongoing and a preferred alternative/recommended plan has been identified and reduced to a small area of potential impacts that are located on the project slope and shoreline. The majority of the project will consist of regrading the slope and placing fill, vegetation, and riprap within the project site. (See Figures 2, 3, & 4).

As part of the project, the Corps conducted a reconnaissance survey by a District archaeologist. The purpose was to inspect the project and determine if any resources were present and if any additional work should be required for the project. The project area was also reviewed using the VCHRIS data viewer. No known cultural resources are located within the proposed project area. The project area is heavily eroded, and the lower bank was inspected for debris and any signs of resources eroding from the bank and slope of the project area. None were observed. There is, however, considerable modern debris located within the tidal shoreline associated with modern dumping/shoreline stabilization which mainly consists of concrete debris. Because of the heavy erosion, the Corps has determined that the project area which consists of the shoreline, slope and immediate top of bank poses a low probability for the presences of cultural materials. Based upon the pedestrian survey of the project area, lack of known resources in the immediate area, and the limited project area, the Corps has determined the proposed project will have no effect to historic properties. The Corps proposes to move forward with the project utilizing its Fortuitous Finds Clause which will be placed within the project specifications. Should any resources be discovered during construction all work within the immediate area will be stopped until the resources can be ascertained, and appropriate parties notified.

The Corps requests your comments on the proposed no effect determination. Please contact Justine Woodward with any question or concerns by email at Justine.R.Woodward@usace.army.mil.

Sincerely,

Susan Layton

Susan E. Layton
Chief, Planning and Policy Branch
Norfolk District
U.S. Army Corps of Engineers

Figure 1. Project Area and Area of Potential Effect.

Figure 2. View facing northwest.

Figure 3. View facing northwest.

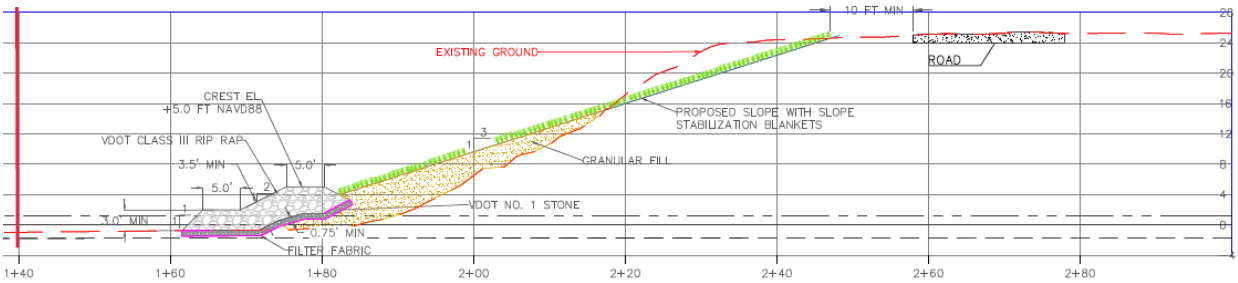

Figure 4. Proposed Project consists of a longitudinal rock sill for the length of the project area which is approximately 600 linear feet. The project would include re-grading a portion of the slope to a 1:3 slope, 2,900 tons of Virginia Department of Transportation (VDOT) Class III riprap and 800 tons of VDOT No. 1 stone; 4,300 cubic yards of fill; 1,600 square yards of geotextile filter fabric; 35,000 square feet of seeding; and 700 cubic yards of debris removal.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

August 28, 2020

SUBJECT: Continuing Authorities Program, Section 14, Emergency Streambank and Shoreline Protection, James River Shoreline Newport News, Virginia

Chief Samuel M. Bass
Nansemond Indian Nation
3903 Manning Road
Suffolk, Virginia 23437-8873

Dear Chief Bass:

The U.S. Army Corps of Engineers, Norfolk District (Corps), is studying an emergency streambank and shoreline protection project along the James River, Newport News, Virginia. The City of Newport News requested the Corps, Norfolk District to evaluate structural and non-structural measures that could be implemented as part of a Federal project under Section 14, Emergency Streambank and Shoreline Protection, of the Continuing Authorities Program (CAP). The focus of this study is to mitigate erosion along the James River in the vicinity of River Road, adjacent to the Government Ditch, which is threatening various public work utilities.

An approximate 600-foot section of the riverbank along the James River is severely eroded by the combined effects of natural erosion processes; river flow, water level rise, and tidal, storm, and wind driven wave action. The resulting 25-foot high receding sandy bluff is an imminent threat to existing public facilities, causing continual loss of land threatening existing public utilities, including River Road, electric, gas, communications, public water and sewer lines, as well as creating dangerous conditions associated with the steep slope. The project involves the stabilization of approximately 600 linear feet eroding riverbank along the James River with the construction of a longitudinal rock sill running the length of the project area at a height of 5-feet (NAVD88); earthen sloped berm graded on a 1:3 slope; 2,900 tons of Virginia Department of Transportation (VDOT) Class III riprap and 800 tons of VDOT No. 1 stone; 4,300 cubic yards of fill; 1,600 square yards of geotextile filter fabric; 35,000 square feet of seeding; and 700 cubic yards of debris removal.

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proposed ground disturbance, including beach placement, access, staging, and construction (Figure 1). The feasibility study for the project is ongoing and a preferred alternative/recommended plan has been identified and reduced to a small area of potential impacts that are located on the project slope and shoreline. The majority of the project will consist of regrading the slope and placing fill, vegetation, and riprap within the project site. (See Figures 2, 3, & 4).

As part of the project, the Corps conducted a reconnaissance survey by a District archaeologist. The purpose was to inspect the project and determine if any resources were present and if any additional work should be required for the project. The project area was also reviewed using the VCHRIS data viewer. No known cultural resources are located within the proposed project area. The project area is heavily eroded, and the lower bank was inspected for debris and any signs of resources eroding from the bank and slope of the project area. None were observed. There is, however, considerable modern debris located within the tidal shoreline associated with modern dumping/shoreline stabilization which mainly consists of concrete debris. Because of the heavy erosion, the Corps has determined that the project area which consists of the shoreline, slope and immediate top of bank poses a low probability for the presences of cultural materials. Based upon the pedestrian survey of the project area, lack of known resources in the immediate area, and the limited project area, the Corps has determined the proposed project will have no effect to historic properties. The Corps proposes to move forward with the project utilizing its Fortuitous Finds Clause which will be placed within the project specifications. Should any resources be discovered during construction all work within the immediate area will be stopped until the resources can be ascertained, and appropriate parties notified.

The Corps requests your comments on the proposed no effect determination. Please contact Justine Woodward with any question or concerns by email at Justine.R.Woodward@usace.army.mil.

Sincerely,

Susan Layton

Susan E. Layton
Chief, Planning and Policy Branch
Norfolk District
U.S. Army Corps of Engineers

Figure 1. Project Area and Area of Potential Effect.

Figure 2. View facing northwest.

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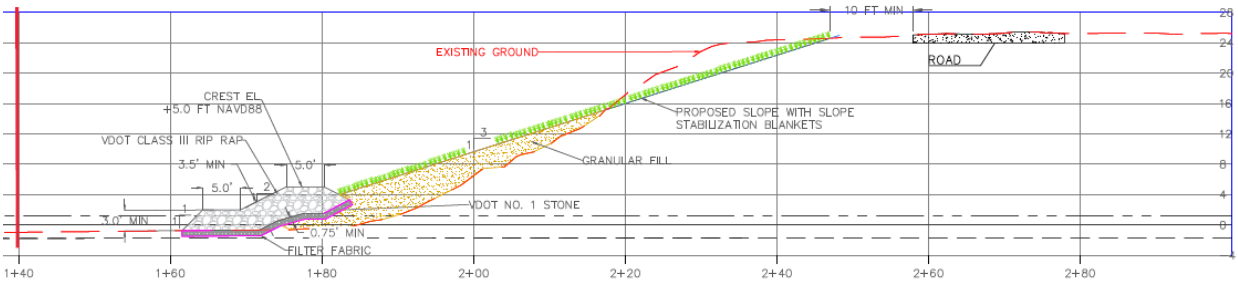

Figure 4. Proposed Project consists of a longitudinal rock sill for the length of the project area which is approximately 600 linear feet. The project would include re-grading a portion of the slope to a 1:3 slope, 2,900 tons of Virginia Department of Transportation (VDOT) Class III riprap and 800 tons of VDOT No. 1 stone; 4,300 cubic yards of fill; 1,600 square yards of geotextile filter fabric; 35,000 square feet of seeding; and 700 cubic yards of debris removal.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

August 28, 2020

SUBJECT: Continuing Authorities Program, Section 14, Emergency Streambank and Shoreline Protection, James River Shoreline Newport News, Virginia

Erin Thompson-Paden
Director of Historic Preservation
Delaware Nation
31064 State Highway 281
Anadarko, OK 73005

Dear Ms. Thompson-Paden:

The U.S. Army Corps of Engineers, Norfolk District (Corps), is studying an emergency streambank and shoreline protection project along the James River, Newport News, Virginia. The City of Newport News requested the Corps, Norfolk District to evaluate structural and non-structural measures that could be implemented as part of a Federal project under Section 14, Emergency Streambank and Shoreline Protection, of the Continuing Authorities Program (CAP). The focus of this study is to mitigate erosion along the James River in the vicinity of River Road, adjacent to the Government Ditch, which is threatening various public work utilities.

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proposed ground disturbance, including beach placement, access, staging, and construction (Figure 1). The feasibility study for the project is ongoing and a preferred alternative/recommended plan has been identified and reduced to a small area of potential impacts that are located on the project slope and shoreline. The majority of the project will consist of regrading the slope and placing fill, vegetation, and riprap within the project site. (See Figures 2, 3, & 4).

As part of the project, the Corps conducted a reconnaissance survey by a District archaeologist. The purpose was to inspect the project and determine if any resources were present and if any additional work should be required for the project. The project area was also reviewed using the VCHRIS data viewer. No known cultural resources are located within the proposed project area. The project area is heavily eroded, and the lower bank was inspected for debris and any signs of resources eroding from the bank and slope of the project area. None were observed. There is, however, considerable modern debris located within the tidal shoreline associated with modern dumping/shoreline stabilization which mainly consists of concrete debris. Because of the heavy erosion, the Corps has determined that the project area which consists of the shoreline, slope and immediate top of bank poses a low probability for the presences of cultural materials. Based upon the pedestrian survey of the project area, lack of known resources in the immediate area, and the limited project area, the Corps has determined the proposed project will have no effect to historic properties. The Corps proposes to move forward with the project utilizing its Fortuitous Finds Clause which will be placed within the project specifications. Should any resources be discovered during construction all work within the immediate area will be stopped until the resources can be ascertained, and appropriate parties notified.

The Corps requests your comments on the proposed no effect determination. Please contact Justine Woodward with any question or concerns by email at Justine.R.Woodward@usace.army.mil.

Sincerely,

Susan Layton

Susan E. Layton
Chief, Planning and Policy Branch
Norfolk District
U.S. Army Corps of Engineers

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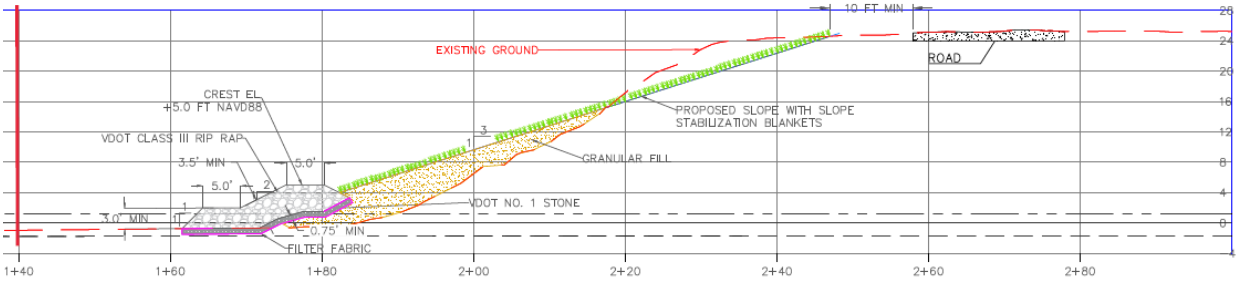

Figure 4. Proposed Project consists of a longitudinal rock sill for the length of the project area which is approximately 600 linear feet. The project would include re-grading a portion of the slope to a 1:3 slope, 2,900 tons of Virginia Department of Transportation (VDOT) Class III riprap and 800 tons of VDOT No. 1 stone; 4,300 cubic yards of fill; 1,600 square yards of geotextile filter fabric; 35,000 square feet of seeding; and 700 cubic yards of debris removal.

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

August 28, 2020

SUBJECT: Continuing Authorities Program, Section 14, Emergency Streambank and Shoreline Protection, James River Shoreline Newport News, Virginia

Caitlin Rogers
Catawba Indian Nation
Tribal Historic Preservation Office
1536 Tom Steven Road
Rock Hill, SC 29730-9535

Dear Ms. Rogers:

The U.S. Army Corps of Engineers, Norfolk District (Corps), is studying an emergency streambank and shoreline protection project along the James River, Newport News, Virginia. The City of Newport News requested the Corps, Norfolk District to evaluate structural and non-structural measures that could be implemented as part of a Federal project under Section 14, Emergency Streambank and Shoreline Protection, of the Continuing Authorities Program (CAP). The focus of this study is to mitigate erosion along the James River in the vicinity of River Road, adjacent to the Government Ditch, which is threatening various public work utilities.

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The Corps requests your comments on the proposed no effect determination. Please contact Justine Woodward with any question or concerns by email at Justine.R.Woodward@usace.army.mil.

Sincerely,

Susan Layton

Susan E. Layton
Chief, Planning and Policy Branch
Norfolk District
U.S. Army Corps of Engineers

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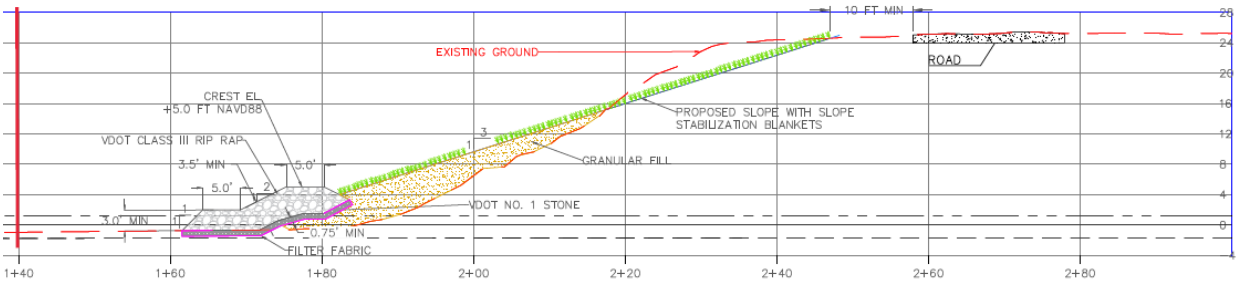

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
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803 FRONT STREET
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August 28, 2020

SUBJECT: Continuing Authorities Program, Section 14, Emergency Streambank and Shoreline Protection, James River Shoreline Newport News, Virginia

Remedios Holmes
Tribal Administrator
Chickahominy Tribe Eastern Division
2895 Mt. Pleasant Road
Providence Forge, VA 23140-3606

Dear Ms. Holmes:

The U.S. Army Corps of Engineers, Norfolk District (Corps), is studying an emergency streambank and shoreline protection project along the James River, Newport News, Virginia. The City of Newport News requested the Corps, Norfolk District to evaluate structural and non-structural measures that could be implemented as part of a Federal project under Section 14, Emergency Streambank and Shoreline Protection, of the Continuing Authorities Program (CAP). The focus of this study is to mitigate erosion along the James River in the vicinity of River Road, adjacent to the Government Ditch, which is threatening various public work utilities.

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Sincerely,

Susan Layton

Susan E. Layton
Chief, Planning and Policy Branch
Norfolk District
U.S. Army Corps of Engineers

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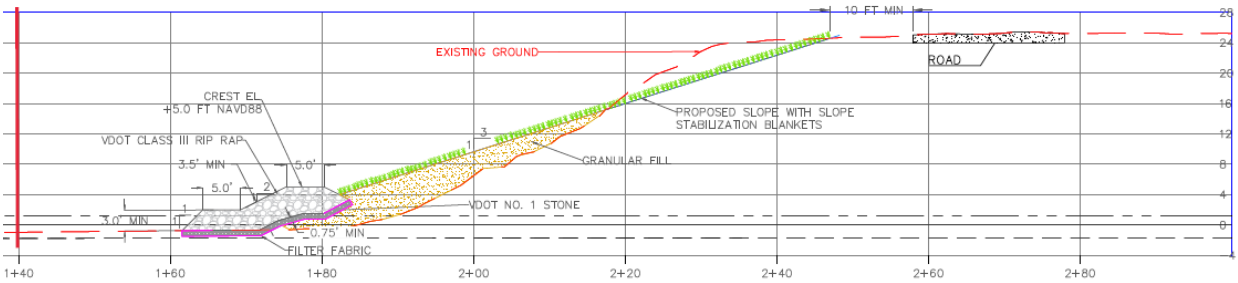

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

August 28, 2020

SUBJECT: Continuing Authorities Program, Section 14, Emergency Streambank and Shoreline Protection, James River Shoreline Newport News, Virginia

Samantha Henderson
Project Review Archeologist
DHR Headquarters, Richmond Central Office
2801 Kensington Avenue
Richmond, VA 23221-2470

Dear Ms. Henderson:

The U.S. Army Corps of Engineers, Norfolk District (Corps), is studying an emergency streambank and shoreline protection project along the James River, Newport News, Virginia. The City of Newport News requested the Corps, Norfolk District to evaluate structural and non-structural measures that could be implemented as part of a Federal project under Section 14, Emergency Streambank and Shoreline Protection, of the Continuing Authorities Program (CAP). The focus of this study is to mitigate erosion along the James River in the vicinity of River Road, adjacent to the Government Ditch, which is threatening various public work utilities.

An approximate 600-foot section of the riverbank along the James River is severely eroded by the combined effects of natural erosion processes; river flow, water level rise, and tidal, storm, and wind driven wave action. The resulting 25-foot high receding sandy bluff is an imminent threat to existing public facilities, causing continual loss of land threatening existing public utilities, including River Road, electric, gas, communications, public water and sewer lines, as well as creating dangerous conditions associated with the steep slope. The project involves the stabilization of approximately 600 linear feet eroding riverbank along the James River with the construction of a longitudinal rock sill running the length of the project area at a height of 5-feet (NAVD88); earthen sloped berm graded on a 1:3 slope; 2,900 tons of Virginia Department of Transportation (VDOT) Class III riprap and 800 tons of VDOT No. 1 stone; 4,300 cubic yards of fill; 1,600 square yards of geotextile filter fabric; 35,000 square feet of seeding; and 700 cubic yards of debris removal.

Pursuant to Section 106 of the National Historic Preservation Act (54 USC 306108), and it's implementing regulations (36 CFR Part 800), the Corps has determined that the Project constitutes an undertaking as defined in 36 CFR 800.16(y) and is initiating consultation with your office. As part of the project consultation, the Corps has identified the area of potential effects (APE) for the undertaking to encompass all areas

of proposed ground disturbance, including beach placement, access, staging, and construction (Figure 1). The feasibility study for the project is ongoing and a preferred alternative/recommended plan has been identified and reduced to a small area of potential impacts that are located on the project slope and shoreline. The majority of the project will consist of regrading the slope and placing fill, vegetation, and riprap within the project site. (See Figures 2, 3, & 4).

As part of the project, the Corps conducted a reconnaissance survey by a District archaeologist. The purpose was to inspect the project and determine if any resources were present and if any additional work should be required for the project. The project area was also reviewed using the VCHRIS data viewer. No known cultural resources are located within the proposed project area. The project area is heavily eroded, and the lower bank was inspected for debris and any signs of resources eroding from the bank and slope of the project area. None were observed. There is, however, considerable modern debris located within the tidal shoreline associated with modern dumping/shoreline stabilization which mainly consists of concrete debris. Because of the heavy erosion, the Corps has determined that the project area which consists of the shoreline, slope and immediate top of bank poses a low probability for the presences of cultural materials. Based upon the pedestrian survey of the project area, lack of known resources in the immediate area, and the limited project area, the Corps has determined the proposed project will have no effect to historic properties. The Corps proposes to move forward with the project utilizing its Fortuitous Finds Clause which will be placed within the project specifications. Should any resources be discovered during construction all work within the immediate area will be stopped until the resources can be ascertained, and appropriate parties notified.

The Corps requests your comments on the proposed no effect determination. Please contact Justine Woodward with any question or concerns by email at Justine.R.Woodward@usace.army.mil.

Sincerely,

Susan Layton

Susan E. Layton
Chief, Planning and Policy Branch
Norfolk District
U.S. Army Corps of Engineers

Figure 1. Project Area and Area of Potential Effect.

Figure 2. View facing northwest.

Figure 3. View facing northwest.

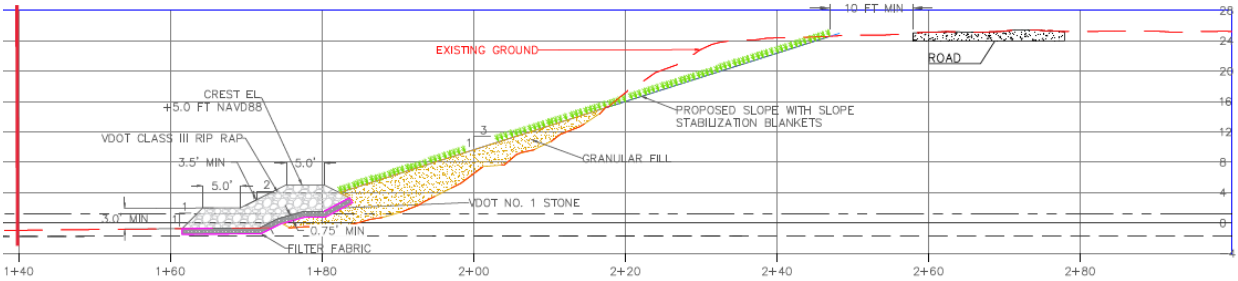


Figure 4. Proposed Project consists of a longitudinal rock sill for the length of the project area which is approximately 600 linear feet. The project would include re-grading a portion of the slope to a 1:3 slope, 2,900 tons of Virginia Department of Transportation (VDOT) Class III riprap and 800 tons of VDOT No. 1 stone; 4,300 cubic yards of fill; 1,600 square yards of geotextile filter fabric; 35,000 square feet of seeding; and 700 cubic yards of debris removal.

Catawba Indian Nation
Tribal Historic Preservation Office
1536 Tom Steven Road
Rock Hill, South Carolina 29730

Office 803-328-2427
Fax 803-328-5791

September 28, 2020

Attention: Susan E. Layton
Department of the Army
803 Front Street
Norfolk, VA 23510-1011

Re. THPO # TCNS # Project Description
2020-219-6 Emergency Streambank and Shoreline Protection, James River Shoreline

Dear Ms. Layton,

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 Caitlin.Rogers@catawba.com.

Sincerely,

Caitlin Rogers for

Wenonah G. Haire
Tribal Historic Preservation Officer

PAMUNKEY INDIAN TRIBE

Terry Clouthier
Cultural Resource Director

TRIBAL GOVERNMENT
Tribal Office

1054 Pocahontas Trail
King William, VA 23086

(804) 843-2109
FAX (866) 422-3387

THPO File Number: 2020-771

Date: 09/30/2020

Susan E. Layton
Chief, Planning and Policy Branch
U.S. Army Corps of Engineers,
Norfolk District
Fort Norfolk
803 Front Street
Norfolk, VA 23510

RE: Continuing Authorities Program, Section 14, Emergency Streambank and Shoreline Protection, James River Shoreline, Newport News, Virginia

Dear Ms. Layton,

Thank you for contacting the Pamunkey Indian Tribe regarding the proposed undertaking relating to the emergency streambank and shoreline protection project along the James River shoreline in Newport News, Virginia. My office offers the following comments.

Due to the extremely limited potential to impact sites of significance to the Tribe, my office does not wish to remain a consulting party for the remainder of the undertaking.

However, should any human remains or pre-contact cultural or historic 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.

Please submit all correspondence via email whenever possible to the email below.

If you have any questions feel free to email me at terry.clouthier@pamunkey.org.

Sincerely,

Terry Clouthier Digitally signed by Terry Clouthier
Date: 2020.09.30 09:43:22 -04'00'

From: Henderson, Samantha
To: Woodward, Justine R CIV USARMY CENAO (USA)
Subject: [Non-DoD Source] Re: James River Shoreline Stabilization Consultation Letter - Newport News, Virginia
Date: Tuesday, September 29, 2020 3:27:58 PM

Dear Ms. Woodward:

The Department of Historic Resources (DHR) has received the James River Shoreline Stabilization (DHR File No. 2020-0430) project for our review and comment. Based upon the documentation provided, DHR concurs with the U.S. Army Corps of Engineers' determination that no historic properties will be affected by the proposed undertaking.

Implementation of the undertaking in accordance with the finding of No Historic Properties Affected as documented fulfills the Federal agency's responsibilities under Section 106 of the National Historic Preservation Act. If for any reason the undertaking is not or cannot be conducted as proposed in the finding, consultation under Section 106 must be reopened.

Thank you for your consideration of historic resources. If you have any questions or if we may provide any further assistance at this time, please do not hesitate to contact me.

Regards,

Sam Henderson, Archaeologist
Division of Review and Compliance
Phone: (804) 482-6088
Samantha.Henderson@dhr.virginia.gov <mailto:Samantha.Henderson@dhr.virginia.gov>

On Mon, Aug 31, 2020 at 9:27 AM Woodward, Justine R CIV USARMY CENAO (USA) <Justine.R.Woodward@usace.army.mil <mailto:Justine.R.Woodward@usace.army.mil> > wrote:

> Good Morning Samantha,
>
> Please see attached correspondence for your review. A hard copy will also be sent via certified mail. Please don't hesitate to contact me if you have any questions.
>
> Regards,
> Justine
>
> Justine Woodward
> Biologist
> Environmental Analysis Section
> Norfolk District, U.S. Army Corps of Engineers
> 803 Front Street
> Norfolk, VA 23510
> 757-201-7728

--

Samantha J. Henderson
Project Review Archaeologist
Review and Compliance Division
Virginia Department of Historic Resources
2801 Kensington Avenue | Richmond, VA 23221
(804) 482-6088 | samantha.henderson@dhr.virginia.gov <mailto:samantha.henderson@dhr.virginia.gov>

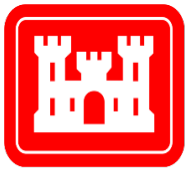
DHR is currently teleworking. Please consider contacting me via email rather than via a phone call as I am not at my desk.

APPENDIX A-8
FISH AND WILDLIFE COORDINATION ACT CONSULTATION

CONTINUING AUTHORITIES PROGRAM, SECTION 14

EMERGENCY STREAMBANK AND SHORELINE PROTECTION

JAMES RIVER SHORELINE, NEWPORT NEWS



U.S. Army Corps
of Engineers
Norfolk District

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
http://www.fws.gov/chesapeakebay

April 12, 2021

Colonel Patrick V. Kinsman
District Engineer
U.S. Army Corps of Engineers
803 Front Street
Norfolk, Virginia 23510-1096

Attn: Richard M. Harr, PWS, CES, Water Resources Division, Planning and Policy Branch, Planning Resource Section

RE: U.S. Fish and Wildlife Coordination Act 2(b) Report for the James River Shoreline Stabilization Draft Integrated Feasibility Study/Environmental Assessment Report February 4, 2021

Dear Colonel Kinsman:

This constitutes the report of the U.S. Fish and Wildlife Service (Service) on the proposed James River Shoreline Stabilization project that may be funded as part of the Continuing Authorities Program Section 14 of the Flood Control Act of 1946, as amended (P.L. 79-526), Emergency Streambank and Shore Protection. It is submitted in accordance with Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat 401, as amended; 16 U.S.C. *et seq*.); Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1513 *et seq*.); and the Coastal Barrier Resource Act (CBRA) (16 U.S.C. § 3501 et seq; 12 U.S.C. § 1441 *et seq*.). The Service previously submitted a Planning Aid Report dated March 25, 2021, containing information on the baseline biological conditions and environmental impacts. The present report summarizes pertinent information from our previous report and sets forth the Service's official position on the U.S. Corps of Engineers, Norfolk Districts (Corps) recommended plan as described in the Draft Integrated Feasibility Report/Environmental Assessment dated November 5, 2020.

Project Description

The Integrated Feasibility Report/Environmental Assessment Report evaluated four alternatives against the No Action Alternative. All alternatives proposed using rock, vegetation, or a combination of the two, to stabilize a 600-foot length of shoreline along the James River in Newport News, Virginia. The purpose of the proposed action is to stabilize the existing shoreline along a 600-foot section of the James River and prevent future erosion resulting from combined

effects of storm surge, sea level rise, and stormwater runoff. The project would provide long-term protection to existing public utilities on adjacent upland and eliminate unsafe conditions associated with the current steep slope. The Preferred Alternative selected by the Corps is Alternative 1, a rock sill with vegetated slope. The entire slope would be graded back to a 1V:3H slope, with placement of Virginia Department of Transportation (VDOT) Class III rip rap on top of VDOT number 1 stone and filter fabric at the toe. This Alternative was chosen as the lowest cost alternative and had minimal environmental impacts.

Service Comments

Minimizing hardened substrate and using more nature-based design reduces impact on the infaunal community. Living shorelines reduce erosion, improve marine habitat and spawning area, improve water quality, and filter groundwater and storm water runoff (NOAA Fisheries 2021). The Service reviewed the Feasibility Study/Environmental Assessment with the objective of identifying the alternative that would meet the purpose and need while providing the largest benefit to fish and wildlife habitat.

While all the alternatives will work to stabilize the shoreline, Alternative 4 is the best alternative from a fish and wildlife benefit perspective. Alternative 4 is a living shoreline with vegetated slope. This consists of regrading a portion of the slope to a 1V:4H, transitioning to a 1V:10H for wetland planting, and placement of filter fabric and VDOT number 1 stone topped with VDOT Class III rip rap. Alternative 4 meets the purpose and need and provides the largest benefits to fish and wildlife resources. Living shorelines maintain natural connections between land and water ecosystems that enhance resilience, increase storm water infiltration, and promote slow inland water transfer. When compared to hardened shorelines, evidence shows living shorelines are able to perform better. Marsh vegetation and oyster reefs (if present) attenuate waves and trap sediment which can allow the marsh to grow in elevation to accommodate sea level rise. If appropriately designed, the shoreline can provide fish habitat and promote marsh migration (NOAA Fisheries 2021). Incorporating oysters, native high and low marsh vegetation, submerged aquatic vegetation (SAV), a sandy or cobble beach, or other natural shoreline features can provide additional functioning habitats.

Conclusion

The Service believes that Alternative 4 provides better environmental benefits to fish and wildlife resources than Alternative 1. However, we do recognize that the cost of implementation is a significant driver in decision-making for the Corps. Although we do not believe that Alternative 1 is the best alternative for fish and wildlife habitat, we recognize that it still enhances ecological value for fish and wildlife resources. The Service recognizes that choosing Alternative 1 is a reasonable compromise between cost and ecological benefit.

The Service appreciates the opportunity to provide comment on the James River Shoreline Project Feasibility Study/Environmental Assessment. If there are any questions, please contact Amy O'Donnell, of my staff, at amy_odonnell@fws.gov.

Sincerely,

GENEVIEVE PULLIS

Digitally signed by GENEVIEVE PULLIS
Date: 2021.04.14 08:37:59 -04'00'

Genevieve LaRouche
Field Supervisor

cc: Cindy Shultz, U.S Fish and Wildlife Service, Virginia Field Office

References

NOAA Fisheries. Understanding Living Shorelines. Accessed 2/11/2021 https://www.fisheries.noaa.gov/insight/understanding-living-shorelines

USFWS, 2021. Draft Fish and Wildlife Planning Aid Report On James River Shoreline Stabilization Project, Newport News, Virginia Authorized under Section 14 of the Flood Control Act of 1946

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
http://www.fws.gov/chesapeakebay

March 25, 2021

Richard Harr
Project Manager
Norfolk District, U.S. Army Corps of Engineers
803 Front Street
Norfolk, VA 23510

RE: James River Shoreline Restoration Project

Dear Richard Harr,

Enclosed is the U.S. Fish and Wildlife Service's Coordination Act Report for the proposed James River Shoreline Project in Newport News, Virginia. The project has been reviewed, impacts have been assessed and the attached letter and report serve to satisfy the requirements of the Fish and Wildlife Coordination Act (FWCA; 16 U.S.C. § 661 et seq). The report summarizes pertinent information regarding effects of the U.S. Army Corps of Engineers' plan to continue with the James River shoreline restoration. The alternative selected by the U.S. Army Corps of Engineers, "Preferred Alternative," involves a rock sill with a vegetated slope. The U.S. Fish and Wildlife Service has found the project contains actions that are not likely to have effects on the area's fish and wildlife resources, and have actions found to be beneficial for fish and wildlife resources.

We appreciate the opportunity to participate in this project. If there are any questions, please contact Amy O'Donnell amy_odonnell@fws.gov.

Sincerely,

GENEVIEVE PULLIS

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Date: 2021.03.25 10:11:14 -04'00'

Genevieve LaRouche
Field Supervisor

Final
Planning Aid Report:
James River Shoreline Restoration, Newport News Virginia

Prepared for:
U.S. Army Corps of Engineers
Norfolk District

Prepared by:

Amy O'Donnell

Chesapeake Bay Field Office
U.S. Fish and Wildlife Service
March 2021

Executive Summary

This document constitutes the planning aid report (PAR) of the U.S. Fish and Wildlife Service (Service) to assist the U.S. Army Corps of Engineers (Corps) with the development of the James River Shoreline study. The James River Shoreline, Newport News, Virginia study is authorized by the Continuing Authorities Program (CAP), Section 14 of the Flood Control Act of 1946, as amended (P.L.79-526), Emergency Streambank and Shore Protection. The purpose of the Section 14 program is to construct emergency streambank and shore protection to prevent natural erosion processes from damaging highways, bridge approaches, public works, churches, public and private non-profit hospitals, schools, water and sewer lines, and other public or non-profit facilities that offer public services to all, and known historic properties eligible or listed on the National Register of Historic Places. The PAR and subsequent Fish and Wildlife Coordination letter are submitted in accordance with Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat 401, as amended; 16 U.S.C. *et seq*.); Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1513 *et seq*.); and the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 *et seq*.). The PAR summarizes information on biological resources and project impacts that are both positive and negative to Service resources.

Table of Contents

Introduction

The U.S Army Corps of Engineers (Corps) requested assistance from the U.S. Fish and Wildlife Service (Service) in identifying positive and/or negative effects from a project along the James River shoreline, Newport News, Virginia. The Service developed this Planning Aid Report (PAR) to help the Corps identify, with respect to fish and wildlife resources, the least harmful and most beneficial alternatives for this project. The proposed action is to stabilize the existing shoreline along a 600-foot section of the James River; it is intended to prevent future erosion resulting from the combined effects of storm surge, sea level rise, and stormwater runoff. The project is needed to provide long-term protection to existing public utilities on the adjacent upland, including River Road, and to eliminate unsafe conditions associated with the steep slope. This project is authorized under the Continuing Authorities Program (CAP), Section 14 of the Flood Control Act of 1946, as amended (P.L.79-526), Emergency Streambank and Shore Protection. The purpose of the Section 14 program is to construct emergency streambank and shore protection to prevent natural erosion processes from damaging highways, bridge approaches, public works, churches, public and private non-profit hospitals, schools, water and sewer lines, and other public or non-profit facilities that offer public services to all, and known historic properties eligible or listed on the National Register of Historic Places. The PAR only evaluates impacts to fish and wildlife resources and their habitats and is not meant to be the sole document in which decisions are made on the preferred alternatives for this project.

Project Description

The project area lies in the City of Newport News, Virginia. The City of Newport News is located on the Lower Peninsula in eastern Virginia, adjacent to the Chesapeake Bay, approximately 65 miles southeast of Richmond. The study area is located entirely within the City along the north bank of the James River, west of the James River Bridge (US-17/US-258). It is bound on the south by the Government Ditch, to the north by North Avenue, and extends eastward to River Road (Figure 1).

The purpose of the proposed action is to stabilize the existing shoreline along the 600-foot section of the James River, the primary objective is to reduce the risk future erosion poses to existing infrastructure. Based on identified problems that the bank erosion causes within the study area, a planning objective has been established to aid in development and evaluation of the alternative plans discussed within this document. The primary objective is to stabilize the eroding shoreline to reduce the risk that River Road and the other public utilities within the vicinity will be damaged and compromised by continuous erosion over the period of analysis. The local sponsor, the City of Newport News, has provided support for the proposed shoreline project.

Figure 1. Location of the Study Area provided by the Corps

Detailed Alternative Plan Description

In addition to the No Action/Future Without Project Alternative, the following measures are considered as in this study:

Alternative 1: Rock Sill with Vegetated Slope. This will consist of the entire slope being graded back to a 1V:3H slope, placement of VDOT Class III rip rap on top of VDOT number 1 stone and filter fabric at the toe.

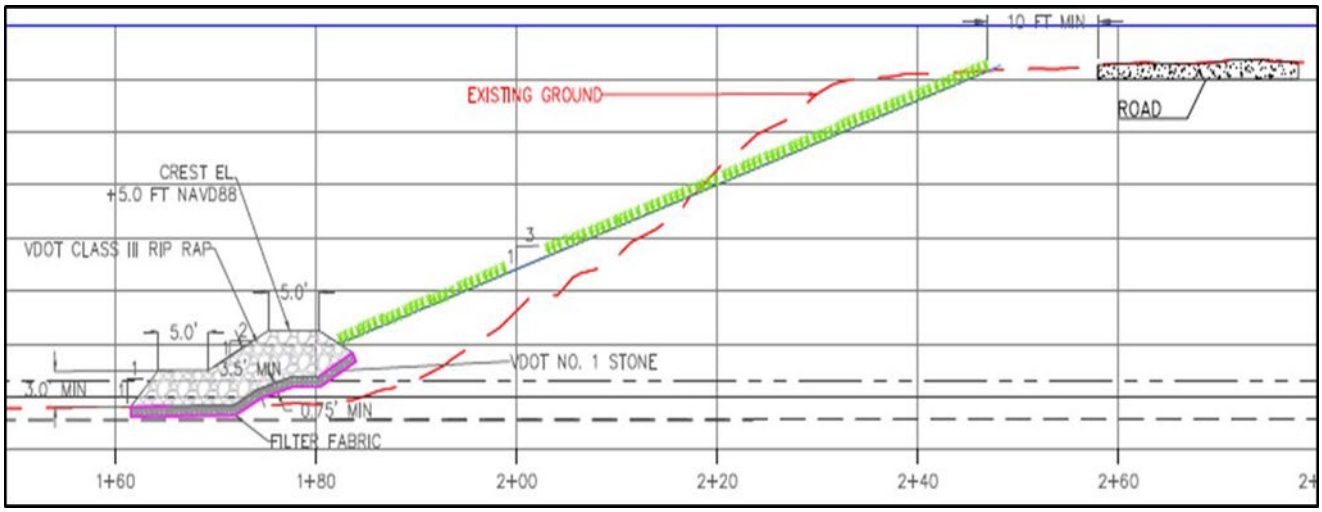


Figure 2. Alternative 1 Rock Sill with Vegetated Slope

Alternative 2: Full Rock Revetment. This consists of re-grading the slope to a 1V:3H slope, placement of filter fabric, placement of VDOT number 1 stone, and the placement of VDOT Class III rip rap.

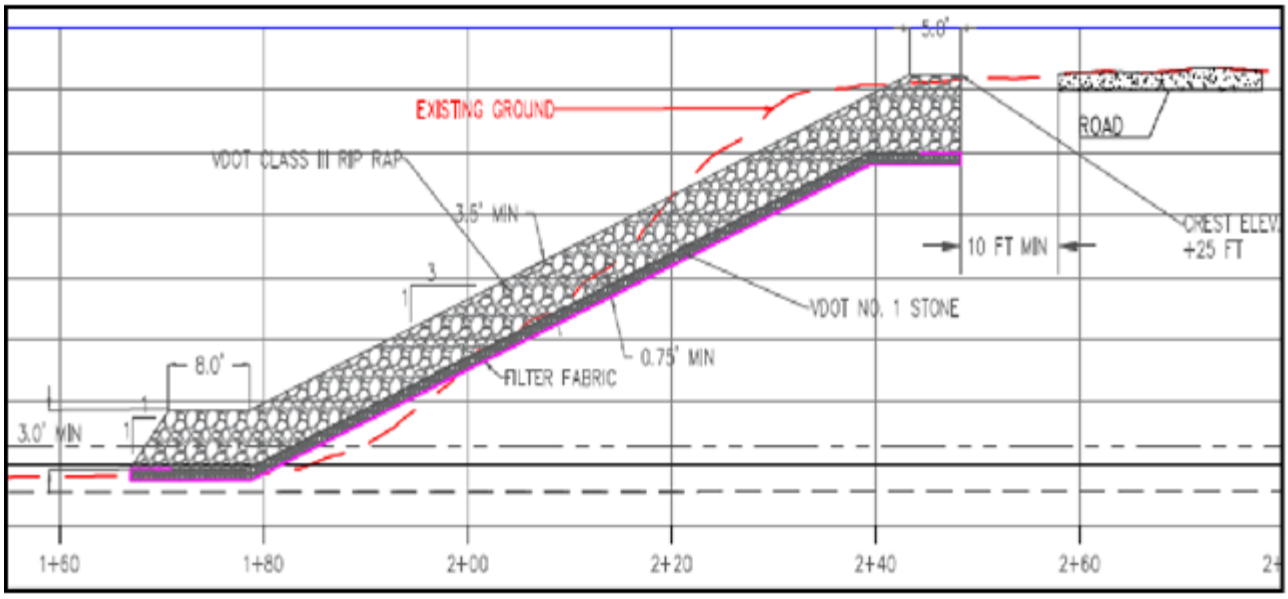


Figure 3: Alternative 2. Full Rock Revetment.

Alternative 3: Partial Rock Revetment with vegetated slope. This consists of re-grading the slope to 1V:3.5H slope that will be vegetated, placement of filter fabric with VDOT number 1 stone, and topped with VDOT Class III rip rap.

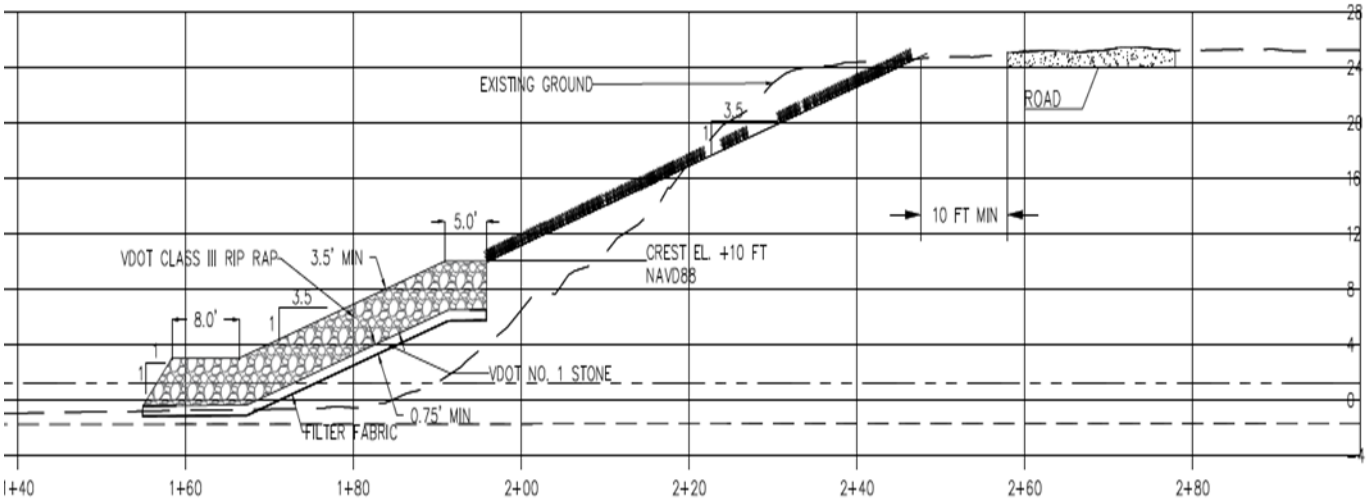


Figure 4. Alternative 3. Partial Rock Revetment with Vegetated Slope.

Alternative 4: Living Shoreline with vegetated slope. This consists of re-grading a portion of the slope to a 1V:4H, then transition to a 1V:10H for wetland planting, placement of filter fabric, VDOT number 1 stone topped with VDOT Class III rip rap. Alternative 4 would extend further channelward of mean low water than Alternative 1 with the potential for additional, minor impacts to Essential Fish Habitat and State-owned subaqueous bottomlands.

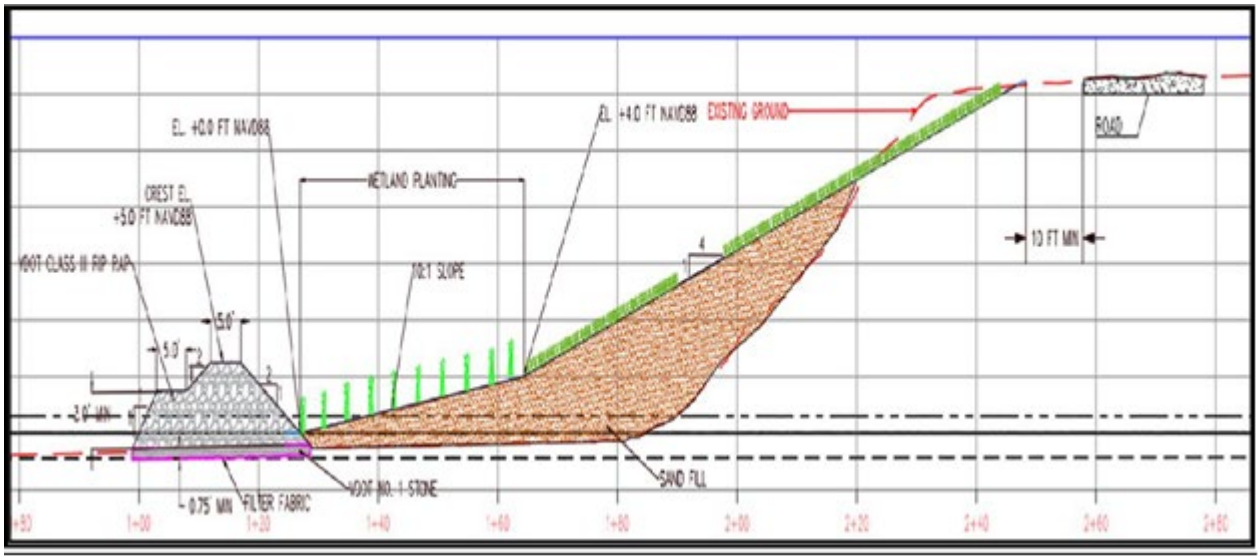


Figure 5. Alternative 4. Living Shoreline with Vegetated Slope.

Alternatives Considered but Dismissed

An initial array of alternatives was developed early in the planning process and included vertical steel sheet piling, rock-filled timber cribs, and breakwaters. The vertical steel sheet piling was determined to be cost prohibitive. The rock-filled timber cribs were determined to have only a lifecycle of 25 years which was not sufficient for long-term protection of the shoreline. The breakwaters were determined to require modeling and would not combat wind-erosion effects. There would also be substantial impacts to state-owned submerged lands channelward of mean low water with the construction of breakwaters.

In accordance with Engineering Regulation 1105-2-100, the recommended plan is considered to be justified if it is the least cost of all alternative streambank protection plans, is environmentally acceptable and in compliance with Federal and state regulations, and is also less than the cost to relocate the threatened facilities.

Resources Without the Project

Baseline Environmental Conditions

Climate change is one of the most visible environmental consequences of sea level rise (SLR) in Virginia. Sea level along the coasts is slowly rising. Impacts from waves and storm surges are increasing as waters

are pushed into coastal areas and low-lying streets. The relative SLR rate on Virginia's coasts, defined as local water level relative to land, is one of the highest of all United States coasts, and the rate appears to be accelerating. SLR rates from tidal gauges in Virginia over the past 10 to 30 years are between 4 and 6 mm/year, compared to global mean rate of ~1.7mm/year over the past century as measured by tidal gauges (Ezer and Atkinson 2015). Relative SLR is primarily the rate of three processes: globally due to warming ocean temperatures and melting land ice, land subsidence (sinking), and ocean dynamics. Impacts of subsidence and ocean dynamics is evident in Virginia. Virginia's coast is sinking due to glacial isostatic adjustment and underwater extraction. Glacial isostatic adjustment (GIA) is the earth responding to the loss of the Laurentide ice sheet tens of thousands of years ago (Ezer and Atkinson 2015). The earth is rising in northern regions (New York and Quebec), while sinking in regions south of New York. This adjustment has been estimated to cause subsidence of 0.6 to 1.88mm/year. The second factor affecting Virginia's subsidence is groundwater withdrawal, which has a more local effect than GIA. The extent of this effect extends to the lower Chesapeake Bay region in the heavily populated areas of Virginia Beach and Norfolk areas; the subsidence rate has been estimated to be between 2.0 and 4.8 mm/year. Ocean dynamics is the impact of offshore ocean currents, but many studies find that variations in sea level are correlated with changes in Gulf Stream flow: high water levels and increased floods often happen during periods when the Gulf Stream is weakening. Using this information to predict sea level is a great challenge (Ezer and Atkinson 2015).

Wave action and the shifting and transport of sand particles is an ongoing natural ecological process that exists within shoreline landscapes. Wave intensity is a factor that can affect long-term shoreline stability. Wave energy results from a combination of factors. This may include tidal current dynamics, water depth, temperature, and wind conditions. In this area of the river, fetch ranges from approximately 3 to 8 miles in distance from the project site moving mostly from the southwest. Consequently, the shoreline is subject to erosion as a result of unimpeded wave action, particularly during repeated storm events. Further degradation of the aquatic environment will continue due to erosion in the absence of shoreline stabilization measures.

Effects on Fish and Wildlife Resources

Data Quality

The following is a description of priority Service resources for the project area. The information represents the best available current information that could be gathered from existing sources. Whenever possible, project specific information was used.

Submerged Aquatic Vegetation

Submerged aquatic vegetation (SAV) are submerged flowering plants found in shallow marine waters, such as bays and lagoons. SAV provides food, habitat, and nursery areas for numerous vertebrate and invertebrate species. The vast biodiversity and sensitivity to changes in water quality inherent in SAV communities makes them an important indicator of the overall health of coastal ecosystems. The U.S. Environmental Protection Agency has designated SAV as a special aquatic site under Section 404(b)(1) of

the Clean Water Act due to its important role in the estuarine ecosystem for nesting, spawning, nursery cover, and forage areas for fish and wildlife. A Service review of the aerial mapping surveys of SAV conducted by the Virginia Institute of Marine Science (VIMS) from 1985 to 2020 revealed that no SAV occurred near the project area during this period (VIMS SAV Mapper 2021).

Wetlands

The Service has always recognized the importance of wetlands to waterfowl, other migratory birds, and wildlife, and considers these habitats a trust resource. Trust resources are natural resources that the Service has been entrusted with protecting for the benefit of the American people. The Service's responsibility for protecting wetland habitats comes largely from the Fish and Wildlife Coordination Act. Since the 1950s, the Service has been particularly concerned about wetland losses and their impacts on fish and wildlife populations. According to the U.S. Fish and Wildlife Service Wetland Mapper (accessed February 5, 2021), there are two wetland types in the study area: estuarine/marine wetlands and estuarine/marine deep water.

The no action alternative will not change the overall health of the wetlands or their ability to deal with sea level rise and subsidence. The other four options all involve either a rock sill or partial or full revetment. Generally a hardened shoreline is not preferred over a naturalized shoreline design that mimics natural features. Other Corps projects have incorporated bank restoration, wetland restoration, or utilizing oyster reefs to assist in absorbing wave energy. These restoration alternatives are preferred by the Service as they mimic natural features, improve water quality, and reduce erosion. Alternative 4, which involves a rock sill and wetland plantings on the landside, could benefit wetlands in the area by attenuating wave action along shoreline and affording wetland plants to grow along the slope of the bank. This alternative has the greenest infrastructure. Full revetment would remove suitable habitat altogether, and a partial revetment, while including some planting, would be less beneficial than a natural restoration tactic or alternative one.

Migratory Birds

Data Metrics

Migratory birds are an important trust resource. The Service works with partners to protect, restore, and conserve bird populations and their habitats for the benefit of future generations. The following data bases were used to gather information on migratory birds within the project area, including data from the Service's Information, Planning and Consultation system (IPaC), eBird, Audubon Society, and Atlantic Coast Joint Venture. This was done in order to provide a more complete analysis of the resources that are found within the described project area and represents the "best available science" for this project. IPaC is a project planning tool that is used to streamline the Service's environmental review process. It is used to identify migratory birds, endangered species, interjurisdictional fish, marine mammals, wetlands and Refuge lands. IPaC official species lists are valid for 90 days. After 90 days project proponents should reconfirm their results by requesting an updated IPaC species list for their project area to ensure accurate and up-to-date information. Another resource used to examine wildlife presence is eBird, a website launched in 2002 by the Cornell Lab of Ornithology and National Audubon Society, which provides rich data sources for bird abundance and distribution at a variety of spatial and

temporal scales (Sullivan et al. 2009). This site is primarily used for citizen science, so data should be used cautiously. However, when unusual birds or unusual high counts are reported, the regional experts review the data and verify potential for incorrect species identification.

A polygon of the project area was mapped in IPaC (Appendix A). From this data a list of migratory birds as well as Birds of Conservation Concern was created (Table 1). IPaC identified 55 migratory bird species for this site (IPaC report, 2/4/2021). The relevant species of conservation concern are presented below and are the subset of birds identified in IPaC that relate to the 1988 Fish and Wildlife Coordination Act mandating the Service to, "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act (ESA) of 1973."

Table 1. Bird of Conservation Concern

Common Name	Scientific Name	Breeding Season
American Oystercatcher *	*Haematopus palliatus*	Apr 15 to Aug 31
Bald Eagle	*Haliaeetus leucocephalus*	Oct 15 to Aug 31
Black Skimmer	*Rynchops niger*	May 20 to Sep 15
Cerulean Warbler *	*Dendroica cerulea*	Apr 29 to Jul 20
Least Tern	*Sterna antillarum*	Apr 20 to Sep 10
Prothonotary Warbler	*Protonotaria citrea*	Apr 1 to Jul 31
Red-headed Woodpecker	*Melanerpes erythrocephalus*	May 10 to Sep 10
Red-throated Loon	*Gavia stellata*	Breeds elsewhere
Ruddy Turnstone*	*Arenaria interpres morinella*	Breeds elsewhere
Rusty Blackbird	*Euphagus carolinus*	Breeds elsewhere

*indicates At-risk species

At-risk species

At-risk species are species that are declining but are not yet determined to be threatened or endangered. This includes species that are proposed for listing, candidates for listing, and/or petitioned for listing under the Endangered Species Act. The Service may also consider state species of greatest conservation need. The species detailed below were identified in the IPaC search for this project area.

American Oystercatcher (*Haematopus palliates)*

The American oystercatcher is a common coastal salt marsh and sandy beach shorebird. Its bright red-orange bill is sturdy and laterally flattened, built for opening mussels and oysters. In young birds, the bill is pinkish brown and dusky black toward the tip. It has a yellow eye and an orange-red eye ring. Breeding and non-breeding plumage is almost identical in American oystercatchers. They have black heads and necks, dark blackish-brown underparts, and white wing and upper-tail patches. Their legs are a tan or sand color. Males and females look alike but females are larger and heavier (Prince William Network 2017). American oystercatchers are shy and intolerant of people. Since coastal property is always in demand for recreation and development, human disturbance is perhaps the greatest threat to breeding American oystercatchers. The American oystercatcher builds nests in open, sandy areas where

they are vulnerable to predators like red fox, cats, dogs, or other birds (Prince William Network 2017). Pollution is another threat to the oystercatcher population if the levels are high enough to affect the shellfish these shorebirds feed on (Prince William Network 2017). This species is not known to nest within the project area; therefore the proposed alternatives are not expected to impact the population trends for American oystercatchers other than temporary displacement during construction. If material used mimics preferred habitat for American oystercatchers, it may benefit the species by offering substrate used for feeding.

Ruddy Turnstone (*Arenaria interpres*)

The ruddy turnstone is a chunky sandpiper with short legs. This species nests on high arctic tundra of North America and Eurasia and is commonly found wintering along the coastlines of six continents. While migrating, it is seen mostly along the coast. Its preferred habitats are beaches, mudflats, jetties, and rocky shores. This bird is named for its unusual feeding habit; it inserts its bill under stones or shells and flips them over to find food underneath. For a larger object, several will work together to flip it over. They lay up to four eggs which are olive-green with spots of brown. Their diet is variable and includes insects, crustaceans, and mollusks. They have also been known to eat worms, small fish, sea urchins, and other bird eggs (Audubon 2020b). This species is not known to nest anywhere around the project area. The proposed alternatives are not expected to impact population trends for ruddy turnstone other than temporary displacement during construction. If material used mimics preferred habitat for ruddy turnstone, it may benefit the species by offering substrate used for feeding.

Cerulean Warbler (*Setophaga cerulea*)

The cerulean warbler is a small migratory bird. The males are brightly colored blue above and white below with white wing bars, white tail spots and black necklace, and black streaking along the side and back. The female is a duller turquoise color above and yellow-white below with a pale blue crown and a white or yellow line over the eye. They are considered area-sensitive. They prefer to breed only in large forest tracts, building open cup nests in the middle to upper branches of deciduous trees 30 to 60 feet above the ground. Three or four eggs are laid in May or Juneand incubated for about 2 weeks. This species is not likely to nest near the project area due to lack of appropriate nesting habitat. The proposed alternatives are not expected to impact population trends for cerulean warblers other than temporary displacement during construction.

Threatened and Endangered Species

IPaC identified only one threatened species, the northern long-eared bat (*Myotis septentrionalis*). The bald eagle was identified due to its federally protected status under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). The nearest bald eagle nest to the project site is located approximately 2 miles from the project site (Center for Conservation Biology; 2020). NOAA National Marine Fisheries Service (NMFS) Section 7 mapper identified several species listed below.

Northern Long-eared Bat *Myotis septentrionalis*

The northern long-eared bat is a medium-sized bat that uses caves and mines for hibernacula during the

winter months and commonly roosts in trees during the summer (Wisconsin Department of Natural Resources 2013). The current range of the northern long-eared bat spans throughout much of Canada, including all territories except Nunavut, Canada, and in the United States from Maine to North Dakota, extending south to Wyoming, Nebraska, Kansas, Oklahoma, Louisiana, and all states further east to the coast (USDA Forest Service 2014). The main threats to the northern long-eared bat are white-nose syndrome, habitat loss and degradation, and hibernaculum disturbance (Wisconsin Department of Natural Resources 2013). Although the northern long-eared bat was identified in preliminary screening, the beach shoreline and non-vegetated eroding bank is not suitable habitat for this species, therefore, the project will have no effect on this species.

Green Sea Turtle (*Chelonia mydas*)

The green sea turtle, federally listed as threatened, grows to a maximum size of approximately 1 meter in shell length, and can weight nearly 200 kg. They have a small head, single-clawed flippers, and a heart-shaped shell. The carapace of the shell has 5 vertebral scutes, 4 pairs of coastal scutes, and 12 pairs of marginal scutes. The head has a single pair of prefrontal scales and four postorbital scales behind each eye, with are distinguishing characteristics that differentiate this species from other hard-shell sea turtles. The term "green" refers to the subdermal fat, the carapace is generally light to dark brown and changes as the turtle grows from hatchling to adult. This species is globally distributed, and is believed to inhabit coastal waters of over 140 countries and nest in over than 80 countries worldwide (Seminoff et al. 2015). They spend a majority of their lives in coastal foraging grounds, including shallow waters on open coastline and in protected bays and lagoons. They rely primarily on marine algae and SAV for their diet, with some populations feeding extensively on invertebrates. Green turtles nest on sandy, ocean-facing beaches. Characteristics vary but typical nesting beaches have intact dune structures and native vegetation. The clutches are laid at night at the base of a primary dune. Mean clutch size varies, an average is about 100 eggs per clutch (Seminoff et al. 2015). This species is regarded as a species of conservation concern. They are impacted by a variety of sources such as coastal development, beachfront lighting, erosion from sand mining, non-native vegetation, and sea level rise which affects hatchlings and nesting turtles. Fishing and marine pollution are shown to affect foraging and migrating green turtles, and fishery bycatch (trawling, gill net, and dredging) are also threats (Seminoff et al. 2015). Disease and predation are continuing threats to the North American population. The Service recommends that the Corps pursue appropriate coordination and consultation with National Marine Fisheries Servive (NMFS) which has Federal jurisdiction over the green sea turtle.

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)

The Kemp's Ridley sea turtle, federally listed as endangered, is one of the smallest of the sea turtles with adults reaching about 2 feet in length. The core habitat for Kemp's Ridley sea turtle occurs in the nearshore and inshore waters of the northern Gulf of Mexico, 95 percent of worldwide nesting occurs in Tamaulipas, Mexico with occasional nesting in North Carolina, South Carolina, and Florida. Adult and sub-adult Kemp's Ridley sea turtles primarily occupy nearshore habitat that contain muddy or sandy bottoms where prey can be found. Hatchlings typically associate with floating Sargassum seaweed and juveniles remain within Gulf of Mexico currents while others are swept into the Atlantic Ocean by the Gulf Stream. Nesting occurs from April into July along the coast of Mexico, with an average of two and a

half times per season. Clutch size is around 100 eggs. The decline of the Kemp's Ridley sea turtle is due primarily to human activities, including the direct harvest of adults and eggs and incidental capture in commercial fishing operations. Other threats include marine debris, disease, chemical pollution, noise, and habitat degradation (NMFS et al. 2011). The Service recommends that the Corps pursue appropriate coordination and consultation with NMFS who has Federal jurisdiction over Kemp's Ridley sea turtle.

Leatherback Sea Turtle (*Dermochelys coriacea*)

The leatherback sea turtle, federally listed as endangered, is the largest, deepest diving, and most migratory and wide-ranging of all the sea turtles. They inhabit open ocean and nest on sandy beaches backed with vegetation and sloped sufficiently so that distance to dry sand is limited. The leatherback sea turtle is distributed worldwide in tropical and temperate waters of the Atlantic, Pacific, and Indian Oceans. Nesting occurs from March to July at an average of five to seven times within the nesting season. Clutch size averages 80 to 85 eggs. The decline of leatherback sea turtles is attributed to exploitation by humans for their eggs and meat, as well as incidental take in numerous commercial fisheries in the Pacific. Other factors include degradation of nesting habitat from coastal development, disorientation of hatchlings by beachfront lighting, nest predation by native and non-native predators, degradation of foraging habitat, marine pollution and debris, and watercraft strikes (NMFS and USFWS 2013). The Service recommends that the Corps pursue appropriate coordination and consultation with NMFS who has Federal jurisdiction over leatherback sea turtle.

Loggerhead Sea Turtle (*Caretta caretta*)

The loggerhead sea turtle, federally listed as endangered, is characterized by a large head with blunt jaws. It is found worldwide in tropical and temperate waters of the Atlantic, Pacific, and Indian Oceans, and is widely distributed throughout its range. The loggerhead sea turtle may be found hundreds of miles out to sea as well as in inshore areas such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers. Foraging occurs in coral reefs, rocky places, and shipwrecks. Nesting occurs mainly on open beaches or along narrow bays having suitable sand and it is often found in association with other species of sea turtles. Loggerheads are known to nest from one to seven times within a nesting season. Average clutch size varies from 100 to 126 eggs. Threats include loss or degradation of nesting habitat from coastal development and beach armoring, disorientation of hatchlings by beachfront lighting, nest predation by native and nonnative predators, degradation of foraging habitat, marine pollution and debris, watercraft strikes, disease, and incidental take from channel dredging and commercial trawling, longline, and gill net fisheries (NMFS and USFWS 2008). The Service recommends that the Corps pursue appropriate coordination and consultation with NMFS who has Federal jurisdiction over loggerhead sea turtle.

Atlantic Sturgeon (*Acipenser oxyriynchus oxyriynchus*)

Atlantic sturgeon, federally listed as endangered, is an anadromous species occurring on the Atlantic Coast of North America. Atlantic sturgeon are long-lived, anadromous fish reported to reach lengths of 459 cm and body weights of 364.9 kg. The Atlantic sturgeon is a bottom-feeder without teeth and has four whiskers halfway between its snout and mouth. The species has five rows of armor-like scales, called scutes, and the tail is longer on the top than on the bottom (ASSRT 2007). The species tends to

reach maturity at 16 and 17 years for males and females, respectively. The number of eggs that can be produced is about 25,000 eggs per kg of body weight and females are thought to spawn once every 2 to 6 years, whereas males are thought to spawn every 1 to 5 years. Juveniles tend to spend 1 to 3 years in freshwater before spending their adult life in the marine environment. Spawning typically occurs in the spring over large gravel and other substrates when flow, pH, and other cues are optimal (ASSRT 2007). Populations of Atlantic sturgeon can be found from Quebec, Canada down along the Atlantic Coast and Gulf Coast to Louisiana with possible extirpation in Rhode Island and presumed extirpation in Washington, D.C. (NatureServe 2017). The primary threats for this species include habitat degradation including alteration and obstruction, vessel strikes, urbanization, pollution, and fishery by-catch (ASSRT 2007). The Service recommends that the Corps pursue appropriate coordination and consultation with NMFS who has Federal jurisdiction over Atlantic sturgeon.

Shortnose Sturgeon (*Acipenser brevirostrum*)

Shortnose sturgeon is an anadromous species occurring on the Atlantic Coast of North America (Collins et al. 2000). Sturgeon grow in freshwater and then spend their adult life in saltwater. Juveniles tend to spend 1 to 3 years in freshwater before entering the marine environment. Spawning typically occurs in the spring over large gravel and other substrates when flow, pH, and other cues are optimal (Florida Fish and Wildlife Conservation Commission, 2013). The primary threats for this species include habitat degradation including alteration, urbanization, pollution, and fishery by-catch (Florida Fish and Wildlife Conservation Commission, 2013). Dam construction has also had a particularly detrimental effect on sturgeon populations (Balazik 2012). The Service recommends that the Corps pursue appropriate coordination and consultation with NMFS who has Federal jurisdiction.

Fish and Shellfish Resources

Anadromous and Catadromous Fish

The Anadromous Fish Conservation Act (Act) is a Federal law enacted in 1965 to conserve, develop, and enhance the anadromous fish resources of the U.S. that are subject to depletion from water resources development and other causes, or with respect to which the U.S. has made conservation commitments by international agreements, and the fish in the Great Lakes and Lake Champlain that ascend streams to spawn. The provisions of the Act are found under 16 USCS §§ 757a-757f. Inter-jurisdictional, catadromous and anadromous fish are a Service trust resource. Anadromous fish spend most of their adult lives in saltier water but return each year to spawn in freshwater. Catadromous fish spend most of their adult lives in freshwater and return to saltwater to spawn. The Service and our partners are working to protect the health of aquatic habitats, recover and restore populations of native fish, and provide opportunities to enjoy the many benefits of healthy aquatic resources.

Essential Fish Habitat

One of the priorities of National Oceanic and Atmospheric Administration (NOAA) is Essential Fish Habitat (EFH). Using the best available science, NOAA along with regional fishery management councils identify and map EFH for each life stage of over 1,000 federally managed species (see species present within the project area in Table 2). EFH includes a variety of habitat in which fish are able to spawn, breed, feed, and grow to maturity. These habitats include wetlands, reefs, seagrass, rivers, and coastal

estuaries. High priorities for EFH are referred to as Habitat Areas of Particular Concern (HAPC) due to major ecological functions, sensitivity to decline, stress from development, and/or rare habitat. Using NOAA's EFH Mapper, several species were identified to use the habitat around the project area (NOAA EFH 2020). The Service recommends that the Corps pursue appropriate coordination and consultation with NMFS who has Federal jurisdiction over EFH.

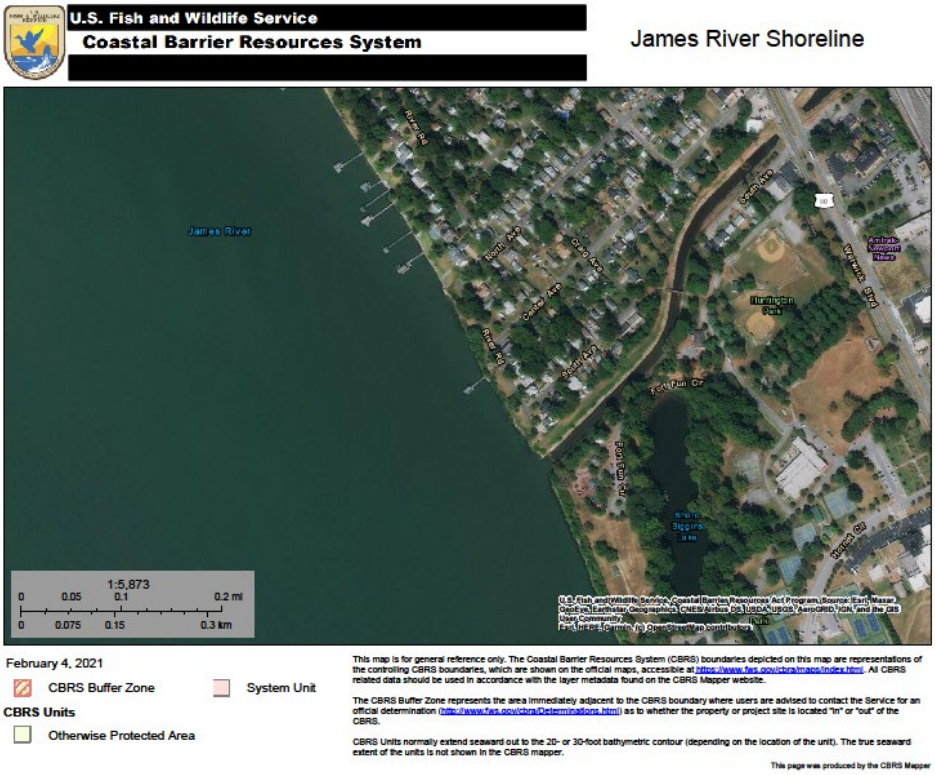
Table 2. Species within the project area identified with the essential fish habitat mapper

Species	Lifestage (s) Found at Location
Little Skate (*Leucoraja erinacea*)	Adult
Atlantic Herring (*Clupea harenus*)	Juvenile, adult
Red Hake (*Urophycis chuss)*	Adult, Eggs/larvae/juvenile
Winter Skate (*Leucoraja ocellata*)	Adult
Clearnose Skate (*Raja eglanteria*)	Adult, juvenile
Windowpane Flounder (*Scophthalmus aquosus*)	Juvenile
Sandbar Shark (*Carcharhinus plumbeus*)	Juvenile, neonate
Sand Tiger Shark (*Carcharias taurus*)	Adult
Bluefish (*Pomatomus saltatrix*)	Adult, juvenile
Atlantic Butterfish (*Peprilus triacanthus*)	Adult, juvenile
Summer Flounder (*Paralichthys dentatus*)	Larvae, Juvenile, Adult
Black Sea Bass (*Centropristis striata*)	Juvenile, adult

Coastal Barrier Resources Act

The Coastal Barrier Resources Act (CBRA) and its amendments prohibit most new Federal expenditures that tend to encourage development or modification of coastal barriers. The laws do not restrict activities carried out with private or other non-Federal funds and only apply to the areas that are within the defined John H. Chafee Coastal Barrier Resource System (CBRS). The James River shoreline project area has no CBRA areas.

Figure 6. The extent of the mapped CBRA zone relative to the proposed project.



Conclusion

Under the no-action alternative the shoreline would remain in its current state and condition. Erosion and degradation of the shoreline would continue, resulting in impacts to upland habitat, nearby roads, water quality and local aquatic species for this segment of the James River.

Alternative 1 involves the construction of a rock sill with a vegetated slope. This will offer minimal benefits to fish and wildlife resources. Alternative 2 is a full rock revetment. This will have no benefits to fish and wildlife resources. Alternative 3 is a partial rock revetment with vegetated slope. This alternative also offers very limited benefits to fish and wildlife resources. Alternative 4, a living shoreline with vegetated slope and wetland planting, offers the highest benefits of fish and wildlife resources of the alternatives offered. However, the Service would like the Corps to reconsider the potential for a greener shoreline. Under Alternatives Considered but Dismissed, breakwaters were mentioned. For fish and wildlife resources, segmented breakwaters would offer a greener shoreline instead of a rock sill with Alternative 4. Segmented breakwaters can help promote SAV in shallow water, offering quiescent conditions along with sediment transport. Segmented breakwaters help stabilize sediment in the area to reach dynamic equilibrium and this promotes balance between sediment and marsh species (CCRM 2021). Living shorelines built with sills parallel to the shoreline reduce wave energy and prevent erosion. They provide habitat and ecosystem services (habitat for fish and other wetland species), maintain

natural connections between land and water ecosystems to enhance resilience, increase storm water infiltration, and slow inland water transfer (SAGE 2021). It is an alternative to a more hardened shoreline (such as revetment). Evidence shows that during major storm activity, living shorelines are able to perform better than a hardened shoreline. Marshes and oyster reefs act as barriers to waves. A mere 15 feet of marsh can absorb up to 50 percent of wave energy. Marshes also trap sediment from the water which can allow marshes to continue to grow in elevation to accommodate for sea level rise (NOAA Fisheries 2021). Also, as per Code of Virginia § 28.2-104.1. (Living shorelines; development of general permit; guidance), "The Commission shall permit only living shoreline approaches to shoreline management unless the best available sciences shows that a living shoreline approach is not suitable, the Commission shall require the applicant to incorporate, to the maximum extent possible, elements of living shoreline approaches into permitted projects" (Virginia State Law Portal 2021). There are also multiple living shoreline projects up river (Jamestown Beach Restoration) and down river (multiple projects in Norfolk including Virginia Zoo and Hermitage Museum restoration sites) from the proposed project area that can show efficacy for what type of living shoreline is suitable for the area such as oyster reefs and segmented breakwaters (CCRM VIMS Project Mapper). While there may be a concern for state-owned subaqueous bottomlands, wetland restoration occurring landward could mitigate impacts to the bottomlands. If the shoreline is designed for fish and wildlife resources, it can provide fish habitat and promote marsh migration versus seaward erosion (NOAA Living Shoreline 2021). Areas with shorelines that mimic natural coastal habitat have higher populations of fish and other living organisms, which is beneficial for shorebirds. Many types of shoreline protection can result in negative impacts when rock sills are involved. Minimizing hardened, unnatural surfaces would reduce the impact on infaunal community. Incorporating oyster, native high and low marsh vegetation, native SAV, sandy or cobble beach, or other natural shoreline features can add additional functional habitats. Incorporating breaks or openings in breakwaters or rock sills facilitates natural water flushing and allows a variety of aquatic organisms to access habitat. Fish habitat enhancement structures can be added to the rock sills (NOAA 2015). Because of the ability to reduce erosion, improve marine habitat and spawning area, improve water quality, and even potential to filter stormwater and groundwater runoff, the Service recommends an alternative with living shoreline and to consider including oyster reef structures and/or segmented breakwater to promote submerged land habitat quality and provide the most benefits for fish and wildlife resources.

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Appendix A. IPaC Resource List, accessed 2/4/2021

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Newport News County, Virginia

Local office

Virginia Ecological Services Field Office

(804) 693-6694
(804) 693-9032

6669 Short Lane
Gloucester, VA 23061-4410

http://www.fws.gov/northeast/virginiafield/

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. 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.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

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

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
American Oystercatcher Haematopus palliatus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8935	Breeds Apr 15 to Aug 31
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black Skimmer Rynchops niger This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15
Cerulean Warbler Dendroica cerulea This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 29 to Jul 20
Least Tern Sterna antillarum This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 20 to Sep 10
Prothonotary Warbler Protonotaria citrea This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31

Red-headed Woodpecker Melanerpes erythrocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Red-throated Loon Gavia stellata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Ruddy Turnstone Arenaria interpres morinella This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Rusty Blackbird Euphagus carolinus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting

point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

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 AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix B. Results from eBird Survey of Huntington Park (2/5/2021)

American Black Duck	Canada Goose	Green Heron	Prairie Warbler
American Coot	Carolina Chickadee	Great Crested Flycatcher	Purple Martin
American Crow	Carolina Wren	Herring Gull	Red-bellied Woodpecker
American Goldfinch	Cedar Waxwing	Hooded Merganser	Red-eyed Vireo
American Redstart	Chimney Swift	Horned Grebe	Red-winged Blackbird
American Robin	Chipping Sparrow	House Finch	Ring-billed Gull
American Wigeon	Common Goldeneye	House Sparrow	Ring-necked Duck
Bald Eagle	Common Grackle	House Wren	Rock Pigeon
Baltimore Oriole	Common Loon	Killdeer	Royal Tern
Barn Swallow	Common Yellowthroat	Laughing Gull	Ruby-crowned Kinglet
Belted Kingfisher	Cooper's Hawk	Lesser Black-backed Gull	Ruddy Duck
Black-and-white Warbler	Dark-eyed Junco	Magnolia Warbler	Solitary Sandpipe
Blackpoll Warbler	Double-crested Cormorant	Mallard	Song Sparrow
Black-throated Blue Warbler	Downy Woodpecker	Merlin	Spotted Sandpiper
Blue Grosbeak	Eastern Bluebird	Mourning Dove	Summer Tanager
Blue Jay	Eastern Towhee	Northern Cardinal	Tree Swallow
Blue-gray Gnatcatcher	Eastern Wood-Pewee	Northern Flicker	Tufted Titmouse
Boat-tailed Grackle	European Starling	Northern Mockingbird	Turkey Vulture
Bonaparte's Gull	Fish Crow	Northern Parula	White-breasted Nuthatch
Brown Creeper	Fox Sparrow	Northern Rough-winged Swallow	White-eyed Viero
Brown Pelican	Gadwall	Northern Waterthrush	White-throated Sparrow
Brown Thrasher	Golden-crowned Kinglet	Orchard Oriole	Wilson's Warbler
Brown-headed Cowbird	Gray Catbird	Osprey	Wood Duck
Brown-headed Nuthatch	Great Black-backed Gull	Peregrine Falcon	Yellow Warbler
Bufflehead	Great Blue Heron	Pied-billed Grebe	Yellow-bellied Sapsucker
	Great Egret	Pine Warbler	Yellow-billed Cuckoo
			Yellow-rumped Warbler

APPENDIX B

FINAL REAL ESTATE PLAN

CAP Section 14

Emergency Streambank and Shoreline Protection

James River Shoreline Feasibility Study

Newport News, Virginia

Prepared for

U.S. Army Corps of Engineers
North Atlantic Division
Norfolk District

Prepared by

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Realty Specialist
Real Estate Division
Acquisition, Management, and Disposal Branch
Norfolk District

OCTOBER 2021

Table of Content

Attachments:

Exhibit "A" – Real Estate Map
Exhibit "B" – Estates Required
Exhibit "C" – NFS Capability Assessment

1. Preamble

a) Study Authorization: The James River Shoreline, Newport News, Virginia study is authorized by Section 14 of the Flood Control Act of 1946, as amended (P.L.79-526), Emergency Streambank and Shore Protection. The Purpose of the Section 14 program is to construct emergency streambank and shore protection to prevent natural erosion processes from damaging highways, bridge approaches, public works, churches, public and private non-profit hospitals, schools, water and sewer lines, and other public or non-profit facilities that offer public services to all, and known historic properties eligible or listed on the National Register of Historic Places.

If an eligible facility is in imminent danger of failure, and after a request for a project has been received from a potential non-federal sponsor stating its desire to participate in a solution, the Corps will conduct a feasibility study to analyze the problem, develop a solution, and determine the feasibility of a solution. In the feasibility phase, the first $100,000 is 100 percent federally funded. Any additional feasibility study costs require an executed Feasibility Cost Sharing Agreement, stating that all costs above the initial $100,000 are cost-shared 50 percent federal and 50 percent non-federal.

b) Official Study Designation: Continuing Authorities Program, Section 14 Emergency Streambank and Shoreline Protection, James River Shoreline Feasibility Study (the "Study").

c) Study Location: The project area is located along the east bank of the James River west of River Road between North and South Avenues in Newport News, Virginia. The section of the bank is approximately 600 feet long. The shoreline in this area has been severely eroded by wind and wave action from the James River.

d) Non-Federal Sponsor: The non-Federal partner for the Study is the City of Newport News, Virginia (the "Sponsor" or "NFS"). The City of Newport News will also serve as the non-Federal sponsor for the construction of the Study's Recommended Plan (defined in paragraph 3(b)) at a 50% (Federal) and 50% (non-Federal) cost share. In accordance with the Project Partnership Agreement (PPA) between the Sponsor and the Department of the Army (the "Government"), which is scheduled to be executed in January 2022, the Sponsor will be responsible for performing or ensuring the performance of the Lands, Easements, Rights-of-Way, Relocation, and Disposal Area (LERRD) requirements for the Study's Recommended Plan as outlined in this Real Estate Plan (REP).

2. Statement of Purpose

This REP is presented in support of the Study, and describes the real estate required to implement the project. The purpose of the REP is to identify the LERRD necessary to support construction, operation and maintenance of the proposed project elements described in the Study, and to outline the costs and real estate considerations associated with project implementation.

This Study is preliminary and written to the level of detail of the main report, other details may be added and is intended for planning purposes only. Both the final real property lines and land value estimates are subject to change even after approval of this report. There may be modifications to the plans that occur during the Design and Implementation phase, thus changing the final acquisition area(s) and/or administrative and land costs.

3. Project Purpose and Features

a) Study Purpose: The purpose of this study is to determine if constructing emergency streambank protection to prevent bank erosion from damaging River Road and other public works utilities on River Road is feasible and economically justified. The study identifies the least cost alternative, and the recommended plan is justified if total project costs are less than costs of relocating the threatened road and public utilities. Federal costs are limited to not more than $5,000,000 for one locality. Cost of lands, easements, right-of-way, relocations of utilities, disposal areas, and the operation and maintenance of the project, once completed, are a non-federal responsibility.

b) Recommended Plan: The recommended plan, Alternative 1, consists of the stabilization of approximately 600 linear feet eroding riverbank along the James River with the construction of a longitudinal rock sill running the length of the project area at an elevation of 5-feet (NAVD88); earthen sloped berm graded on a 1 Vertical to 3 Horizontal (1V:3H) slope; approximately 2,900 tons of Virginia Department of Transportation (VDOT) Class III riprap and 800 tons of VDOT No. 1 stone; an estimated 4,300 cubic yards of fill; 1,600 square yards of geotextile filter fabric; approximately 35,000 square feet of seeding; and 700 cubic yards of debris removal. This plan will impact 8 parcels of land, 3 of which are owned by the Sponsor.

c) Required Lands, Easements, Right-of-Ways (LER): In accordance with the executed PPA, the Sponsor will be responsible for acquiring or ensuring the acquisition of all the LER required for the construction, operation and maintenance of the Recommended Plan. Table-1 reflects the required real estate to implement the Recommended Plan.

Since this report was prepared during a feasibility level study, the size of the required real estate interests presented are preliminary estimates based only on existing, readily available Geographic Information System (GIS) data. The LER requirements are subject to change with plan optimization during the Recommended Plan's design and implementation phase when final plans, specifications and detailed drawings are prepared.

Table 1 LERRD details

Parcel ID #	Estate Required	Ownership	Required Acreage
272000129	Temporary Work Area Easement	Private	.154 Acres
272000261	Bank Protection Easement	Private	.079 Acres
272000242	Bank Protection Easement	Private	.023 Acres
268000542	Bank Protection Easement	Private	.023 Acres
272000239	Bank Protection Easement	Private	.082 Acres
272000130	Bank Protection Easement	NFS Owned	.544 Acres
272000262	Bank Protection Easement	NFS Owned	.38 Acres
272000301	Bank Protection Easement	NFS Owned	.01 Acres

Parcel Id # 272000129 is proposed currently as the staging area for the project. However, this area may not be utilized as the City of Newport may have available areas in the vicinity that could

be utilized instead. Access to the project will be using River Road for any land access and water access is available as well.

The following details the minimum interest in real property required for the Recommended Plan.

(1) Permanent Bank Protection Easement (USACE Standard Estate No. 21) – Approximately 1.141 acres are required for permanent bank protection easement to construct, operate, and maintain the recommended plan, there are 7 tax parcels (4 privately-owned and 3 publicly-owned) impacted by this easement.

(2) Temporary Work Area Easement (TWAE) (USACE Standard Estate No. 15 – Approximately .154 acres are required in TWAEs for work and staging purposes. The term of the purposed TWAE would be for 12 months.

The easement for the lands acquired by the Sponsor must contain the USACE-approved standard estate language as written herein (see **Exhibit "B"** for the estate language). After the PPA is fully executed and once the final design of the Recommended Plan is complete, a general written description of the final LER (with corresponding real estate maps required will be provided to the Sponsor in their formal written *Notice to Proceed with Real Estate Acquisition* letter (hereinafter, the "NTP").

Once the Sponsor receives the NTP from USACE, the Sponsor will commence real estate acquisition activities. To delineate the precise boundary of the required estate and to mitigate against potential boundary disputes, a boundary land survey with a corresponding legal description for each required estate will be completed by the Sponsor. Further, the Sponsor is advised to obtain a chain of title and title insurance on all acquired property to identify potential encumbrances and to protect against "defects"[1] in title. To ensure easements acquired remain in effect in the event of a foreclosure, a Subordination of Mortgage is necessary for properties with an existing mortgage(s). The Sponsor must work with the property owners and their mortgage lenders to execute the appropriate agreement that allows the mortgage to be subordinate to the easement. USACE will remain in close coordination with the Sponsor throughout the real estate acquisition process for support and guidance.

After the Sponsor completes its acquisition efforts and prior to USACE's issuance of the solicitation for construction contracts, the Sponsor must provide USACE with copies of all real estate conveyance agreements recorded in their respective county and a signed *Authorization for Entry* (with an attorney's Certificate of Authority) for all the LER USACE identified in the NTP for that construction contract. USACE will examine and evaluate all records received to ensure sufficient real property interests are available to support construction. USACE will then certify in writing to the appropriate USACE District elements that the real estate for the Recommended Plan has been obtained and the solicitation for construction contract(s) may commence.

d) Appraisal Information: In accordance with USACE Real Estate Policy Guidance Letter No. 31, CEMP-CR, 11 Jan 19, subject: Real Estate Policy Guidance Letter No. 31-Real Estate

[1] A defective title is when real property has a publicly-recorded encumbrance, such as a lien, mortgage, or judgment, where title ownership cannot be legally transferred to another party free and clear.

Support to Civil Works Planning (hereinafter referred to as "PGL 31"), a land appraisal cost estimate, or a "rough order of magnitude" estimate, was completed for the Recommended Plan since the value of real estate (land, improvements and severance damages) was not expected to exceed ten percent of the total costs of the Recommended Plan. A cost estimate is not a full appraisal. To establish a more accurate land valuation for the required real estate, a full land appraisal based on surveyed boundaries of the Recommended Plan's final design plans is required.

The appraisal cost estimate represents the estimated market value of the real estate required for the Recommended Plan. It also serves to identify the estimated compensation amount paid to land owners for the purchase of the required real estate. The appraisal cost estimate does not include the incidental costs (e.g., appraisals, surveys, title, attorney fees, etc.) that would be incurred to facilitate and complete the acquisition of real estate. The appraisal cost estimate is an item of the Recommended Plan's 01-Lands & Damages cost account. It is incorporated into the Base Line Cost Estimate for Real Estate (BCERE) under the "Land Payments" and "Land Payments under PL 91-646" line items. See paragraph 11 for the BCERE and the Recommended Plan's overall estimated real estate costs.

An appraisal cost estimate was completed by a licensed USACE staff appraiser who concluded, as of June 17, 2020, the market value (i.e., property owner's compensation amount) for the Recommended Plan's required real estate is approximately ***$450,000***. Table-3 provides a summary of the estimated market value for the real estate required.

Table-2: Estimated Market Value of the Required Real Estate

Estate Type	**Estimated Market Value**
Permanent Easements	$440,000.00
Temporary Easements	$10,000.00
Total	**$450,000.00**

4. LER Owned by the Non-Federal Sponsor

The City of Newport News currently owns three parcels of land within the required project footprint in fee. This land consists of .934 acres out of the 1.295 acres required for the project. The Sponsor confirmed that they have no competing needs for the land and will grant an authorization for entry for construction here in accordance with ER 405-1-12. There is a confirmed encroachment on Sponsor owned Parcel 272000301. The Sponsor will need to resolve the encroachment prior to the certification of lands to proceed with construction. The Sponsor can receive credit for the currently owned land required for the project and the land required will be valued as of the date of the authorization for entry for construction to determine the creditable amount.

5. Non-Standard Estates

Currently, there are no proposed non-standard estates for the Recommended Plan. Non-standard estates are necessary only when there is no corresponding USACE approved standard estate for the real property interest required, or when changes to a corresponding standard estate (or previously approved non-standard estate) are desired. In such situations, a non-standard

estate will be drafted in collaboration with the Sponsor, then distributed for approved by the District Chief of Real Estate or Headquarters USACE, as appropriate.

6. Existing Federal Project

There are no existing federal projects within the project area. However, adjacent to the project is The Government Ditch. The Government Ditch is a Section 205 project of the Flood Control Act approved 30 June 1948. Built for drainage to minimize flooding in the area from Newmarket Creek. The proposed shoreline protection will help prevent future damages to The Government Ditch where it feeds into the James River.

7. Federally-Owned Land

The Recommended Plan includes no Federally-owned lands as part of its LER requirements.

8. Navigational Servitude

The application of Navigational Servitude is not available for the Recommended Plan. Navigational Servitude is the dominant right of the Federal government under the Commerce Clause of the U.S. Constitution (Article 1, Section 8, Clause 3) to use, control, and regulate the navigable waters of the United States and the submerged lands thereunder for various commerce-related purposes, including navigation and flood control. Generally, the Federal government does not acquire interests in real property that it already possesses or over which its use or control is or can be legally exercised. If navigational servitude is found to be available, then the Federal Government will generally exercise its right thereunder and, to the extent of such rights, will not acquire a real property interest in the land to which the navigational servitude applies.

9. Real Estate Maps

Real estate maps are provided in **Exhibit "A"**. The GIS tax parcel data and ownership was obtained from the City of Newport News in May 2019, with their last update occurring in March 2020. The lot boundaries delineated in the real estate maps do not represent legal boundaries and should not be used to provide a legal determination of land ownership. The parcels boundaries are not survey data and should not be used as such. There may be boundary discrepancies between what is shown on the real estate maps and the property's actual deeded boundary. The GIS tax parcel data obtained is intended for planning purposes only to provide a reasonable representation of parcel boundaries and project features. Surveys of the Recommended Plan's final design are needed to determine the levee/floodwall's precise location on properties based on the property's deeded legal description.

10. Induced Flooding

The Recommended Plan does not induce flooding.

11. Baseline Cost Estimate for Real Estate (BCERE)

a) The BCERE establishes the estimated financial costs (for both the Government and Sponsor) that are attributed to the Recommended Plan's real estate requirements. It is recorded in the 01-Lands & Damages project cost account. The Recommended Plan's total estimated real estate cost is ***$647,200.00***. Table-4 provides a summary of the BCERE.

Table-3: BCERE Summary

Project Account	Federal Costs	Non-Federal Cost	Total BCERE
01-Lands &Damages	$34,000	$613,200	$647,200

b) For civil works projects that are cost-shared between the Federal government and a non-Federal interest, the Water Resources Development Act of 1986 ("WRDA 86" or "Public Law 99-662") assigns the NFS the responsibility of providing the LER, performing the facility/utility relocations, and fulfilling any disposal area requirements (collectively referred to as "LERRD") for the project. All LERRD requirements must be performed in accordance with the project's PPA, WRDA 86, and Public Law 91-646 (Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970) as amended.

The valuation of LER for crediting purposes for continuing authority projects constructed pursuant to Section 14 of the Flood Control Act of 1946, is the same as for other projects except for cases in which the required LER is part of the tract of land that includes the facility or structure being protected. In such cases, the NFS shall not receive credit for the value of LER it provides that are owned by the NFS when the PPA for the project is executed.

LERRD costs represent an NFS's estimated upfront direct and indirect financial costs in fulfilling its real estate responsibilities. The NFS receives credit for their actual associated costs if found to be reasonable, allowable, and allocable. They must document all their LERRD expenses (i.e., receipts, invoices, official certified timesheets, etc.) and submit to USACE for review and approval as part of their claim for credit.

The Sponsor's estimated LERRD costs is ***$613,200.00***, which represents their approximate upfront financial obligation in fulfilling their real estate responsibilities to implement the Recommended Plan. The Sponsor is aware of its requirement to document all LERRD expenses for its claim for credit.

12. Public Law 91-464, Uniform Relocation Assistance

Public Law 91-646 provides uniform equitable treatment of persons and businesses displaced by a Federal or Federally-assisted project. Along with the PPA, it requires the NFS to provide assistance and certain benefits to be paid to all persons and businesses that are displaced and must be relocated from their residence or place of business due to a Federally-funded project. The cost incurred by the NFS to provide relocation assistance is part of its LERRD responsibilities.

There are no anticipated relocations under PL 91-646 required for this project.

13. Mineral and Timber Activity

There are no known present or anticipated mineral extraction or timber harvesting activities within the LER required for the Recommended Plan.

14. Land Acquisition Experience and Capability of the Non-Federal Sponsor

The Sponsor's assessment of their real estate acquisition capabilities is provided in **Exhibit "C"**. The Sponsor has been identified as highly capable of performing or ensuring the performance of its real estate responsibilities. They possess the professional capability to acquire the real estate for the Recommended Plan and have sufficient general and legal authority to do so. The Sponsor has been advised of Public Law 91-646 requirements and the requirements for documenting expenses for credit purposes. The Sponsor has successfully acquired real estate for similar USACE cost-share projects, such the Government Ditch.

15. Land Use Zoning

No application or enactment of local zoning ordinances is anticipated in lieu of or to facilitate the Recommended Plan's LERRD requirements.

16. Schedule of Real Estate Acquisition

Table -3: Forecasted Real Estate Acquisition Schedule

Milestone	Date
Execution of Project Partnership Agreement with Sponsor	January 2022
Notice to Proceed with Real Estate Acquisition furnished to Sponsor	January 2022
USACE receives Authorization for Entry from Sponsor	February 2023
USACE Certifies the Real Estate for the Recommended Plan	March 2023
USACE Commences with Advertising for Construction Contracts	April 2023

17. Relocation of Facilities or Public Utilities

There are no facility or utility relocations anticipated within the project area at this time. The purpose of the project is to prevent any issues with the utilities so no relocations in the future will be necessary. However, a contingency for any possible facility/utility relocations requirements that may be identified in design and implementation have been accounted for in the total project costs and has been identified in the risk register.

18. Hazardous, Toxic, and Radioactive Waste (HTRW)

There are no known hazardous, toxic and radioactive waste materials at this time that would affect the implementation or operation of the Recommended Plan.

19. Project Support

There may be opposition from landowners of the existing private dock and two that are currently in the permitting process for construction. We are currently working with the Sponsor on a solution. The existing dock has an armored shoreline that could possibly tie into the construction of the Project. If the two other landowners receive permit approvals and build two new docks, unless the docks are constructed with an armored shoreline, they will have to be demolished prior to construction of the Project. Another option would be for the landowners to construct the new docks after the Project is constructed. The homeowners could then work with the Sponsor and USACE to obtain a consent to cross the project area for building purposes. We should make sure that there is communication and coordination with these landowners to ensure project success. The risk of landowner opposition to the project is greater if there is a requirement for pier demolition.

20. <u>Risk Associated with Advanced Land Acquisition</u>

The NFS has been advised of the risks associated with advance land acquisition activities, as indicated below, in a letter dated January 20, 2021.

Risks associated with advanced land acquisition include, but are not limited to, the following:

- Congress may not appropriate funds to construct the proposed project.
- The proposed project may otherwise not be funded or approved for construction.
- A Project Partnership Agreement (PPA) mutually agreeable to the NFS and the Government may not be executed and implemented.
- The NFS may incur liability and expense by virtue of its ownership of contaminated lands, or interests therein, whether such liability should arise out of local, state, or Federal laws, or regulations including liability arising out of Comprehensive Environmental Response Compensation and Liability Act (CERCLA), as amended.
- The NFS may acquire interests or estates that are later determined by the Government to be inappropriate, insufficient, or otherwise not required for the project.
- The NFS may initially acquire insufficient or excessive real property acreage which may result in additional negotiations and/or benefit payments under Public Law 91-646, as well as, the payment of additional fair market value to affected landowners which could have been avoided by delaying acquisition until after the PPA execution and the Government's notice to commence acquisition; and performance of LERRD.
- The NFS may incur costs or expenses in connection with its decision to acquire real estate interest and/or perform LERRD in advance of the executed PPA and the Government's notice to proceed which may not be creditable under the provisions of Public Law 99-662 or the PPA.

21. Recommendation

This report has been prepared in accordance with Corps of Engineers Regulation 405-1-12, Chapter 12. Recommend approval of this draft Real Estate Plan, that includes preliminary estimates of impacts, potential required property rights and interests, and a cost estimate based on identified limitations, factors, and assumptions as identified to the extent practicable at this time, be accepted for the purposes herein.

Prepared by: _____ June 25th, 2021

ALICIA BARRETTE
Realty Specialist

Date

Approved by: CARRIER-TAL.DONNA.L.1263332039 Digitally signed by CARRIER-TAL.DONNA.L.1263332039 Date: 2021.06.25 19:46:34 -04'00'

DONNA CARRIER-TAL, ESQ
Chief, Real Estate Office
Real Estate Contracting Officer

Date

EXHIBIT "A"

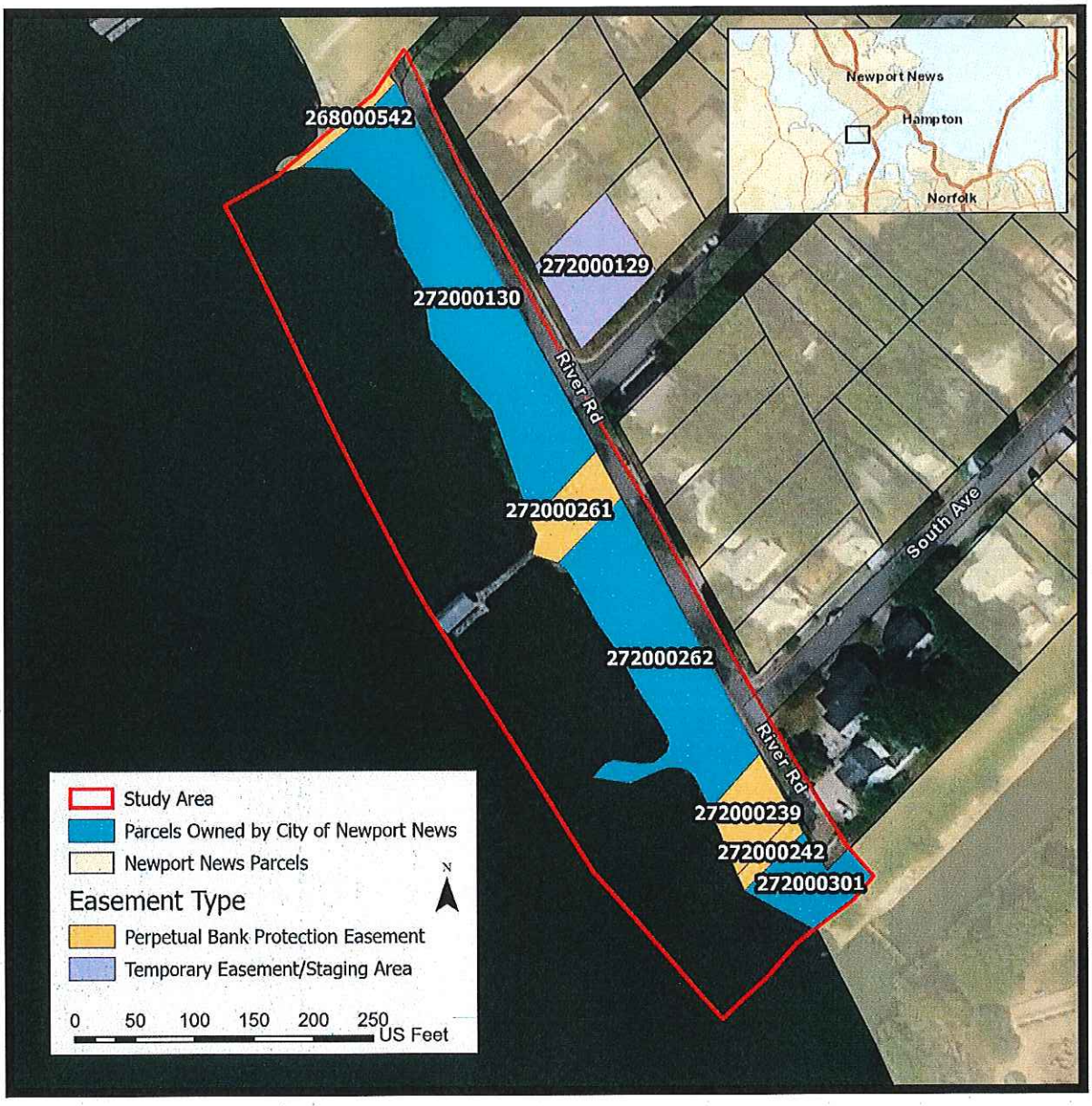
Newport News
Hampton
Norfolk
268000542
272000129
272000130
River Rd
272000261
South Ave
272000262
River Rd
272000239
272000242
272000301
Study Area
Parcels Owned by City of Newport News
Newport News Parcels
N
Easement Type
Perpetual Bank Protection Easement
Temporary Easement/Staging Area
0 50 100 150 200 250
US Feet

EXHIBIT "B"
REQUIRED ESTATES

BANK PROTECTION EASEMENT

A perpetual and assignable easement and right-of-way in, on, over and across the land hereinafter described for the location, construction, operation, maintenance, alteration, repair, rehabilitation and replacement of a bank protection works, and for the placement of stone, riprap and other materials for the protection of the bank against erosion; together with the continuing right to trim, cut, fell, remove and dispose therefrom all trees, underbrush, obstructions, and other vegetation; and to remove and dispose of structures or obstructions within the limits of the right-of-way; and to place thereon dredged, excavated or other fill material, to shape and grade said land to desired slopes and contour, and to prevent erosion by structural and vegetative methods and to do any other work necessary and incident to the project; together with the right of ingress and egress for such work; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however to existing easements for public roads and highways, public utilities, railroads and pipelines.

TEMPORARY WORK AREA EASEMENT:

A temporary easement and right-of-way in, on, over and across (the land described in Schedule A) (Tracts Nos. _____, _____ and _____), for a period not to exceed 1 year, beginning with date possession of the land is granted to the United States, for use by the United States, its representatives, agents, and contractors as a work area, including the right to move, store and remove equipment and supplies, and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of the James River Bank Stabilization Project, together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

EXHIBIT "C"

APPENDIX 12-E

ASSESSMENT OF NON-FEDERAL SPONSOR'S
REAL ESTATE ACQUISITION CAPABILITY

I. Legal Authority:

a. **Does the sponsor have legal authority to acquire and hold title to real property for project purposes?**
(yes/no)

Yes. The City has and may exercise all powers which are now or may hereafter be conferred upon or delegated to cities under the Constitution and laws of the Commonwealth, pursuant to Section 2.01 of the City Charter issued by the Virginia General Assembly.

Article VII. Local Government, Sections 8 and 9 assume the right of the City to hold and manage its real property and impose conditions on the allowance of use and conveyance of interests in the City's real property.

Virginia Code Section 15.2-1800 indicates a locality may acquire by purchase, gift, devise, bequest, exchange, lease as lessee, or otherwise, title to, or any interests in any real property.

b. **Does the sponsor have the power of eminent domain for this project?**
(yes/no)

Yes. Under Virginia Code Sections 15.2-1901, 15.2-1901.1 and 15.2-1902 localities have the power of condemnation for acquisition of (i) streets and roads, (ii) drainage facilities, (iii) water supply and sewage disposal systems, and any governmentally owned utilities. Restoration of the embankment would involve preservation of the road and any stormwater and City owned sanitary sewer facilities. As to ecosystem restoration, that might be one of the benefits but not the primary one. Localities also have a right of eminent domain to acquire property by eminent domain for purposes of prevention of pollution of water and for the purposes of erection of infrastructure to accomplish this goal. Va. Code Section 15.2-2109.

c. **Does the sponsor have "quick-take" authority for this project? (yes/no)**

Yes generally. Virginia Code Section 15.2-1902 and 15.2-1904.A. indicate that the City may use quick-take (Chapter 3 of Title 25.1, codified as Section 25.1-300, et seq.) for projects involving (i) streets and roads, (ii) drainage facilities, (iii) water supply and sewerage disposal systems, and (iv) oyster beds. Anything not within this enumerated purposes must use the slow take method (Virginia Code 25.1-200 et seq.).

The quick-take process requires that the City obtain an acquisition plat, an evaluation of value or appraisal if the interest is valued over $25,000.00 (or if the owner demands an appraisal if the value is over $10,000.00), a public meeting before City Council and an ordinance allowing acquisition voluntarily or by condemnation. A bona fide offer is then made. If the landowner accepts the offer, the take can take less that sixty days. If the offer is not accepted, a certificate of take must be filed after mandatory notices. The take occurs at that point. Our experience indicates that this process takes 120 to 150 days.

After this a petition for condemnation must be filed and the matter goes into litigation.

d. **Are any of the lands/interests in land required for the project located outside the sponsor's political boundary? (yes/no)**

No. All lands within the project boundaries are located within the City of Newport News.

e. **Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? (yes/no)**

None of the property to be acquired is owned by the federal government, the state government, other local government entities or a public service corporation with the power of eminent domain.

II. Human Resource Requirements:

a. **Will the sponsor's in-house staff require training to become familiar with the real estate requirements of Federal projects including P.L. 91-646, as amended? (yes/no)**

Yes, they are familiar with P. L. 91-646, and have experience through previous highway projects where the City received federal money. However, even with past experience, they may need a refresher and re-familiarize themselves with the process.

Currently there are no homeowner relocations anticipated for this project, however if this assessment changes in PED, the City is competent in completing this requirement as required.

b. **If the answer to II.a. is "yes," has a reasonable plan been developed to provide such training? (yes/no)**

Yes, the City would have a review of the federal statutes by anyone who will work on the property acquisitions.

c. **Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? (yes/no)**

Yes. They have handled eminent domain cases and voluntary real estate sales as required for the needs of the city on a regular basis. They have sufficient knowledge of real estate acquisitions from the years of experience.

d. **Is the sponsor's projected in-house staffing level sufficient considering its other work load, if any, and the project schedule? (yes/no)**

Yes, the staffing level is sufficient to accomplish the real estate requirements for this project.

e. **Can the sponsor obtain contractor support, if required in a timely fashion? (yes/no)**

Yes. Outside counsel and/or ROW agents can be brought in if necessary.

f. **Will the sponsor likely request USACE assistance in acquiring real estate? (yes/no) (If "yes," provide description)**

No, the City is capable of obtaining all the required real estate for the project.

III. Other Project Variables:

a. Will the sponsor's staff be located within reasonable proximity to the project site? (yes/no)

Yes. They are located within four miles of the site.

b. Has the sponsor approved the project/real estate schedule/milestones? (yes/no)

Preliminary milestones have been received by the City. Currently the milestones are estimates, during PED the milestones will be established and the NFS will be involved in establishing them.

IV. Overall Assessment:

a. Has the sponsor performed satisfactorily on other USACE projects? (yes/no/not applicable)

Yes. The Government Ditch project is an example

b. With regard to this project, the sponsor is anticipated to be: highly capable/fully capable/moderately capable/marginally capable/ insufficiently capable. (If sponsor is believed to be "insufficiently capable," provide explanation)

The NFS is anticipated to be highly capable in accomplishing obtaining the real estate requirements for this project.

V. Coordination:

a. Has this assessment been coordinated with the sponsor? (yes/no)

b. Does the sponsor concur with this assessment? (yes/no) (If "no," provide explanation

Prepared by:

Alicia Barrette
Realty Specialist

Reviewed and approved by:

CARRIER-TAL.DONNA.L.1263332039

Digitally signed by CARRIER-TAL.DONNA.L.1263332039
Date: 2021.06.25 19:47:25 -04'00'

Donna Carrier-Tal, Esq.
Chief, Real Estate Office
Real Estate Contracting Officer

ENGINEERING APPENDIX

James River Shoreline, Newport News, VA
Continuing Authority Program, Section 14
Emergency Streambank & Shoreline Protection

APPENDIX C

OCTOBER 2021

U.S. Army Corps
of Engineers
Norfolk District

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1.0 **Study Area and Purpose**

The City of Newport News is located in eastern Virginia adjacent to the Chesapeake Bay and about 65 miles southeast of Richmond. The project area is located entirely within the City along the north bank of the James River, west of the James River Bridge (US Routes 17/258) and between Newmarket Creek and North Avenue, immediately adjacent to River Road. An approximately 600-foot section of riverbank along the James River is severely eroded by the combined effects of natural erosion processes; river flow, water level rise, and tidal, storm, and wind driven wave action. The resulting 25-foot high receding sandy bluff is an imminent threat to existing public facilities, causing continual loss of land, threatening existing public utilities, including River Road, electric, gas, communications, public water and sewer lines, as well as creating dangerous conditions associated with the steep slope.

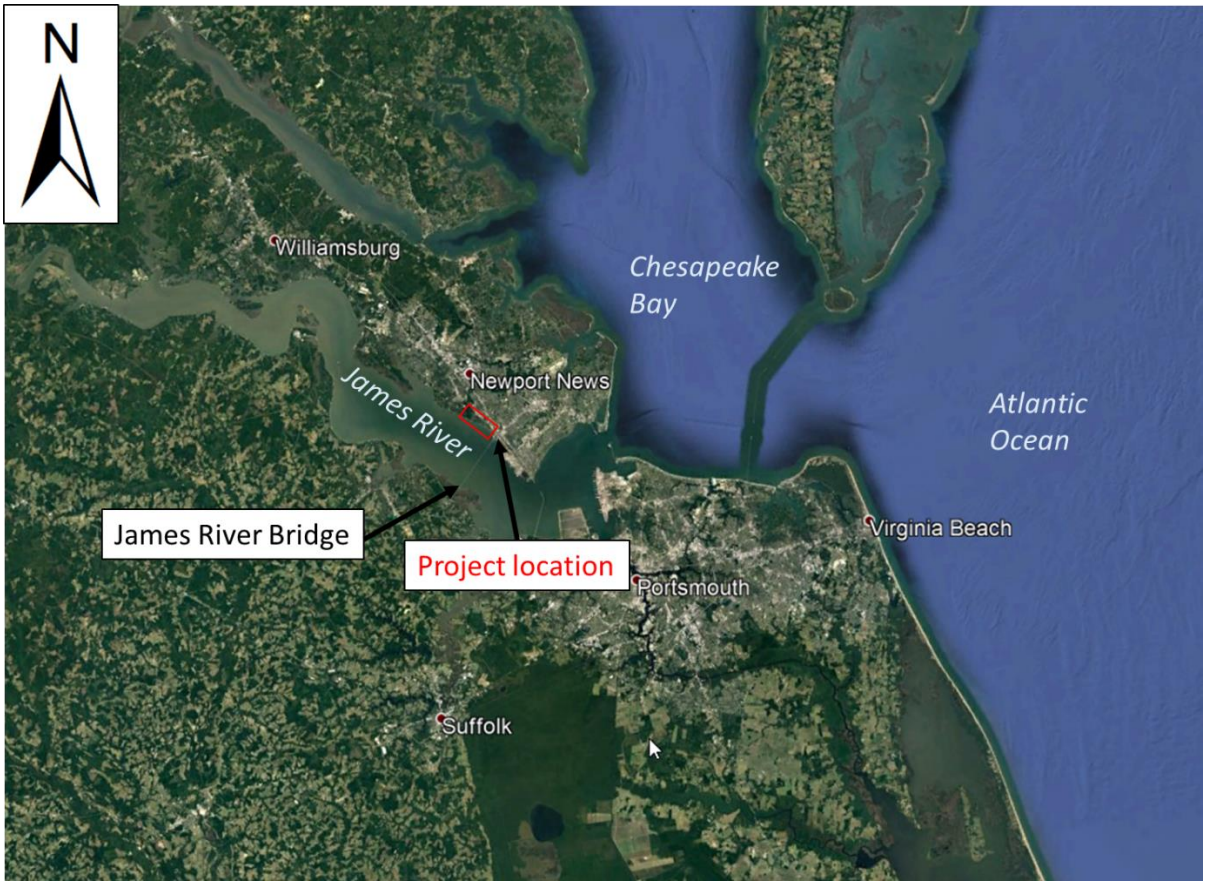

Figure 1.1 Satellite image of project location (Image from Google Earth Pro)

Figure 1.2 Satellite image of project vicinity (Image from Google Earth Pro)

The tidal shorelines of the Chesapeake Bay are generally classified into six basic types depending on the height of the upland banks (**Figure 1.3**). The stability of the bank face is dependent upon the width and type of shore zone features. Wide soft engineering features such as beaches/dunes and marsh zones can offer significant wave protection even during storms (Hardaway and Byrne 1999). The project area best fits into the High Bank type of shoreline, where upland elevation is greater than 10 feet above mean low water. Bank erosion takes place at the shoreline and higher up the bank, where wave and storm surge action during hurricanes cause bank erosion and slumping from wave undercutting and can threaten the high bank, or bluff. Thus, any shoreline protection measures should consider stabilizing not only the lower shoreline but the slope of the bank as well.

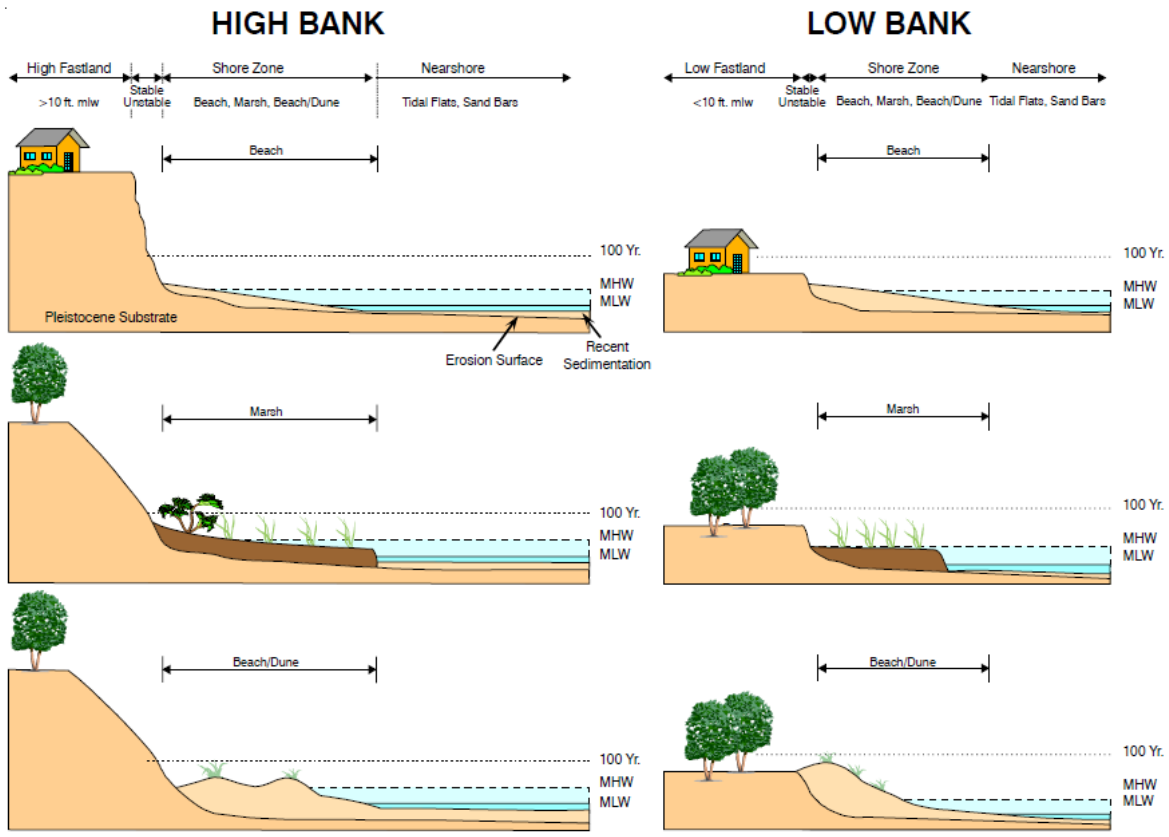

Figure 1.3 Six Typical Shoreline Profiles around Chesapeake Bay (Hardaway and Byrne 1999)

The purpose of the study is to evaluate the site, identify options for bank stabilization measures, and recommend a preferred alternative for the project.

2.0 **Definitions**

Below are definitions to words that are used in this analysis.

- **Revetments** (**Figure 2.1**) are shoreline/river bank armoring systems that protect the base of eroding river banks and upland shorelines. They are by far the most common means of shoreline/river bank defense currently in use within the study area. Revetments are typically placed atop a graded slope. This slope may be achieved by excavating eroding banks in a landward direction (commonly referred to as bank "layback") or via the placement of fill materials in a seaward direction or by a combination of both cut and fill. The dimensions of the revetment are dependent on existing bank conditions and design parameters such as storm surge and wave height. These parameters also determine the size of the stone required for long-term structural integrity. Generally, two interlocking faces of armor stone are laid over a bedding stone layer with filter cloth between the earth sub-grade and the bedding layer. The size of materials used within the revetment depends on the typical storm surge and wave heights experienced at the location.

Figure 2.1 Typical Rock Revetment

- **Sills** (**Figure 2.2**) combine elements of rock revetments and offshore breakwaters. Rock sills generally have a "free standing" cross section similar to breakwaters, however they are usually smaller than breakwaters. Rock sills are typically built parallel and close to shore and are usually continuous. Sills may be used in higher wave energy environments to establish intertidal marsh grasses in the lee of the sill. The dimensions of the sills are dependent on existing bank conditions and design parameters such as storm surge and wave height. These parameters also determine the size of the stone required for long-term structural integrity. Generally, two interlocking faces of armor stone are laid over a core stone layer with filter cloth between the earth sub-grade and the core layer. The size of materials used within

the revetment depends on the typical storm surge and wave heights to be protected against at the location (Hardaway and Byrne 1999).

Figure 2.2 Stone sill with marsh planting on Chester River, Kent County, Md.

- **Living Shoreline** (**Figure 2.3**) is a broad term that encompasses a range of shoreline stabilization techniques along estuaries, bays, and other generally sheltered shorelines. A living shoreline incorporates natural vegetation or other living, natural, '"soft" elements alone or in combination with some type of harder shoreline structure, like oyster reefs, rock sills, or anchored large wood for added stability. **Figure 2.3** is an example of a living shoreline constructed fairly recently along the James River shoreline approximately 2.3 miles north of the project site.

Figure 2.3 Living shoreline behind rock sill in Newport News, VA.

- **Vegetated Slope** is term used in this report to describe a slope, typically located up in the higher bank of a shoreline above a rock structure planted with native grasses.

Figure 2.4 Example of Vegetated Slope in Newport News, VA.

- **Fetch** is the distance of open water over which wind can blow and generate waves in an areas. The greater the fetch, the greater the potential wave energy (Hardaway and Byrne 1999).

- **Low energy shorelines** have average fetch exposures of less than 1 nautical mile and are often found along tidal creeks and small tributary rivers (Hardaway and Byrne 1999).

- **Medium energy shorelines** typically occur along the main tributary estuaries with average fetch exposures of 1 to 5 nautical miles (Hardaway and Byrne 1999).

- **High energy shorelines** average fetch exposures of over 5 nautical miles. These occur along the main stem of the bay and at the mouths of tributary estuaries (Hardaway and Byrne 1999).

- **Tropical Storm** refers to a localized intense cyclonic circulation, intense low pressure wind system, forming over tropical oceans with high winds above 39 miles per hour (mph) to 73 mph, heavy rainfall, large waves, and tidal surges.

- **Hurricane** is a term applied to an intense cyclonic storm originating in the tropical and subtropical latitudes of the Atlantic Ocean north of the equator. These storms normally gain intensity as they pass over land or move into the northern latitudes, where conditions are such that the energy of the storm cannot be maintained. A hurricane is characterized by low barometric pressure, high winds (over 74 mph), heavy rainfall, large waves, and tidal surges. Intensity of hurricanes are classified and rated based on the Saffir-Simpson Hurricane Scale. A 1-5 rating system is used where Category 5 being the most intense and Category 1 being the least intense.

Table 2.1 Saffir-Simpson Hurricane Scale

CATEGORY	WIND (MPH)	WIND (MPH)
5	>156	Catastrophic
4	131 – 155	Extreme
3	111 – 130	Extensive
2	96 – 110	Moderate
1	74 - 95	Minimal

- **Northeaster (also Nor'easter)** is the term given to storms that occur during the fall, winter, and spring months along the Atlantic Coast. A Northeaster is characterized by high winds circulating around an essentially stationary low pressure, producing high tides, large waves, and heavy rainfall along the coast. Like all cyclonic winds systems in the northern hemisphere, the wind direction is always rotating inward and counter-

clockwise about the low pressure area. Typically, winds originate from the northeast quadrant relative to this area, hence the term "northeaster." Northeasters sometimes develop into complex storms with more than one influencing pressure cell. The location of high pressure centers and low pressure centers with respect to each other may greatly intensify the wind speeds that would be expected from a single storm cell. Strong winds reaching almost hurricane strength may occur over many thousands of square miles. Northeasters may form with little or no advance warning and have been known to persist for as long as a week to ten days; however, the average duration of a northeaster is only about two or three days.

3.0 Existing Site Conditions

The Project Delivery Team (PDT) visited the project site two times. Photos of erosion along the shoreline, existing riprap/debris at the toe of the existing slope, trees and existing vegetation on the steep slopes are shown in **Figure 3.1** to **Figure 3.6**. A private pier is also located within the project. All the alternatives developed during this study assume the private pier will remain in place and shoreline stabilization will take place on either side of the existing private pier. This decision was made as the during the site visits a rock sill (along the shoreline underneath the pier) and concrete stairs were observed as existing shoreline stabilization at this property. For the purposes of this feasibility study, it is assumed that all the alternatives in this report will be able to tie in to the existing rock and stabilized slope (**Figure 3.6**) along this private property. This assumption will need to be verified during PED as well as the size of the existing rock in this location confirmed. See the Real Estate Plan for more information regarding the private properties along the project shorelines.

Figure 3.1 Shoreline erosion from the top of the bank in the southern end of the project area

Figure 3.2 Rip rap/debris at the toe of the existing slope

Figure 3.3 Existing slope vegetation along the southern end of the project area

Figure 3.4 Shoreline erosion and existing debris from the toe of the slope in the southern end of the project area

Figure 3.5 Shoreline erosion from the top of the bank in the northern end of the project area

Figure 3.6 Private pier and existing rock stabilization within project area

4.0 Alternatives

4.1. Focused Alternatives Array

The Engineering Team members assisted the Planning and Environmental team members during the Plan Formulation process. This included the Planning Objectives, Preliminary Plan Formulation, including the No-Action Alternative and Alternatives consisting of different elements. The formulation considered three general types of shoreline erosion control solutions:

- "Hard" or structural solution (i.e. seawall or stone revetment)
- "Soft" or "natural" solution (i.e. beach nourishment and vegetative planting aimed at stabilizing soil
- "Hybrid" solution (i.e. combination of structural and soft elements)

Hard control methods can have serious negative effects on the natural environment compared to the other solutions. On the other hand, soft methods often cannot provide long-term control in high-energy wave environments. Hybrid methods attempt to incorporate the strengths of both categories and have recently become popular at several sites along the Chesapeake Bay estuary. The hybrid category known as "living shorelines" combines both soft and hard erosion control measures.

For this site, both "hard" and "hybrid" erosion control alternatives were considered based on experience with similar projects in the Chesapeake Bay area, as well as by evaluating other shoreline stabilization projects along the James River shoreline in the vicinity of the project site. It is believed that the "soft" erosion control option would not be feasible for this site since erosion is taking place in front of a high bluff, mostly during moderate wave and high water levels within the project reach. It is also believed that as the adjacent shorelines to the project site are already hardened with revetments and rock sills that the structural solutions will not negatively impact the existing shoreline environment. All alternatives consider stabilizing not only the lower shoreline but the slope of the bank as well.

The following is a description of the final array of alternatives:

1) Alternative 0- No Action.
    - No action would be taken in this study area.
2) Alternative 1- Rock sill with vegetated slope
    - Rock sill at the bottom of the slope constructed to an elevation of +5 ft NAVD88 and biodegradable erosion control blankets from the top of the rock sill to the top of the shoreline bank (approximately +25 ft NAVD88)
3) Alternative 2- Full rock revetment
    - Rock revetment constructed along the full slope and bank of the shoreline (approximately +25 ft NAVD88)
4) Alternative 3- Partial rock revetment with vegetated slope
    - Rock revetment construction to an elevation of +10 ft NAVD88 and biodegradable erosion control blankets from the top of the partial revetment to the top of the shoreline bank (approximately +25 ft NAVD88)
5) Alternative 4- Living Shoreline with vegetated slope

- Offshore rock sills constructed to an elevation of +5 ft NAVD88, placement of clean sand fill and planting of *Spartina alternifora* (Smooth/saltmarsh Cordgrass) and *Spartina patens* (Saltmeadow cordgrass), and biodegradable erosion control blankets from the top of the wetland fill to the top of the shoreline bank (approximately +25 ft NAVD88)

More information regarding the design considerations for each alternative is provided in the subsequent paragraphs in this Appendix.

4.2. Alternatives Evaluation, Comparison, and Selection

Quantities and costs were developed for each alternatives (shown in **Attachment 1: James River Newport News Alternative Quantity Summaries**). This was done using available existing LiDAR data, hydrographic survey data, historical dredging data, and engineering and environmental assumptions. From this information costs were developed, the Least Cost Alternative from the array was chosen as the selected plan.

4.3. Description of the Selected Plan Alternative

The selected plan is Alternative 1. This plan consists of constructing a continuous rock sill along parallel to the existing shoreline with a crest elevation of +5 ft NAVD88, crest width of 5 ft, and installing biodegradable erosion control blankets from the top of the rock sill to the top of the shoreline bank on a 1V:3H slope to create a vegetated slope. It is estimated that this alternative will require approximately 2900 tons of VDOT Class III riprap, 800 tons of VDOT No. 1 Stone, 4300 CY of fill, 1600 SY of geotextile filter fabric, 700 CY of debris removal, and 35,000 SF of biodegradable erosion control blankets.

5.0 Hydraulics, Hydrology, & Coastal Analysis

5.1. Tidal Datum and Astronomical Tides

The tidal data record available for the project shoreline is the National Oceanographic and Atmospheric Administration (NOAA) Sewells Point VA tide gauge. The Sewells Point Gauge (Station ID: 8638610) is approximately ten miles inside the Chesapeake Bay located on Naval Station Norfolk in the vicinity of Pier 6 from Decatur Avenue at Latitude 36° 56.8' N and Longitude 76° 19.8' W. The gauge is located approximately 9.5 miles from the project.

Figure 5.1 Location of Sewells Point Gauge compared to project site

The Sewells Point Gauge was established in July 1, 1927 with the present reinstallation on December 11, 1995. Historical trends are determined using measurement data from tide gauge records. All tide levels at Sewells Point have increased from the year that the tide level was initially recorded and account for past, present, and anticipated future increase in sea level. The tides in the study area are semi-diurnal, with a mean tide range of approximately 2.43 ft at the gauge and spring tide range of 2.76 ft (**Figure 5.2**). NOAA's Vertical Datum Transformation (VDatum) software was used to calculate the datums at the project site (**Figure 5.3**). Both datum diagrams are relative to NAVD88.

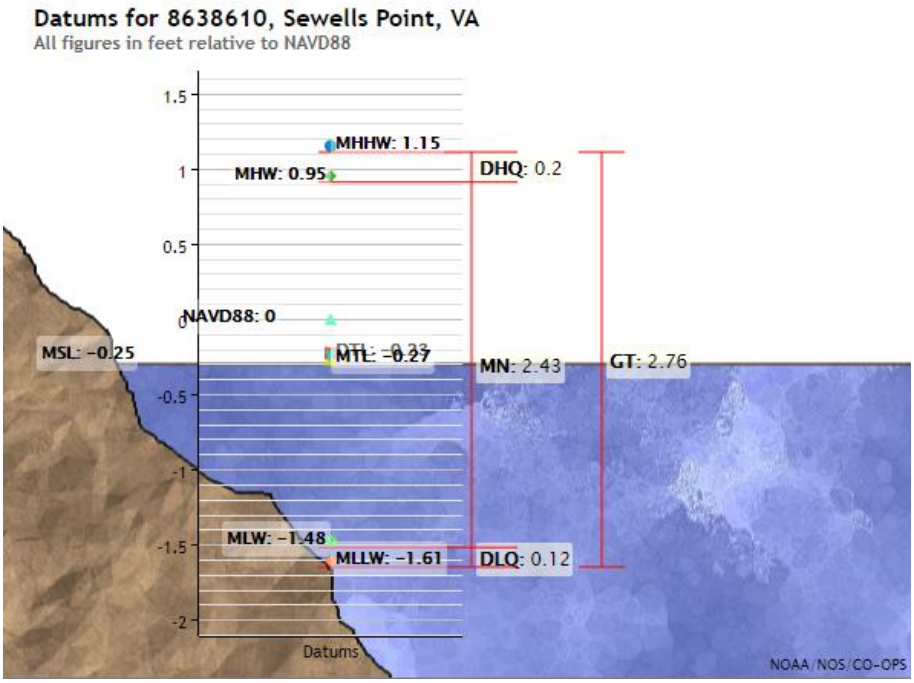

Figure 5.2 Sewells Point Datum Diagram

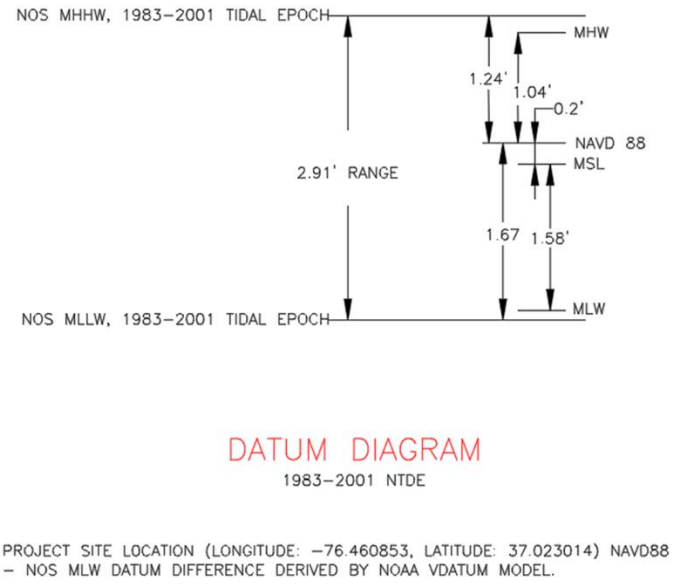

Figure 5.3 Project Location Datum Diagram

5.2. **Historical Storms**

Three general types of major storms affect the Chesapeake Bay area of Hampton Roads in the form of tropical storms, hurricanes and northeasters. **Table 5.1** displays the date of historical storm events where the water surface elevations reached over 4.0 ft NAVD 88, the type of storm,

and the peak water surfaces elevations. The peak water surface elevations were measured by the NOAA – Sewells Point tide gauge and reference to NAVD 88.

Table 5.1 Historical Storm Events

	Storm Event- Date & Name	Type of Storm	Peak Water Surface Elevations (in feet NAVD88)
1	August 1933 (No Name)	Hurricane	6.41
2	September 1933 (No Name)	Hurricane	4.51
3	September 1936 (No Name)	Hurricane	5.11
4	April 1956 (No Name)	Northeaster	4.71
5	March 1962 (Ash Wednesday)	Northeaster	5.61
6	April 1978 (No Name)	Northeaster	4.74
7	February 1998	Northeaster	4.93
8	September 1999 (Floyd)	Hurricane	4.37
9	September 2003 (Isabel)	Hurricane	6.28
10	October 2006	Northeaster	4.92
11	November 2009 (Nor'Ida)	Northeaster	6.13
12	December 2009	Northeaster	4.5
13	August 2011 (Irene)	Hurricane	5.94
14	October 2012 (Sandy)	Hurricane	5.2
15	October 2015 (Joaquin)	Hurricane	4.89
16	September 2016 (Hermine)	Tropical Storm	4.55
17	October 2016 (Matthew)	Hurricane	4.25
18	September 2019 (Dorian)	Hurricane	4.17

Figure 5.4 thru **Figure 5.6** are plots of the water surface elevation (the predicted versus the verified water levels) measured at the NOAA – Sewells Point Gage, during some of the storm events shown in **Table 5.1**. The peaks shown in the figures are what is shown in the **Table 5.1**.

The largest storm event that has occurred in the past 20 years was Hurricane Isabel in 2003 which produce a maximum water level of 6.28 ft NAVD 88.

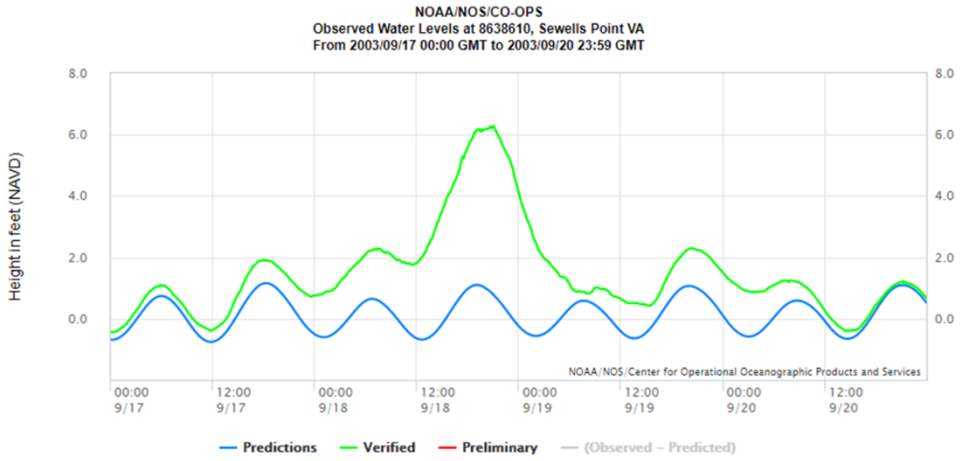

Figure 5.4 Predicted vs. Verified water levels during Hurricane Isabel in 2003

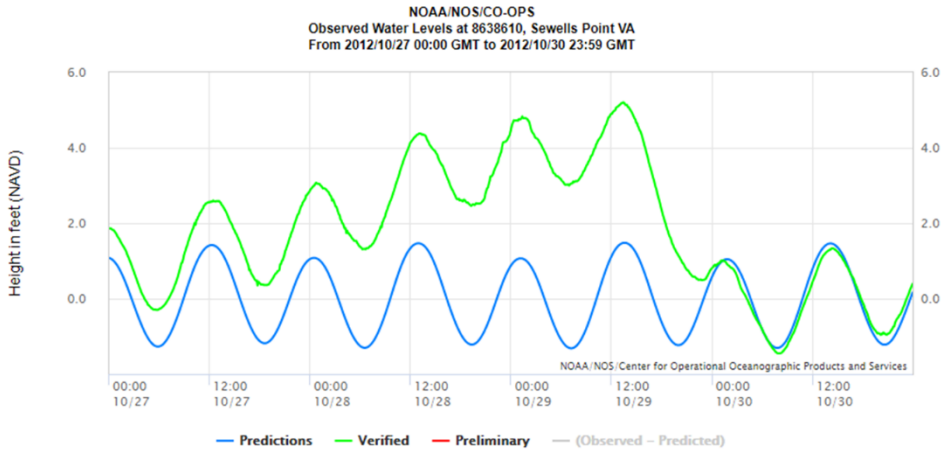

Figure 5.5 Predicted vs. Verified water levels during Hurricane Sandy in 2012

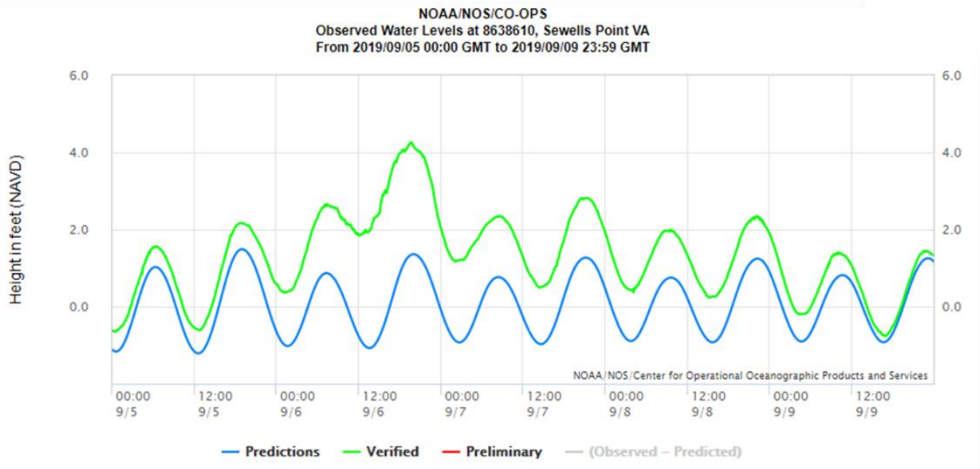

Figure 5.6 Predicted vs. Verified water levels during Hurricane Dorian in 2019

5.3. **Hydrology**

Hydrologic processes are very sensitive to changes in temperature, which can affect the form of precipitation (rain and snow). Precipitation intensity and volume are also affected, along with the timing and volume of runoff, and the conditions that cause or enhance drought. Occasionally, during brief periods, the climatic conditions vary due to storms of both extra-tropical and tropical origin. **Figure 5.7** displays the average monthly precipitation amount for the City of Newport News.

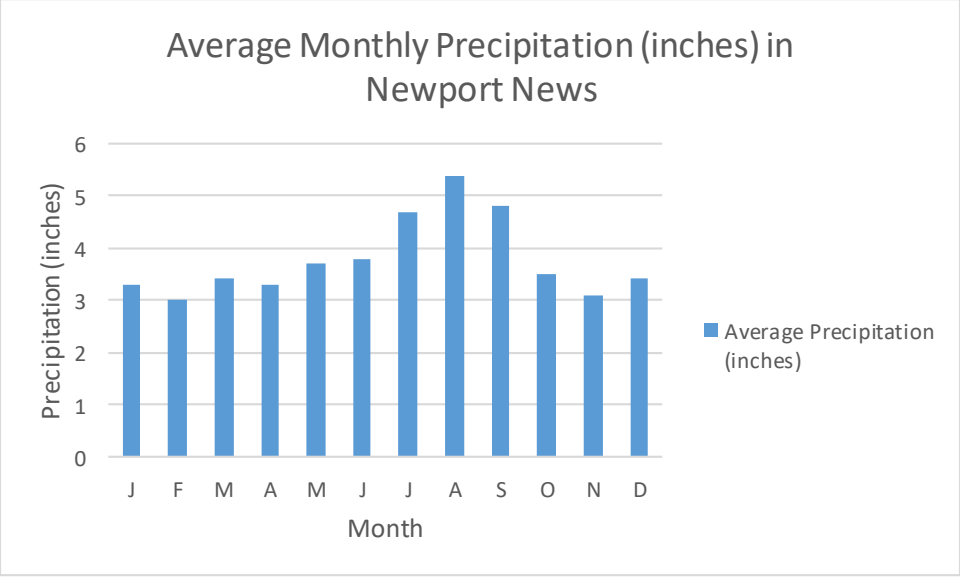

Figure 5.7 Average Monthly Precipitation in Newport News

The USACE May 2015 Civil Works Technical Report, CWTS-2015-09 for the Mid-Atlantic Region of the U.S., focuses on temperature, extreme precipitation events, stream flow trends and future findings. The report encompasses the HUC 02 region and also indicates the HUC 04 boundaries within (see **Figure 5.8**). The technical reports states that air temperatures in the Mid-

Atlantic region will increase over the next century and predicts that the mean air temperature will be increased anywhere from 4.5 degrees to 10°F. The report continues that projections of precipitation and hydrology in the study region are less certain than those associated with air temperature. However, the majority of the studies performed in this HUC region projected increases in precipitation and streamflow through the 21st century. Extreme high events (storms and floods) are projected to increase in the future. Low flows, however, have been projected to increase in the future as a result of the projected temperature increases. This is summarized in **Figure 5.9** which is a matrix of observed and projected climate trends from CWTS-2015-09.

Figure 5.8 TR Reference Map

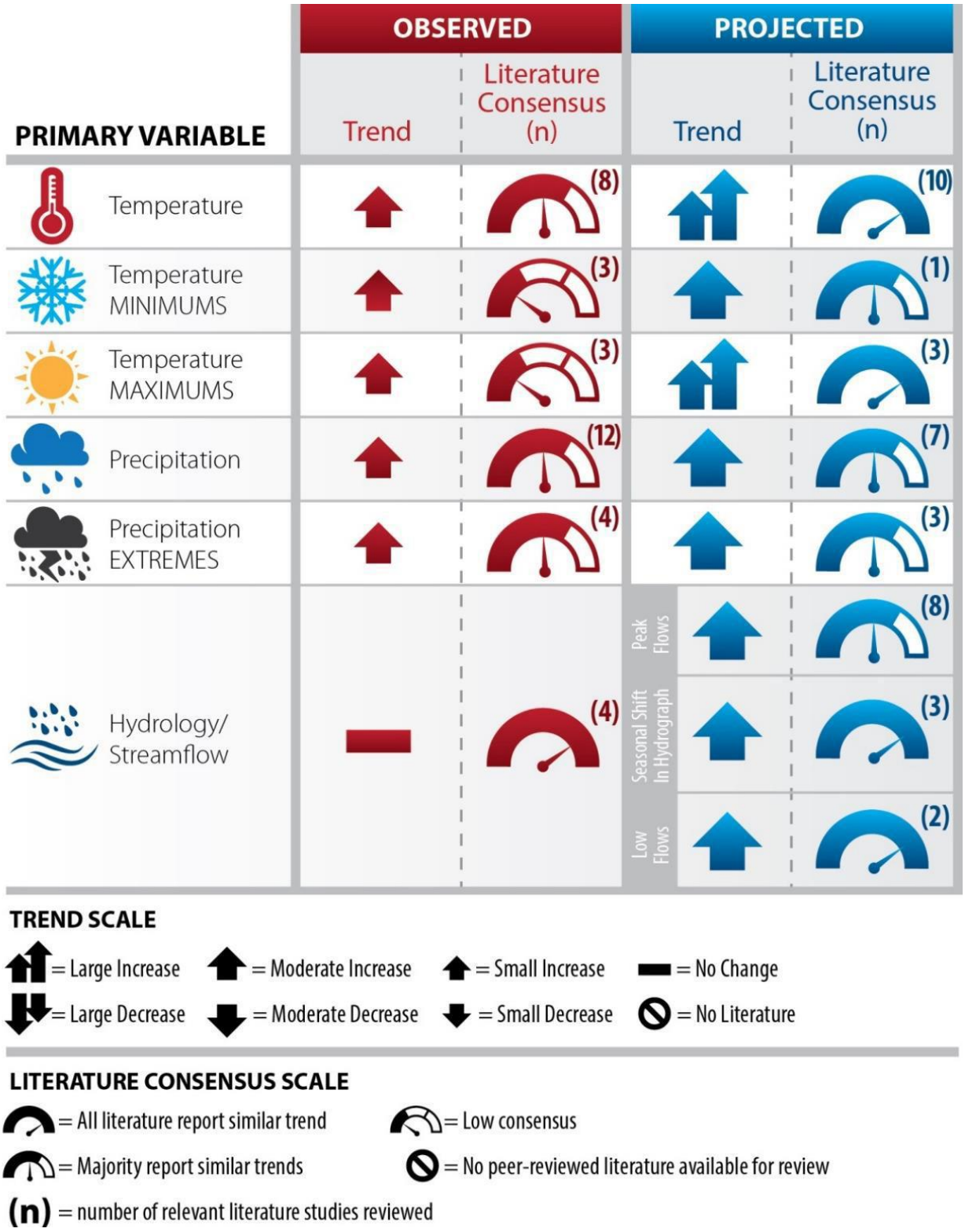

Figure 5.9 Summary Matrix of Observed and Projected Climate Trends

5.4. Relative Sea Level Change (RSLC)

Relative (local) SLC is the local change in sea level relative to the elevation of the land at a specific point on the coast. Relative SLC is a combination of both global and local SLC caused by changes in estuarine and shelf hydrodynamics, regional oceanographic circulation patterns (often caused by changes in regional atmospheric patterns), hydrologic cycles (river flow), and local and/or regional vertical land motion (subsidence or uplift). RSLC is predicted to continue in the future as the global climate changes. According to National Oceanographic and Atmospheric Administration (NOAA), RSLC for the Sewells Point tide gauge averages 0.0154 feet per year (4.7 mm/year) (**Figure 5.10**). Additionally, USACE Engineer Regulation (ER) 1100-2-8162 "Incorporating Sea Level Change in Civil Works Programs", provides guidance that documents how to incorporate RSLC into civil works and explains the three different accelerating eustatic (worldwide changes in sea level) SLR scenarios (USACE 2019a). These include a conservative scenario (historic rate of sea level change), an intermediate scenario and a high scenario. **Figure 5.10** shows a plot of the monthly mean sea level at the Sewells Point tide gage. The average seasonal cycle is removed and monthly average (represented by the blue curve) is represented along with the linear trend with its 95% confidence interval. This was obtained after accounting for the average seasonal cycle. The plotted values are relative to the 1983-2001 mean sea level datum.

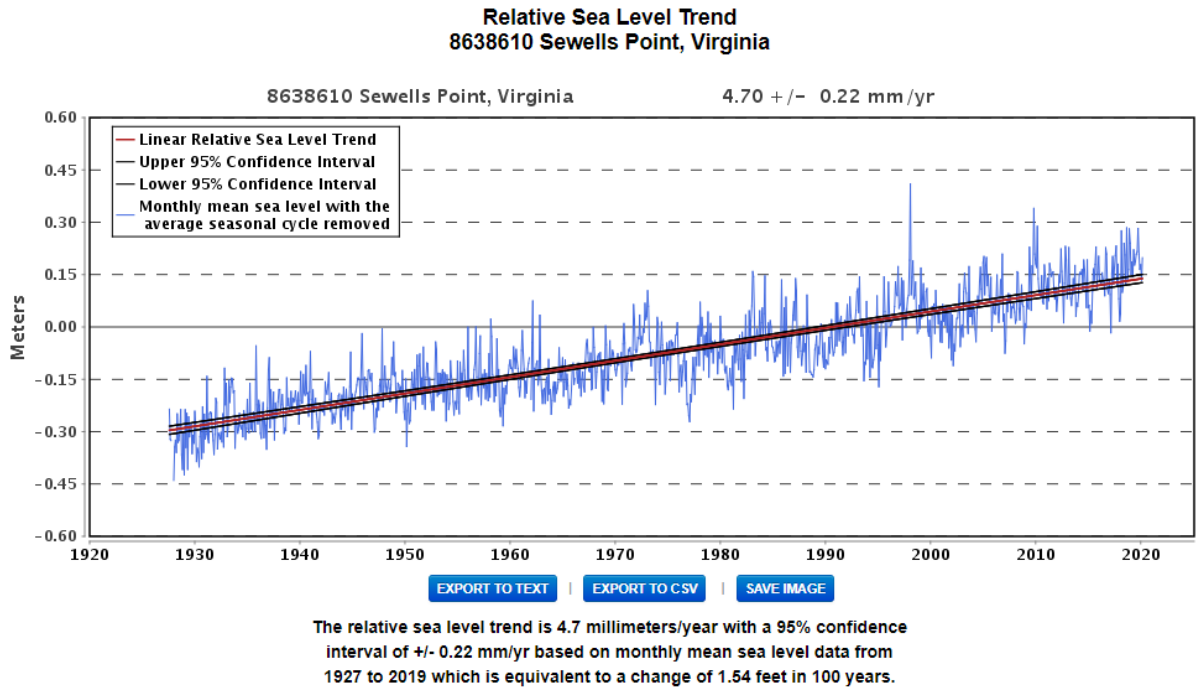

Figure 5.10 NOAA Sea Level Trend at Sewells Point (access May 15, 2020)

5.5. Rates of Relative Sea Level Change

USACE Sea Level Change Curve Calculator (based on information from ER 1100-2-8162) was used to observe the increase rate in RLSC. The calculator tool is used to observe not only the low curve rate of RLSC, but also the intermediate curve rates and high curve rates.

The historic rate of future RSLC (or USACE Low Curve) is determined directly from NOAA gauge data gathered in the vicinity of the project area. The intermediate rate (or USACE Intermediate Curve) of local mean RSLC is estimated by considering the modified National Research Council (NRC) projections and adding the appropriate value to the local rate of vertical land movement. The intermediate rate of relative (local) sea level rise is based on the modified NRC Curve I, since its value is comparable to that of the IPCC projection. NRC Curve I is based on the general equation $E(t) = 0.0017t + bt^2$, where the constant 0.0017 = the IPCC 2007 annual rate of eustatic RSLC in meters;

t = time in years (relative to the year when the curves were developed) and;

$b = 2.71E\text{-}5$.

The high rate (or USACE High Curve) of mean RSLC is estimated by determining the modified NRC Curve III value and adding it to the local rate of vertical land movement. This high rate scenario exceeds the 2001 and 2007 IPCC projections and considers the potential rapid loss of ice from Antarctica and Greenland. NRC Curve III is also based on the general equation $E(t) = 0.0017t + bt^2$; however, the constant "b" changes to $b = 1.13E\text{-}4$.

For both the intermediate and high rates of RSLC, the NRC curves accelerate upward over time beginning in the year 1992 when the curves were developed; therefore, it is necessary to estimate RSLC for a particular time horizon relative to 1992. Engineer Pamphlet (EP) 1100-2-1 "Procedures to Evaluate Sea Level Change: Impacts, Responses and Adaptation", recommends analyzing the effects of RSLC on the project at three future time periods post construction. Figure 5.11 shows an image of the RLSC low, intermediate, and high curve from 1992, which corresponds to the midpoint of the current National Tidal Datum Epoch of 1983-2001 and thus the year of the current datums, through the year 2122 as this is estimated to be 100 years post construction. The historic rate of relative sea level rise measured at the Sewells Point tide gage, 0.0154 feet per year (4.7 mm/year), was entered in the calculator to obtain the rates and curves. **Table 5.2** shows the computed SLC rates (relative to 1992) from the present year and the years that follow per the construction schedule stated in the alternatives description. USACE Civil Works projects are required to incorporate and consider the intermediate RLSC rates for plan formulation, as well as the low and high rates for sensitivity analysis.

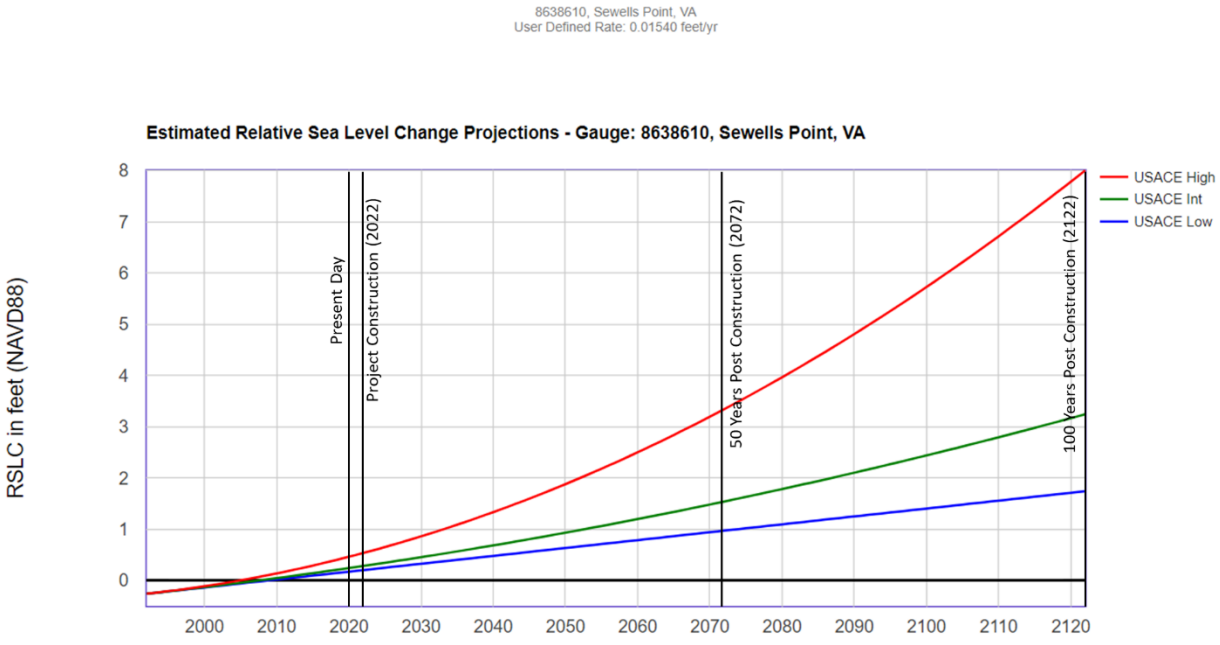

Figure 5.11 Relative Sea Level Rise Curves from USACE calculator.

Table 5.2 Estimated Increase in Relative Sea Level Rise Rates (in feet).

Estimated Relative Sea Level Change			
from 1992 To 2122			
8638610, Sewells Point, VA			
User Defined Rate: 0.0154 feet/yr			
All values are expressed in feet relative to LMSL			
Year	**USACE Low**	**USACE Int**	**USACE High**
1992	0	0	0
2020	**0.43**	**0.5**	**0.72**
2022	**0.46**	**0.54**	**0.8**
2027	0.54	0.65	0.99
2032	0.62	0.76	1.21
2037	0.69	0.87	1.44
2042	**0.77**	**0.99**	**1.7**
2047	0.85	1.12	1.97
2052	0.92	1.24	2.26
2057	1	1.38	2.57
2062	1.08	1.51	2.9
2067	1.16	1.66	3.24
2072	**1.23**	**1.8**	**3.61**
2077	1.31	1.95	3.99
2082	1.39	2.11	4.39
2087	1.46	2.27	4.81
2092	1.54	2.43	5.25
2097	1.62	2.6	5.7
2102	1.69	2.77	6.18
2107	1.77	2.95	6.67
2112	1.85	3.13	7.19
2117	1.93	3.31	7.72
2122	**2.00**	**3.51**	**8.27**

The Sea Level Tracker tool was used to visualize the observed changes in sea level and to compare trends to the projected sea level changes per USACE Engineer Regulation 1100-2-8162 and Engineer Pamphlet (EP) 1100-2-1. The tool shows the historical, observed changes in mean sea level (MSL) as measured and reported for National Oceanic Atmospheric Administration (NOAA) tide gauges, mapped against the USACE sea level change (SLC) projections. Taken together, the tool enables the comparison of actual SLC with USACE SLC projections (as described in ER 1100-2-8162), along with observed monthly water levels and the computation of SLC trends based on historical data (Sant-Miller et al, 2018). Figure 5.12 and Figure 5.13 displays the results of this tool, comparing actual SLC for the 19-year (metonic cycle) midpoint moving average (dark blue line) and 5-year midpoint moving average (orange line) against the USACE SLC curve projections for the entire period of record and for the entire period of record (**Figure 5.12**) and for only the past 20 years **(Figure 5.13**). The observed 19-year moving average is tracking along the intermediate SLC scenario while the 5-year moving average fluctuates more between the intermediate and high scenario since 2010.

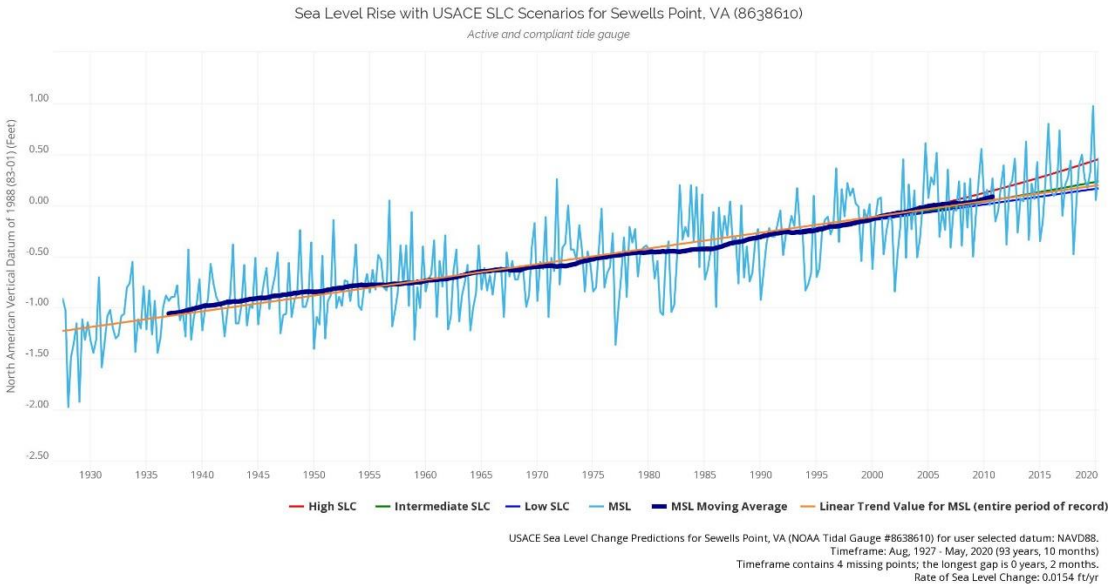

Figure 5.12 Historical Sea Level Rise with USACE SLC Scenarios for Sewells Point (8638610) for the entire period of record

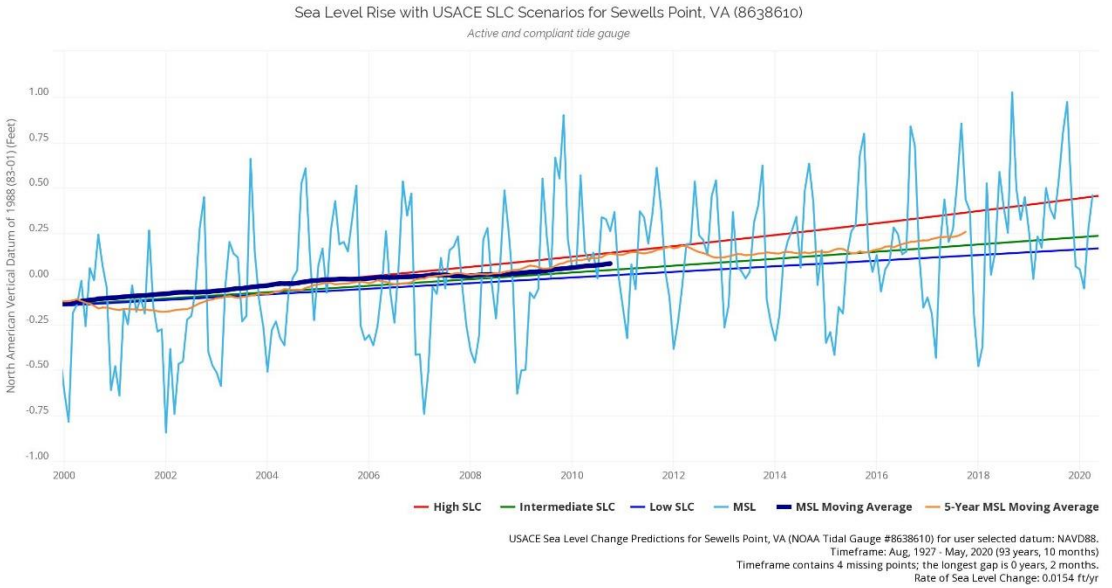

Figure 5.13 Historical Sea Level Rise with USACE SLC Scenarios for Sewells Point (8638610) for the years 2000 - 2020

5.6. **Land Subsidence**

The general land subsidence in the Chesapeake Bay area is approximately -0.0069 feet per year, which is approximately 0.69 feet over the next 100 years (Boon et al., 2010).

5.7. Stillwater Elevations With and Without RSLC

Stillwater Elevation data from two sources was evaluated for the project site is available:

1. James River Bank Stabilization Alternative Analysis report by CH2MHILL (CH2MHILL 2013)
2. The North Atlantic Coastal Comprehensive Study (NACCS) wave statistics

James River Bank Stabilization Alternative Analysis report by CH2MHILL (CH2MHILL 2013)

The first stillwater elevation source comes from the 2013 James River Bank Stabilization Alternative Analysis report of this same section of shoreline prepared for the City of Newport News by CH2MHILL (now Jacobs Engineering). This study performed and extreme value analysis on the Sewells Point tide gauge for the surge data and total water level. The Peak-Over-Threshold (POT) method was used, and various combinations of theoretical probability distributions (Weibull, Truncated Gumbel, Generalized Pareto, Gamma/Pearson, Log-Pearson, Exponential, Log-normal) and estimation methods (Method of Moments, Maximum Likelihood, Method of L-moments) were applied. Analyses with various threshold values in selecting storm events were conducted using a minimum time interval between successive peaks of 240 hours to ensure selection of independent events (CH2MHILL 2013). The results from that study are summarized in **Table 5.3**. As the results of that analysis was completed on gauge data up to the year 2011, the difference or increase in the relative local level rise (based on the USACE low scenario) from 2011 to 2020 (0.14 ft) was added to bring the water levels to present date. The next section about the North Atlantic Coast Comprehensive Study (NACCS) will compare the two study water levels.

Table 5.3 Extreme Surge Levels and Total Water Levels at Sewells Point Station based on Data from 1960 to 2011 (CH2MHILL 2013).

Recurrance (Yrs)	ACE % Flood	Surge (ft)	Standard Deviation (ft)	Total Water Level (ft NAVD88)	Total Water Level Adjusted to 2020 (ft NAV88)	Standard Deviation (ft)
1	100%	2.62	0.07	3.23	3.37	0.05
2	50%	3.18	0.11	3.64	3.78	0.09
5	20%	3.95	0.2	4.27	4.41	0.18
10	10%	4.54	0.29	4.81	4.95	0.29
25	4%	5.34	0.41	5.62	5.76	0.49
50	2%	5.95	0.52	6.3	6.44	0.7
100	1%	6.56	0.64	7.05	7.19	0.95
250	0.4%	7.38	0.81	8.16	8.30	1.35

North Atlantic Coast Comprehensive Study (NACCS)

This study used stillwater levels from the North Atlantic Coast Comprehensive Study (NACCS) performed by the USACE Engineering, Research and Development Center (ERDC). The purpose of the NACCS was to identify flood risk and then plan and implement strategies to reduce the risk now and in the future. The study also determined the magnitude and uncertainty of existing and future forcing conditions. It concluded to use its findings to assess coastal

engineering projects for coastal storm risk management and resiliency for the areas in the region. The study focused on the Northeast coastal region of the United States (from Virginia to Maine).

For this study NACCS data for the Base Conditions + 96 random tides was downloaded from CHS in November 2019. The CHS shows ADCIRC and STWAVE save points which contain NACCS results (storm surge, water level, wave height, wave period, wave direction, and current magnitude, etc.) in different locations. ADCIRC Save Point 17351 **(Figure 5.14**) was the nearest save point to the project location and was analyzed for all engineering evaluation purposes.

Figure 5.14 NACCS model save points near the project location

The native datum of the NACCS results was based on local mean sea level (MSL) tidal epoch 1983-2001. This was the datum that was used to define the NACCS regional hydrodynamic model (ADCIRC), from which storm surge results were obtained. The results of the NACCS water levels were referenced to the year 1992, the midpoint of the current National Tidal Datum Epoch (NTDE) (1983-2001). Therefore, the difference or increase in the relative local level rise (based on the USACE low scenario) from 1992 to 2020 (0.43 ft) was added to bring the water levels to present date. The values were also converted from, MSL to NAVD 88.

The NACCS results produced water levels for different storm frequencies and confidence limits, **Figure 5.15** displays Stage-Frequency Curves from the NACCS results from (CHS) at Save Point 17351 for the mean (50%), 84%, 95%, and 98% confidence limits for water levels. **Table 5.4** displays the values of the NACCS mean (50%) and 98% confidence limits at Save Point 17351 adjusted with SLR to the present date.

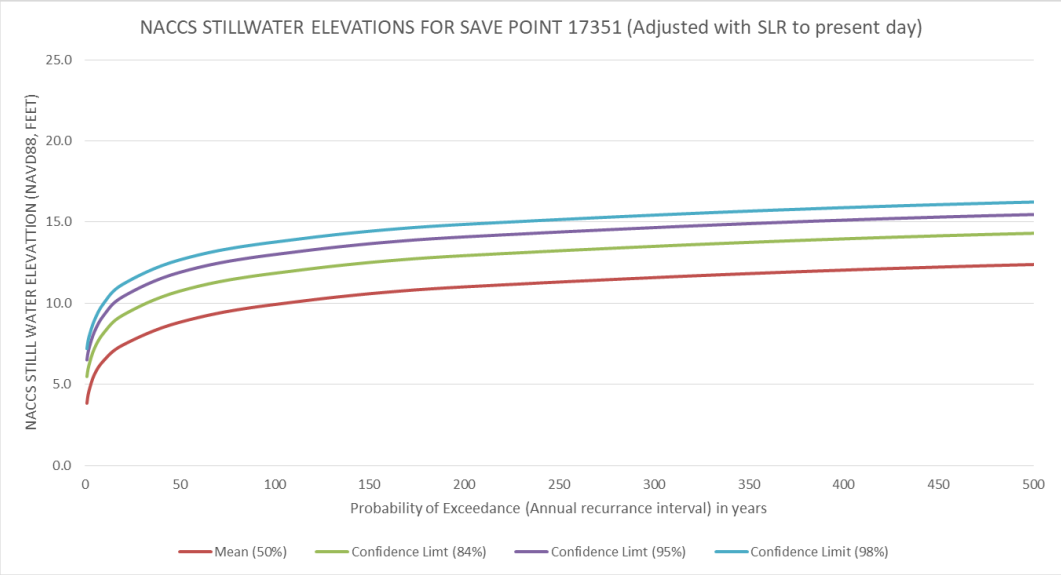

Figure 5.15 NACCS Stillwater elevations for Save Point 17351

Table 5.4 NACCS Mean (50%) and 98% Confidence Limits Stillwater elevations for Save Point 17351 Adjusted to Present Day

NACCS WATER LEVELS ADJUSTED FOR SLR TO YEAR 2020 (LOW CURVE)					
		Base Conditions + 96 Random Tides (NAVD88)			
		Mean (50%)		Confidence Limit (98%)	
Recurrance (Yrs)	ACE %	m	ft	m	ft
1	100%	1.2	3.8	2.2	7.2
2	50%	1.4	4.5	2.4	7.9
5	20%	1.7	5.6	2.7	9.0
10	10%	2.0	6.5	3.1	10.0
20	5%	2.3	7.4	3.4	11.2
50	2%	2.7	8.8	3.9	12.7
100	1%	3.0	9.9	4.2	13.8
200	0.5%	3.4	11.0	4.5	14.9
500	0.2%	3.8	12.4	4.9	16.2
1000	0.1%	4.1	13.3	5.2	17.2
2000	0.05%	4.3	14.2	5.5	18.0
5000	0.02%	4.6	15.2	5.8	19.0
10000	0.01%	4.8	15.8	6.0	19.7

The NACCS water levels are higher than the extreme values calculated by CH2MHILL as the extreme values are based on historical maximums from gauge data while the NACCS data is based on modeling data of a probabilistic storm suite. The historical maximum water levels are approximately equal to a 10% ACE flood to 2% ACE flood (10 to 50-year) tidal events. A statistical gauge analysis of the historical record may suggest that what has occurred in the past will occur

in the future, and this may underestimate the risk. Modeling effects, such as what was done for the NACCS, provide an opportunity to evaluate impacts of stronger hypothetical storms that may not have occurred on record, but could occur and thus the overall ACE water levels are higher. The NACCS water levels are the water levels considered for further analysis in this study.

Impacts of Sea Level Rise during future years.

Engineering Pamphlet (EP) 1100-2-1, Global Changes – Procedures to Evaluate Sea Level Change: Impacts, Responses, and Adaptation, recommends analyzing the effects of SLR on the project at three future time period post construction (the year 2022). The time periods include 20 years after construction is completed (the calendar year 2042), 50 years after construction (the calendar year 2072), and 100 years after construction (the calendar year 2122). **Table 5.5** shows the predicted increase in SLR for the NACCS water levels using the USACE intermediate curve 20 years (2042), 50 years (2072), and 100 years (2122) into the future after the proposed construction year of 2022.

Table 5.5 Additional Increase in SLR predicted 20 years, 50 years, and 100 years into the future (in feet) from project start year of 2022 to 2122.

NACCS MEAN (50%) WATER LEVELS ADJUSTED FOR SLR (USACE INTERMEDIATE CURVE) TO YEAR 2022,2042, 2072, and 2122					
		Year 2022	Year 2042	Year 2072	Year 2122
Recurrance (Yrs)	ACE %	ft	ft	ft	ft
1	100%	3.9	4.3	5.1	6.8
2	50%	4.6	5.0	5.8	7.6
5	20%	5.7	6.1	6.9	8.6
10	10%	6.5	7.0	7.8	9.5
20	5%	7.5	7.9	8.7	10.4
50	2%	8.9	9.3	10.1	11.8
100	1%	10.0	10.4	11.2	12.9
200	0.5%	11.1	11.5	12.3	14.0
500	0.2%	12.4	12.9	13.7	15.4
1000	0.1%	13.4	13.8	14.6	16.3
2000	0.05%	14.2	14.7	15.5	17.2
5000	0.02%	15.2	15.7	16.5	18.2
10000	0.01%	15.9	16.3	17.1	18.9

5.8. **Wind Climate**

Wind data is observed at gauge located at the Dominion Terminal Associates Pier 11 (DOMV2) (Station ID: 8638511) on the southern end of the Virginia Peninsula approximately four miles south of the project site (**Figure 5.16**). The purpose of reviewing this data for the project is to understand which direction causes the biggest waves.

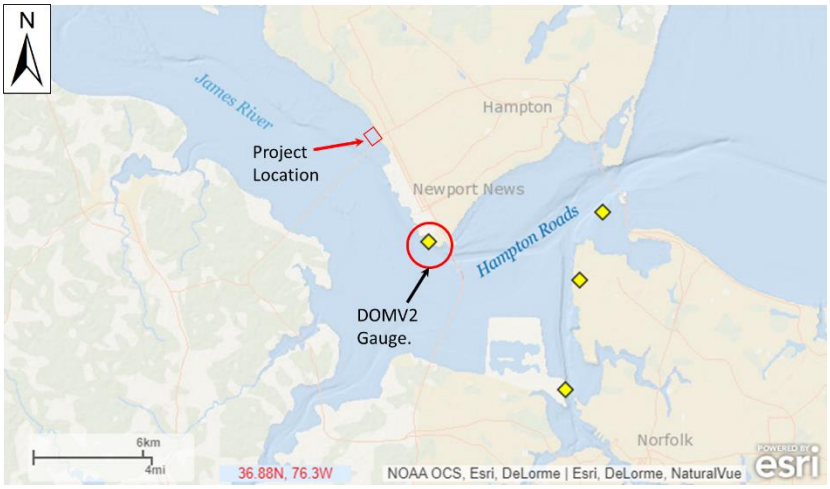

Figure 5.16 Location of DOMV2 Gauge compared to project site

A windrose plot was available for data from August 30, 2016 to March 31, 2020 for this gauge through the Iowa Environmental Mesonet (IEM) which collects environmental data from cooperating members with observing networks and compiles that data into some tables and graphs for public use. The orientation of the project site is shown overlaid on the windrose to display the winds directions responsible for the waves along the shoreline. The windrose shows that the shoreline is subjected to wind and waves most frequently from the Southwest however the strongest winds and subsequently the greatest potential wave energy are those from the Northwest.

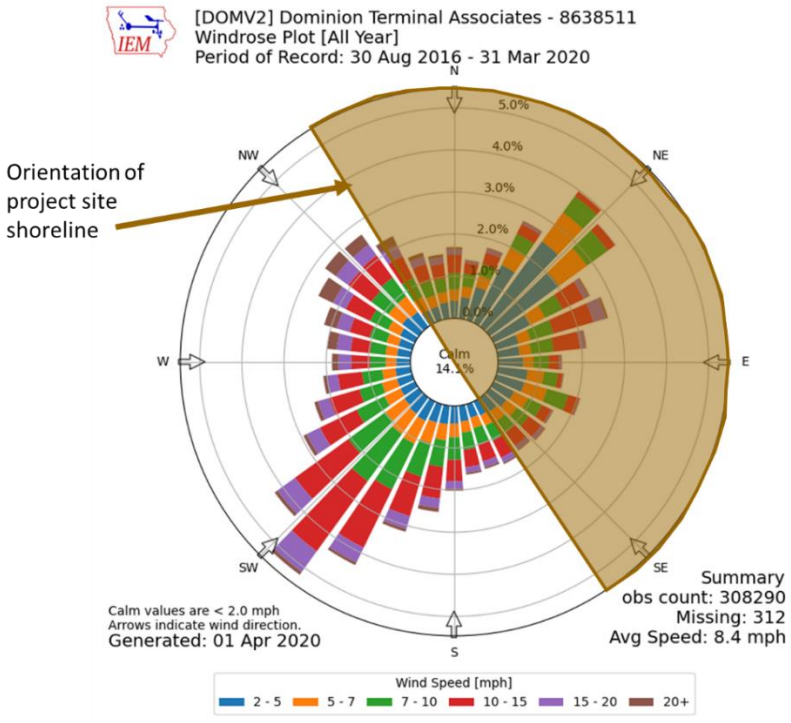

Figure 5.17 IEM Windrose Plot for DOMV2

5.9. **Wave Climate**

Wave climate data for the project site is available from a few different sources:

1. An historical wave hindcast study performed by the Old Dominion University Dept of Civil Engineering (Basco and Shin 1993)
2. James River Bank Stabilization Alternative Analysis past report by CH2MHILL (CH2MHILL 2013)
3. The North Atlantic Coastal Comprehensive Study (NACCS) wave statistics

Historical Wave Hindcast Study (Basco and Shin 1993)

The first source, a detailed wave hindcast study conducted for the Chesapeake Bay and its tributaries by Basco and Shin (1993) used long-term wind data from Norfolk International Airport and Naval Air Station Patuxent River, along with historical storm surge measurements within the bay to develop bay wind-wave hindcast. As a final product, 12 wave information maps were developed showing both iso-wave height contours (spectral significant wave height, H_{m0}) at one-half-foot intervals and wave periods (peak period, T_p) covering all the water areas of the Chesapeake Bay and its major tributaries in Virginia. Figure 5.18 shows iso-wave height contours and associated wave periods for the James River at the entrance to the Chesapeake Bay. Maximum wave height is found to be 3.5 ft, with peak wave period of 3.7 seconds in front of the project site. According to Basco and Shin (1993), the wave climate in front of the project site may be classified as a medium energy wave environment. The iso-wave contour map has limited used since the 1993 study's analyses were based on a simple hindcast model that assumes a constant weighted-average water depth over the entire wind field region. It is also noted that wave energy spreading is not explicitly controlled in the hindcast model and near the shoreline, wave breaking and energy loss further complicate the process.

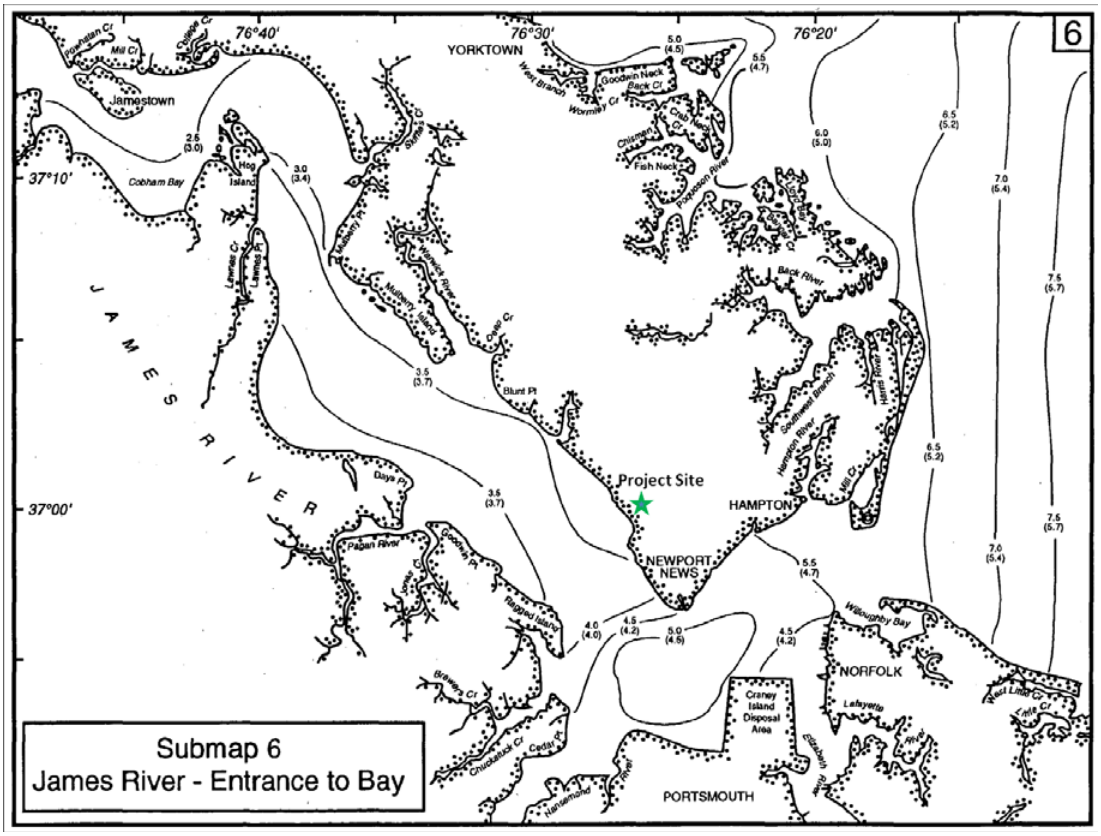

Figure 5.18 Iso-wave Height Contours in James River, VA (Basco and Shin, 1993)

James River Bank Stabilization Alternative Analysis report by CH2MHILL (CH2MHILL 2013)

The second wave climate source comes from the 2013 James River Bank Stabilization Alternative Analysis report of this same section of shoreline prepared for the City of Newport News by CH2MHILL (now Jacobs Engineering). The report references unpublished hydrodynamic modeling performed by CH2MHILL of hurricane storm surge inundation for Newport News Shipyard Facility (NNSF) located southwest of the project site with a modeling grid that included the James River Shoreline in this study. Therefore CH2MHILL utilized that previous modeling data to collect additional wave information for their 2013 report. Based on analyses of this hydrodynamic modeling, which used actual hurricane storm data to determine the most likely hurricane event scenarios and verify accuracy of the mode, Hurricane Isabel was the most severe hurricane among the many examined in terms of surge level at the NNSF site, which is close to the 50-yr return period extreme storm event. **Figure 5.19** shows images taken from the 2013 CH2MHILL report which illustrate the spatial distribution of wave height and peak wave period near the project site, respectively. As shown in **Figure 5.19**, the model predicted a maximum wave height is 4.6 ft, with peak wave period of 4.1 s in front of the project site during the peak of Hurricane Isabel (CH2MHILL 2013).

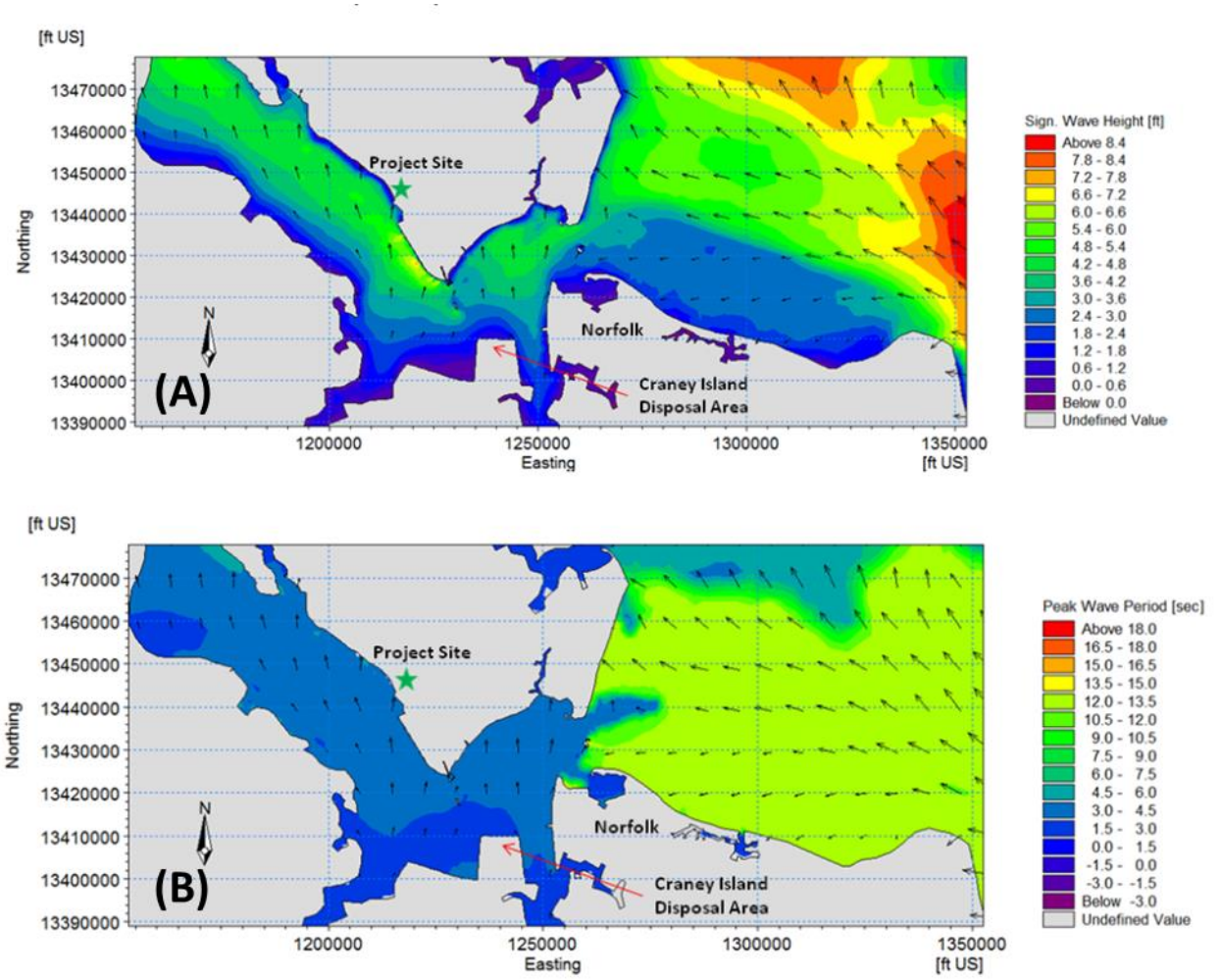

Figure 5.19 Spatial Distribution of (A) Wave Height Vectors and (B) Peak Wave Period Vectors during Peak of Hurricane Isabel (2003) in Front of Project Site (Coordinates: WGS1984, UTM 18N Projection System) (CH2MHILL 2013)

NACCS Wave Statistics

The last wave climate source is the North Atlantic Coast Comprehensive Study (NACCS) which is described in more detail in paragraph 5.5. The NACCS modeling effort not only computed stillwater elevations for different frequencies, but also significant wave heights (ARI significant wave heights) for each storm frequency. The NACCS numerical modeling study produced nearshore wind, wave and water level estimates and the associated marginal and joint probabilities. Data (storms, waves, tides, etc.) was collected from many resources. Once storms were selected and the necessary data input into the ADCIRC model was used to simulate the surge and circulation response to the storms; and STWAVE was used to provide the nearshore wave conditions including local wind generated waves. ADCIRC is a system of computer programs for solving time dependent, free surface circulation and transport problems in two and three dimensions. This model utilizes the finite element method in space allowing the use of highly flexible, unstructured grids. Typical ADCIRC applications have included:

- prediction of storm surge and flooding
- modeling tides and wind driven circulation
- larval transport studies
- near shore marine operations
- dredging feasibility and material disposal studies

STWAVE uses a finite-difference representation of a simplified form of the spectral balance equation to simulate near-coast, time-independent spectral wave energy propagation. **Table 5.6** shows the average significant wave heights that were computed from the NACCS modeling efforts for the mean and 98% confidence limit frequency curves for ADCIRC Save Point 17351/STWAVE Save Point 4301.

Table 5.6 NACCS Wave Heights

		NACCS Wave Heights	
		Mean (50%)	Confidence Limt (98%)
Recurrance (Yrs)	ACE % Flood	ft	ft
1	100%	2.26	8.71
2	50%	2.73	9.21
5	20%	3.03	9.49
10	10%	3.26	9.70
20	5%	3.39	9.86
50	2%	3.56	9.92
100	1%	3.68	9.97
200	0.5%	3.81	10.01
500	0.2%	3.97	10.08
1000	0.1%	4.09	10.12
2000	0.05%	4.20	10.17
5000	0.02%	4.36	10.23
10000	0.01%	4.48	10.28

Wave Heights Used in this Study

After reviewing all of the existing wave data and existing modeling data and results, the study continued with its analysis using two wave heights and periods, the maximum wave height and period from the Basco and Shin wave hindcast study of 3.5 ft and 3.7 seconds respectively, and the modeled wave for Hurricane Isabel from the CH2MHILL hydrodynamic model wave results with a maximum wave height of 4.6 ft, with peak wave period of 4.1 seconds. Looking at the NACCS mean wave heights in Table 5.6, the 3.5 ft wave height corresponds to approximately a 50 YR (2%) wave frequency and the 4.6 ft wave height is slightly larger than the 10000 YR (0.01%).

Table VI-5-28 from the Coastal Engineering Manual (CEM) was used to check the rear side stability for the armor layer. The results showed that the damages would be less than 1%. More information about overtopping and wave runup can be seen in Section 8.2.

5.10. Shoreline Change

There is a significant relationship between wind speed and wave activity, in addition to depth of water and duration of storm. Increase of wind speed will increase waves and as a result, this will increase the erosion potential. Wave and sediment transport modeling performed by Fagherazzi and Wiberg (2009) show a correlation between waves and erosion. They found a relationship between high water levels (leading to waves breaking and hitting the shoreline at higher elevations) and increasing erosion factors. **Figure 5.20** displays a representation of the study results.

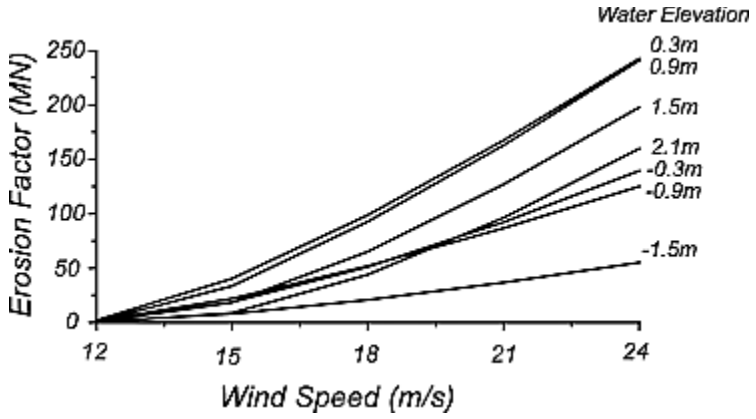

Figure 5.20 Erosion Factor as a function of wind speed for different water elevation (Fagherazzi and Wiberg 2009)

The project site is in an accelerated rate of shoreline retreat characterized by river flow, water level rise, and tidal, storm, and wind driven wave action. It is estimated that the average retreat is 0.7 feet/ year (ft/yr) with aerial imagery from 2014-2018 (**Figure 5.21**). This is close to the typical erosion rate of 0.8 ft/yr for the northern banks in Newport News of the James River by Hardaway and Anderson (1999).

Figure 5.21 Google Earth Image showing the change in shoreline

6.0 Surveying, Mapping, and Other Geospatial Data

6.1. Surveys & Mapping

No new surveys were collected to evaluate the final array of alternatives and only existing data was used. Site specific data will be collected as needed during Preconstruction Engineering and Design (PED) and construction. The following is an overview of the survey, mapping, and geospatial data available in and around the study area:

- LiDAR used for this study was collected in 2015, and later processed and published in 2017 by USGS. The LiDAR vertical accuracy for the Eastern Shore Virginia LiDAR Project is 0.41 feet in non-vegetated terrain and 0.58 feet in vegetated terrain. The project team assumed that much of the collected data was over vegetated terrain. Elevations were referenced to North American Vertical Datum of 1988 (NAVD88).
- Topographic and bathymetric survey data was collected for the 2013 James River Bank Stabilization Alternative Analysis report by CH2MHILL. In total, 6 cross-sections beginning 20 ft landward form the existing top of the bank extending seaward to a maximum depth of 5 ft below the mean low water conditions. The report displays the cross-shore profiles of these 6 transects where general ranges of nearshore bathymetric contours could be derived. XYZ data was not available.

6.2. Horizontal and Vertical Datums

All surveys and mapping products should have the same horizontal and vertical datum. The horizontal datum for this study is tied to the State Plane Coordinate System using North American Datum of 1983 (NAD83, Virginia South, 4502). Distances are in feet by horizontal measurement. Coordinates are Virginia South Zone. The vertical datum for this study is tied to the North American Vertical Datum of 1988 (NAVD88), a requirement of ER 1110-2-8160. Elevations are in feet.

7.0 Geotechnical Engineering Analysis

A preliminary geotechnical engineering analysis was performed by the Norfolk District, US Army Corps of Engineers Geo-Environmental Engineering Section on four (4) proposed design alternatives developed during the Federal Interest Determination (FID) Phase. The four alternatives are described as the following: rock sill with vegetated berm; stone revetment; stone revetment and vegetated berm; and a living shoreline which would consist of a stone toe and/or rock sill, vegetation erosion control, and earthen berm. To analyze these four alternatives, the Geo-Environmental Engineering Section utilized two reports that were provided by the Sponsor, the City of Newport News. The documents provided were: Geotechnical Engineering Data Report, James River Stabilization Project, completed by Schnabel Engineer dated May 10, 2013; and the James River Bank Stabilization Alternative Analysis Report, completed by CH2M HILL, dated July 2013. These reports provided data and site information which were utilized to develop a preliminary slope stability analysis for each alternative.

7.1. Site Description

The project site is located in the City of Newport News, Virginia adjacent to the Chesapeake Bay and about 65 miles southeast of Richmond. The project area is located along the north bank of the James River, west of the James River Bridge (US Routes 17/258), and lies between Newmarket Creek and North Avenue, immediately adjacent to River Road. An approximately 600-foot section of riverbank along the James River is severely eroded by the combined effects of natural erosion processes. The resulting 25-foot high receding sandy bluff is an imminent threat to existing public facilities, River Road which travels parallel to the project site, and private home owners.

The Norfolk District, US Army Corps of Engineers conducted a site visit 6 December 2019. The river bank was observed to contain areas of vegetation such as shrubs and some mature trees. In the walls of the bank, and on the beach, debris such as but not limited to boulder size pieces of concrete, bricks and brick structures, trash, pipe, and metal shrapnel were observed. Existing sparse rip rap, timber piers from older, demolished river piers, dilapidated groins, and an existing pier from a property owner were also observed. The slopes were unevenly eroded and steep, generally exceeding a 1 horizontal to 1 vertical (1H:1V) slope. Measurements were taken at three locations within North Avenue and South Avenue to determine the distance between the edge of the bank and the edge of River Road. The distance between the edge of the bank and River Road varied from approximately 19 to 38 feet. Some tree trunks were observed near the edge of the bank to be bowed which indicates evidence of creep. Storm drains were not visible within the project area or within the immediate vicinity of River Road parallel to the project site. A drainage ditch was observed in one area of the bank to serve as a path for sheet flow to travel over the bank and onto the beach.

7.2. Regional Geology

The project site is underlain the Shirley Formation and the Yorktown Formation. The Shirley Formation is Quaternary age and consists of light to dark gray, bluish-gray and brown sand, gravel, silt, clay, and peat. It is comprised of surficial deposits of riverine terraces and relict

baymouth barriers and bay-floor plains deposits. Formation thickness ranges from 0 to 80 feet. These surficial deposits are underlain by the soils of the Yorktown Formation.

The Yorktown Formation is Miocene in age. The top of the Yorktown Formation typically consists of a relatively thin layer of bluish gray to gray highly plastic clay. The underlying soils of the Yorktown Formation typically consist of bluish gray to gray, fossiliferous, medium dense silty sands, and firm to very stiff sandy silts and silty sands. Shell beds are often abundant in this formation. The Yorktown Formation, once encountered, generally extends to depths in excess to 150 feet below sea level.

7.3. General Subsurface Stratigraphy

The City of Newport News provided the Norfolk District, US Army Corps of Engineers with a Geotechnical Engineering Data Report dated May 10, 2013, completed by Schnabel Engineering for the project site. Schnabel Engineering's subcontractor, ConeTec, Inc. ConeTec Inc. performed four (4) Cone Penetrometer Tests (CPT) over the project site, labeled in the report as CPT-01 through CPT-04. The CPTs were conducted to a depth of 40 feet. Based on the results of this exploration, the report discusses the general stratum types and soil properties as follows.

A. Subsurface Stratigraphy

Stratum A: Sands and sand mixtures, with gravelly sands only encountered in CPT-04, are indicated in the CPTu plots in the appendix of Schnabel's report. The data shows that this stratum was generally encountered at an approximate depth of 0.2 to 16 feet below ground surface for all CPT locations. Unit weight values ranged from approximately 111 to 124 pounds per cubic foot (pcf), friction angle values ranged from approximately 30 to 42 degrees, and undrained shear strength values ranged from approximately 0.4 to 1 ton per square foot (tsf).

Stratum B: Clays, silty clays, and silt mixtures are indicated in the CPTu plots. This stratum was generally encountered at an approximate depth of 16 to 28 feet below ground surface for all locations. Unit weight values ranged from approximately 111 to 114 pcf, friction angle values ranged from approximately 0 to 34 degrees, and undrained shear strength values ranged from approximately 0.2 to 1 tsf.

Stratum C: For all locations at an approximate depth of 28 to 30 feet below ground surface, a layer of sand mixtures, gravelly sand to sand, and sands were indicated in the CPTu plots. Unit weight values ranged from approximately 114 to 127 pcf, friction angle values ranged from approximately 37 to 43 degrees, and undrained shear strength values ranged from approximately 0.6 to 2 tsf. For this depth interval, for informational purposes, the empirical data for the undrained shear strength at locations CPT-03 and CPT-04 were calculated by ConeTec to be zero. The undrained shear strength value of zero was not considered to be an accurate value to use in the analysis and it was not considered.

For the remainder of Stratum C to termination, interbedded clays with silt mixtures and some sand mixtures are indicated in the CPTu plots, ranging in an approximate depth of 30 to 40 feet below ground surface for all locations. Unit weight values ranged from approximately 111 to 121

pcf, friction angle values ranged from approximately 27 to 35 pcf, and undrained shear strength values ranged from approximately 0.4 to 3 tsf.

B. Groundwater

According to the information provided in the Schnabel Engineering's Geotechnical Report, groundwater was encountered in each of the four (4) CPT locations at depths of about 19 to 28 feet below the ground surface. The sounding logs in Appendix A of the report include groundwater observations obtained during the subsurface exploration.

The groundwater levels on the logs indicate the estimate of the hydrostatic water table at the time of the subsurface exploration. The final design should anticipate the fluctuation of the hydrostatic water table depending on variations in precipitation, surface runoff, pumping, tidal action, river levels, evaporation, leaking utilities, and similar factors.

7.4. Geotechnical Engineering Evaluation of Alternatives

The GeoStudio 2018 R2 computer program was utilized to perform the slope stability analysis. This program requires input of slope geometry, subsurface stratigraphy, and material properties to determine the most stable slope for each design alternative. The stability of the slope is measured in terms of factors of safety. The minimum allowable factor of safety for the embankment stability, will be evaluated in accordance with the US Army Corps of Engineers Engineering Manual (EM) 1110-2-1902 Table 3-1. The US Army Corps of Engineers has no minimum factor of safety requirements for shoreline stabilization projects, but the slope stability analysis will be evaluated in accordance to dam and levee criteria. The minimum factor of safety was evaluated as 1.3 for end of construction and 1.5 for long term conditions.

The Norfolk District, Hydrology and Hydraulics Engineering (H&H) Section provided the Geo-Environmental Engineering Section (Geo) with Light Detection and Ranging (LiDAR) profiles at various locations along the project site river bank. The data obtained from the LiDAR profiles were transferred into a Microsoft Excel spreadsheet by the H&H Section and were graphed to observe the behavior of the slopes by the Geo Section. As shown in **Figure 7.1**, several profiles were evaluated, and Arc 5 was selected by the Geo Section for the analysis of the alternatives based on the height and steepness of the slope. The location of Arc 5 is shown in **Figure 7.2**.

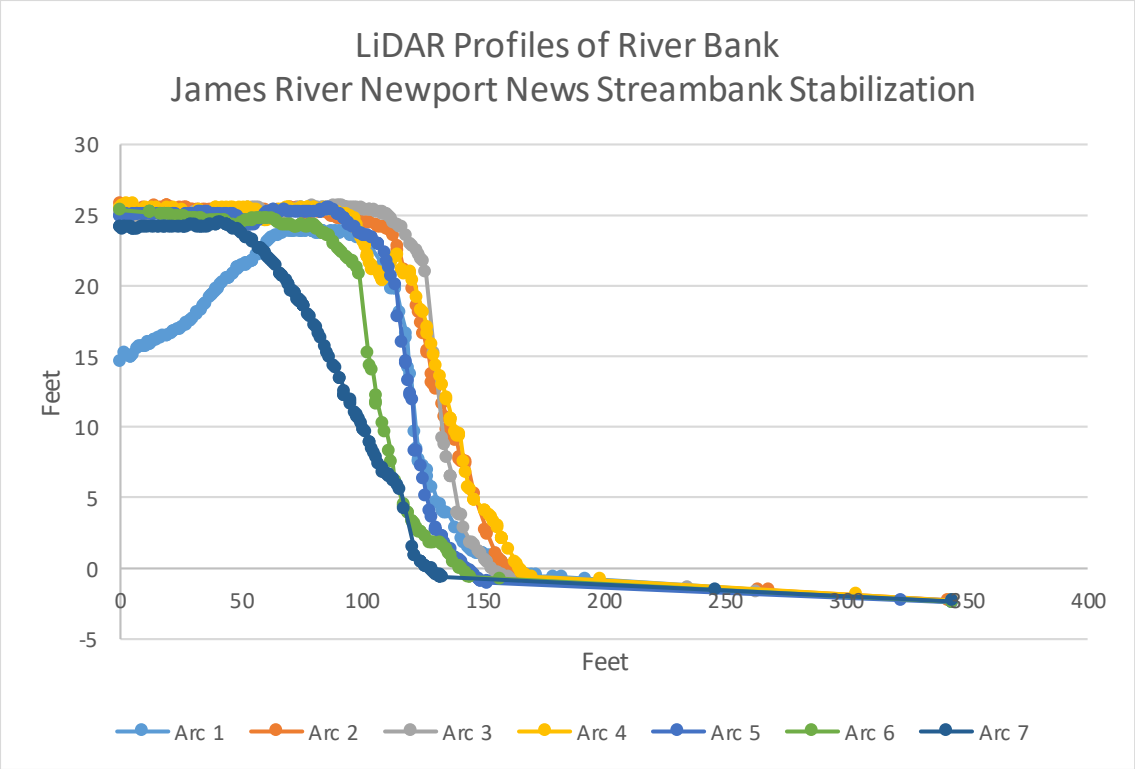

Figure 7.1 LiDAR River Bank Profiles

Figure 7.2 Location of river bank profiles Arc 1 through 7

The provided Geotechnical Engineering Data Report and the James River Bank Stabilization Alternative Analysis Report were used to generalize the subsurface soil properties for the project site. The raw CPT data provided in Appendix B CPT DATA TABLES of the report were exported into Microsoft Excel and interpolated. Table 2-2 on page 2-13 of the James River Bank Stabilization Alternative Analysis Report, provided CH2MHILL's recommendations for depth of the stratums, their USCS Classifications, and each soil stratum's moist unit weight, angle of internal friction, and undrained shear strength. After further evaluation of the data, it was determined that the report's interpretation of each stratum's USCS Classification would be used, but each stratum's depth, soil properties for the soil unit weight, angle of internal friction, and undrained shear strength would need to be re-interpreted. The subsurface conditions and soil parameters from the report were generalized and used in the slope stability analysis for Case 1, undrained condition end of construction as shown in **Table 7.1**. For the Case 2, drained condition long term analysis, phi angle values were interpolated from references by assuming the soils contained a low swell potential with a plasticity index less than 25 as referenced in Table 4-1 of TM 5-818-7 Foundations in Expansive Soils 01 September 1983. Because the CPT undrained shear strength value was interpolated to be 500 psf for the CL-ML layer from 17 to 27 feet, a lower phi angle value was assumed. Low drained shear strength values were also assumed for the ML Mixture and CL-ML layers.

Table 7.1 Generalized Subsurface Soil Properties Used in GeoStudio Analysis

Soil Type (USCS)	Depth Below Ground Surface (feet)	Elevation (feet)	Moist Unit Weight (pcf)	Phi Angle (degrees)	Undrained Shear Strength (psf)	*Phi Angle (degrees)	Assumed Drain Shear Strength (psf)
				Case 1: Undrained Condition End of Construction	Case 1: Undrained Condition End of Construction	Case 2: Drained Condition Long Term	Case 2: Drained Condition Long Term
SW to SM	0 to 16	+9 to +25	117	34	0	34	0
ML Mixture	16 to 17	+8 to +9	114	0	1,000	25	10
CL-ML	17 to 27	-2 to +8	111	0	500	22	15
ML-SM	27 to 29	-4 to -2	114	30	0	30	0
Sand and Gravel	29 to 31	-6 to -4	120	34	0	34	0
CL-ML2	31 to 38	-13 to -6	114	0	1,200	26	20
ML-SM2	38 to 40	-15 to -13	115	27	0	27	0
Sand and Gravel2	40 to 41	-16 to -15	117	32	0	32	0

*EM 1110-2-1913 Design and Construction of Levees, 31 March 1978, Figure 3-2 page 3-7. Mississippi River Soil Data.

Additional soil and rock materials were required to analyze the four alternative designs in the GeoStudio program. Compacted silty sand (SM) material was assumed to be used to fill for areas of the slope that would be required to be brought to finished grade. Poorly graded sand (SP) material was assumed to be used for vegetated areas at the bottom of the slope and behind the rock sill structure for the living shoreline alternative. The VDOT Class III riprap and VDOT No. 1 Stone materials were both selected by the Norfolk District H&H Section for the design of the stone revetment and rock sill structures. Please refer to Section 8 of the Engineering Appendix for stone size design assumptions. VDOT No. 1 Stone material is used as bedding stone beneath the VDOT Class III riprap of the revetment and rock sill structures. These additional soil and rock material properties were interpolated from the NAVFAC Design Manual page 7.2-39 Table 1 and the 4.6.3 Rock Density in the Riprap Construction Guide as indicated below in **Table 7.2**.

Table 7.2 Soil Properties for Additional Materials Used in GeoStudio Analysis

Soil Type (USCS)	Unit Weight (pcf)	Phi Angle (degrees)
**Compacted SM	125	32
*SP (sand fill)	100	32
*VDOT No. 1 Stone	125	37
***VDOT Class III Riprap	140	42

*NAVFAC Design Manual 7.02 page 7.2-39 Table 1.

**Virginia Polytechnic Institute and State University, Shear Strength Correlations for Geotechnical Engineering, by J.M. Duncan, R.C. Horz, and T.L. Yang

***4.6.3 Rock Density in the Riprap Construction Guide. Province of British Columbia Ministry of Environmental, Lands, and Parks. March 2000. <http://www.env.gov.bc.ca/wsd/public safety/flood/pdfs word/riprap guide.pdf>

When entering the Arc 5 profile into the GeoStudio computer program, the southern edge of River Road was assumed to be at point x=0 feet and y=25 feet. The starting height for the Arc 5 profile was interpolated from the LiDAR data to be elevation +25 feet. The design for each alternative began at a 10-foot distance from the southern edge of River Road. This minimum 10-foot distance requirement was provided to the Norfolk District design team by the City of Newport News.

The Norfolk District H&H Section provided the Geo Section with preliminary Computer Aided Design and Drafting (CADD) drawings for each alternative. These preliminary designs were input into the GeoStudio computer program for the slope stability analysis. Refer to section 9.0 Alternative Design Considerations for a more detailed description of each alternative design. The maximum distance at which the outer most edge of the shoreline stabilization system could extend offshore was proposed to be 30 to 40 feet from the toe of the shoreline. This would keep the system within the limits of the ordinary high water (OHW) boundary.

For each alternative analysis, the designs began with a 2 horizontal to 1 vertical (2H:1V) design slope and the horizontal component of the slope was gradually increased if the minimum factor of safety requirements provided in Table 3-1 of EM 1110-2-1902 Slope Stability, 31 October 2003 were not generally satisfied. Two conditions were evaluated for each alternative. The first condition (Case 1) evaluated if the designed slope for undrained soil conditions generally met the minimum factor of safety criteria of 1.3 for end of construction. For this condition the groundwater level in the river bank was assumed to be at elevation +5 feet based on the groundwater information provided in the Geotechnical Engineering Data Report dated May 10, 2013, and the river elevation was determined to be at the Mean Higher High Water level (MHHW) +1.24 feet elevation as provided by the Norfolk District H&H Section. The phreatic line was assumed to extend through to the top surface of the design slope at elevation +5 feet then exits at MHHW elevation +1.24 feet. Case 2 evaluated the designed slope under drained consolidated soil conditions, and evaluated if the slope generally met the minimum factor of safety criteria of 1.5 for long term conditions. For this condition the groundwater level in the river bank was assumed to be similar to that as described for Case 1. The results of the GeoStudio slope stability analysis are provided in **Table 7.3**.

Table 7.3 GeoStudio Slope Stability Analysis Results

Alternative	Stable Design Slope (Horizontal:Vertical)	Factor of Safety 1.3 (Case 1)	Factor of Safety 1.5 (Case 2)
Rock Sill with Vegetated Berm	3H:1V	1.551	1.546
Stone Revetment	3H:1V	1.432	1.423
Stone Revetment with Vegetated Berm	3.5H:1V	1.741	1.459
Living Shoreline with Vegetated Berm	4H:1V	1.775	1.603

The factor of safety requirements in Table 3-1 of EM 1110-2-1902 are used for the design of new embankment dams. Section 3-4 of the EM also provides criteria for structures indicated as "Other Slopes". The criteria provided in Table 3-1 for new embankment dams take into consideration greater uncertainties and consequences of failure. When taking into consideration the uncertainties and consequences of failure for the purposes of this project, these concerns are considered to be smaller. EM 1110-2-1902 states that when the uncertainty and consequences of failure are both small, it is acceptable to use smaller factors of safety, on the order of 1.3. If the factor of safety values provided in **Table 7.3** for each alternative do not meet the minimum factors of safety requirements presented in Table 3-1 of EM 1110-2-1902, the analysis values are considered to be acceptable in accordance with section 3-4 "Other Slopes" of EM 1110-2-1902.

7.5. Geotechnical Engineering and Construction Considerations

In order for the alternative designs to generally meet the minimum factor of safety requirements for stability as stated in EM 1110-2-1902 Table 3-1, the minimum stable design slopes for each alternative are provided in **Table 7.3**.

Although a Geotechnical Engineering Data Report was completed by Schnabel in 2013 and provided by the City of Newport News, it is recommended that another geotechnical exploration be performed during the design phase. Although the 2013 report provides in-situ soils data, additional Standard Penetration Testing (SPT) in accordance with American Society for Testing and Materials (ASTM) D1586 and soils laboratory testing is recommended to confirm the results provided by Schnabel in the 2013 report. SPT locations should also be performed to a deeper depth of at least 60 feet in the embankment area. Cone Penetration Test (CPT) locations in accordance with ASTM D5778 should also be performed in the river within proximity of the location of the proposed rock sill areas to identify underlying soil conditions. Any potential softer

soils should be identified for settlement issues that are encountered during the design phase. Settlement of the shoreline structure should be considered as a part of the design phase.

Prior to construction the river bank slopes, starting 10 feet beyond the southern edge of River Road, the Contractor will be required to be grubbed of all trees, vegetation, stumps, and roots. Due to some large trees, roots may extend two to three feet below the ground surface. Debris removal will be required within the project limits of the river bank slopes and up to approximately 40 feet offshore from the shoreline or as shown in the design drawings. The Contractor shall expect to encounter debris as described in section 8.1 Site Description of this report. The Contractor shall also anticipate the removal of dilapidated groins and remains of old piers within the project limits.

It is recommended that biodegradable erosion control blankets be placed overtop the river bank soils of the vegetated berms to prevent further erosion of the soils.

If it is determined to use the VDOT No. 1 stone for bedding material, it is recommended that a non-woven filtration geotextile be placed beneath the VDOT No. 1 bedding stone for the revetment and rock sill structures. As a proposed revision to the design of the rock sill structure during the design phase, Alternative 1 shown in **Figure 7.3**, the non-woven geotextile fabric should extend up to meet the surface of the berm to prevent berm erosion (erosion concern indicated by the red circle in the figure). Additional No. 1 bedding stone and Class III Rip Rap can be placed on top the geotextile fabric as required to raise the elevation of the top of the sill. The geotextile fabric may also need to be keyed into the slope to secure in place. During the design phase, a filter check should be performed to verify that the VDOT No. 1 bedding layer below the Rip Rap (proposed VDOT Class III) will not erode from between the open void spaces of the Rip Rap. A non-woven geotextile fabric is recommended to be placed between the foundation soils and the VDOT No.1 bedding stone to prevent possible erosion of the foundation soils. If the non-woven geotextile fabric is used as recommended, a filter check may not be necessary between the VDOT No.1 stone and the foundation soils.

Another alternative material to substitute in place of the VDOT No. 1 bedding stone would be filter mattresses. Filter mattresses could be constructed on site by a manufacturer, and a non-woven geotextile could also be attached to the bottom of the mattress. The non-woven geotextile, used for both possible design cases, will prevent erosion of the finer soil particles beneath the stone on the river bottom and berm. If the filter mattress is determined to be used for the design, a filter check would not be required for the bedding stone since the geogrid will secure the stone in the mattress. The stone chosen to be placed within the geogrid shall be greater in diameter than the size of the geogrid openings.

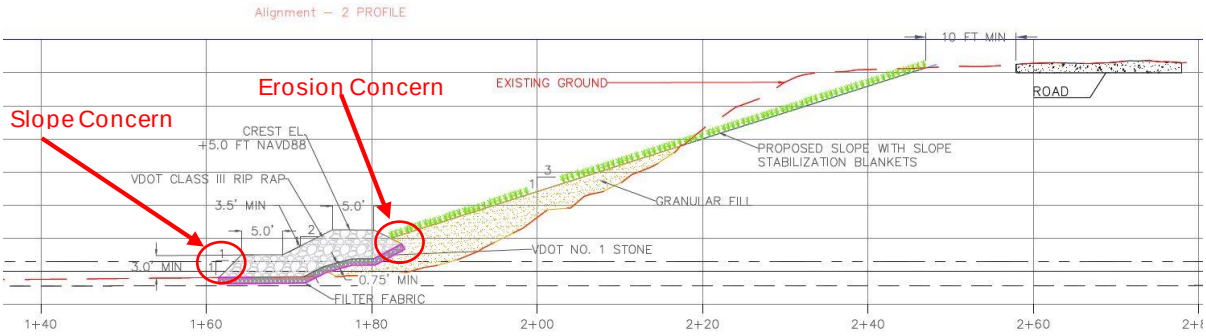

Figure 7.3 Alternative 1 Design Concerns

Another design concern indicated in **Figure 7.3** above (Slope Concern) are the slope dimensions of 1H:1V on the toe of the rock sill for Alternative 1. For a more stable slope on the toe of the rock sill, it is recommended that the 1H:1V slope be revised to a minimum slope of 2H:1V during the design phase.

Although Alternative 3 was not selected as the project's tentatively selected plan (TSP), a revision to the design its current design is suggested. A non-woven geotextile fabric should be placed where the VDOT Class III Rip Rap comes into contact with the berm soils to prevent erosion. Refer to red circle area indicated in **Figure 7.4** (Erosion Concern). Otherwise, wave runoff will overtop the Rip Rap, or if rain water or groundwater seeps into the granular fill, the seepage water will carry granular fill particles into the rip rap and undermine the vegetated slope.

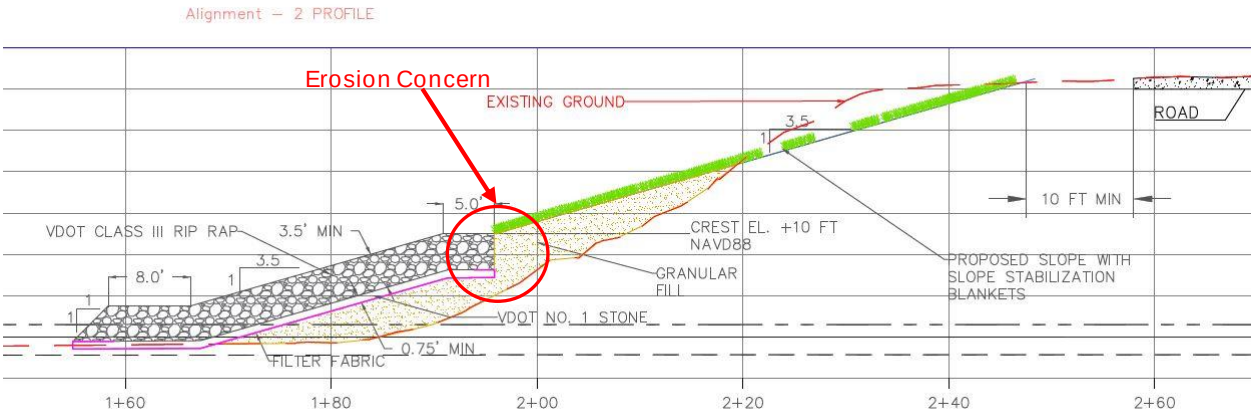

Figure 7.4 Alternative 3 Design Concern

Excavation and construction near and/or on top of the river bank may result in failure of the natural river bank. The Contractor shall proceed with extreme caution and will be required to provide whatever means necessary to prevent failure of the natural river bank. The Contractor shall take into consideration if construction may need to proceed from the toe of the bank until the bank is adequately supported.

The soils which will be excavated on-site may be re-used but shall only be re-used as backfill in areas on the natural river bank in accordance with the satisfactory materials requirements to

be provided in the design specifications. Unsatisfactory materials will be required to be removed offsite by the Contractor.

On-site excavated soils to be re-used and imported satisfactory soils shall be compacted with suitable compaction equipment 90% of maximum laboratory value for the standard moisture density relationship in accordance with ASTM D698.

Groundwater was encountered in the Geotechnical Engineering Data Report dated May 10, 2013 at approximate depths of 19 to 28 feet below the ground surface of the river bank. As indicated in the report, the final design should anticipate the fluctuation of the hydrostatic water table depending on variations in precipitation, surface runoff, pumping, tidal action, river levels, evaporation, leaking utilities, and similar factors. It is recommended, by the Norfolk District Geo Section, that excavations will encounter groundwater and seepage water which will require dewatering methods such as well points or wells to lower the groundwater and allow construction under dry conditions. If the groundwater is not properly controlled the soil may begin to slough and unravel during the slope excavation. The Contractor shall also consider the fluctuating river levels which may require construction of temporary cofferdam.

At this time, it is our understanding that laydown areas will be available for the Contractor to utilize during construction. Proposed laydown locations are identified in sections of this feasibility report.

The Contractor will be responsible for Contacting Miss Utility of Virginia and verifying that all utilities are located prior to construction. The Contractor shall maintain all utility markings through all phases of construction.

The Contractor will be utilizing public roads to access the project area for construction. The Contractor shall take care not to damage the roadways or utilities. Any damage caused to the roadways and utilities shall be repaired by the Contractor to new or existing condition at no additional cost to the government. All roadway and utility repairs shall receive approval from the City of Newport News prior to completion.

The Contractor shall take into consideration to allow property owners to access their properties at all times. Traffic control may need to be taken into consideration by the Contractor. The roadway shall have enough space to allow emergency vehicles to access the properties.

The Contractor will be constructing the shoreline stabilization system near property owners' structures, such as but not limited to, an existing pier. The Contractor shall take care not to damage existing property owners' structures. Any damage caused to existing structures shall be repaired by the Contractor to new or existing condition at no additional cost to the property owner.

It is recommended that the Contractor perform a pre-construction and post construction survey to document all existing conditions prior to construction and after construction. Detailed requirements for these surveys should be provided in the specifications during the design phase for the Contractor to photo document the conditions and complete regular reports.

8.0 Alternative Design Considerations

8.1. Introduction

As it was mentioned in **4.3 Description of the Selected Plan Alternative**, Alternative 1- Rock Sill with Vegetated Slope, is the Selected Plan Alternative, however the following paragraphs detail the engineering design consideration for all four alternatives in the focused array for information. For all four alternatives, the following were assumed: a minimum design significant wave height of 3.5 ft with a peak period of 3.7 s and storm surge of 3.8 ft NAVD88, corresponding to a return interval of 1 year (events that have a 100% of occurrence every year). However, the alternatives are also checked against wave climate similar to Hurricane Isabel (2003), significant wave height of 4.6 ft with the peak period of 4.1 and surge of 6.3 ft NAVD88 for resiliency.

As discussed in **4.0 Alternatives**, there are three general types of shoreline erosion control structures: “hard”, “soft”, and “hybrid.” For this site, both “hard” and “hybrid” erosion control alternatives were considered. The “hard” erosion control alternatives include rock revetments and rock sills designed to varying degrees of protection while the “hybrid” erosion control alternative is a “living shoreline” which combines offshore rock sills with sand fill and wetland planting. Rock (sometimes known as riprap) sills and revetments have a sloped and roughened face that decrease wave reflection and associated bottom scour. Rock material is extremely durable and may persist for 50 years or longer.

According to the City of Newport News, a minimum of 10 ft must be maintained from the top of the bank slope of the erosion control alternative and the adjacent roadway. In order to minimize seaward impact of the all the alternatives, for the 10% design it was assumed that the top of the bank slope for each of the alternatives would be set at 10 ft from the roadway. During the Preconstruction Engineering and Design (PED) phase this distance can be evaluated further and potentially adjusted to create a larger buffer between the top of slope and the roadway. The 10% drawing for each of the Alternatives is shown in **Attachment 3: Focused Alternatives 10% Drawings**.

8.2. Alternative 1- Rock Sill with Vegetated Slope

This Alternative comprises a low rock sill that will protect against the most frequent erosive events at the base of a vegetated slope composed of biodegradable erosion control blankets. Biodegradable erosion control blankets are typically made of biodegradable materials which are designed to hold seeds and soil in place until vegetation is established. This alternative is a similar design used in adjacent properties to the project shoreline. The crest elevation of the low crested sill is set at +5.0 ft NAVD88, which will protect against high tide when considering water levels and overtopping. The low crested sill would be overtopped during severe storm events similar to Hurricane Isabel. However, the vegetation and grading of the slope behind would provide some protection against erosion during these events.

Armor stone weights for the proposed rock sills were selected using the Breakwater Design Using Hudson and Related Equations module as presented in CEDAS: ACES. CEDAS stands for the Coastal Engineering Design & Analysis System and the ACES tool, within CEDAS, is an

interactive computer-based design and analysis system in the field of coastal engineering containing six functional areas: wave prediction, wave theory, wave transformation, structural design, wave run-up, and littoral processes. This application provides estimates for the armor weight, minimum crest width, armor thickness, and the number of armor units per unit area of a breakwater using Hudson and related equation. These equations were used to compute the minimum required median armor weight as a function of:

- Armor Unit Weight (Wr)
- Wave Height (Hi)
- Stability coefficient (KD)
- Layer coefficient (k delta)
- Average porosity (P)
- Cotangent of structure slope (cotθ)
- No. of units comprising thickness of layer (n)

For the above conditions, the design parameters for the breakwaters were determined to be as followed:

- Single armor unit weight (w)
- Minimum crest width (B)
- Average layer thickness (r)
- No single armor units per unit surface area (Nr)

Based on preliminary estimates using the Hudson equation, the rock sill design would be constructed using armor stone/rip rap with D_{50} weight = 750 lbs (D_{50} = 1.5 -1.75 ft), a crest width of 5 ft, and a minimum armor thickness of 3.5 ft (equal to $2D_{50armor}$). This size stone is in the range of VDOT (Virginia Department of Transportation) Class III armor stone/rip rap (VDOT 2016).

Case: Breakwater design (3.5 ft wave)

Breakwater Design Using Hudson and Related Equations

Armor unit weight (Wr):	165.000	lb/ft³
Wave height (Hi):	3.500	ft
Stability coefficient (KD):	1.200	
Layer coefficient (k delta):	1.020	
Average porosity (P):	37.000	%
Cotan of structure slope (cot theta):	2.000	
No. of units comprising thickness of layer (n):	2.000	
Single armor unit weight (w):	749.189	lb
Minimum crest width (B):	5.06707	ft
Average layer thickness (r):	3.37805	ft
No single armor units per unit surface area (Nr):	468.705	per 1000 ft²

Figure 8.1 Results from CEDAS: ACES Run

Class III stones shall consist of stones which weigh from 500 pounds to 1,500 lbs each with at least 50% weighing more than 900 pounds and approximately 10% weighing less than 500 pounds (VDOT 2016).

Figure 8.2 shows one of ACES results completed to evaluate overtopping at the NACCS 1 year event. This determined that the rock sill would overtop with still water levels and wave runup combined.

Case:

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Rough
Rate estimate: Runup and Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.260	ft	Runup for significant waves (R):	2.854	ft
Peak wave period (T):	3.700		Onshore wind velocity (U):	20.000	ft/sec
COTAN of nearshore slope (cot phi):	100.000		Deepwater significant wave (Ho):	2.258	ft
Water depth at structure toe (ds):	4.000	ft	Relative height (ds/Ho):	1.772	
COTAN of structure slope (cot theta):	2.000		Wave steepness (Ho/gT^2):	0.005	
Structure height above toe (hs):	5.000	ft	Overtopping coef(alpha):	0.072	
Rough slope coefficient(a):	0.956		Overtopping coef(Q*o):	0.004	
Rough slope coefficient(b):	0.398		Overtopping rate (Q):	0.196	ft^3/s-ft

Figure 8.2 Results from CEDAS: ACES Run for Wave Runup and Overtopping at NACCS 1 YR Event

The preliminary design also includes a 5 ft wide toe for the sill, a 0.75-1 ft thick bedding layer (from CEM VI-5-11 where bedding layer thickness = 0.5 $D_{50armor}$) under the armor stone composed of VDOT No. 1 aggregate stone (100% stones finer than 4 inch sieve and maximum 5% of stones finer than ¾ inch sieve), and geotextile fabric beneath the bedding layer. According to the slope stability analysis (See **Geotechnical Engineering Evaluation of Alternatives**) the minimum slope inclination required for this alternative is 1V:3H.

8.3. Alternative 2- Full Rock Revetment

This Alternative 2 consists of a two-layer rock revetment placed at a 1V:3H (See **Geotechnical Engineering Evaluation of Alternatives**) on the entire bank between approximately -1 ft and +25 ft NAVD88 (existing top bank elevation). According to **Table 5.5**, a revetment of this size will protect the shoreline against all potential extreme storm events from 1 year storms to 10,000 year storms. At an elevation of +25 ft NAVD88 this revetment will also potentially be resilient against 100 years of SLC to the year 2122 for 10,000 year extreme storm events. Based on preliminary estimates, the design would be constructed using VDOT (Virginia Department of Transportation) Class III armor stone/rip rap with a minimum armor thickness of 3.5 ft and crest width of 5 ft. The preliminary design also includes an 8 ft wide toe for the revetment to protect against scour, a 0.75 – 1 ft thick bedding layer under the armor stone composed of VDOT No. 1 aggregate stone, and geotextile fabric beneath the bedding layer.

8.4. Alternative 3- Partial Rock Revetment with Vegetated Slope

This Alternative 2 consists of a partial two-layer rock revetment placed at a 1V:3.5H (See **Geotechnical Engineering Evaluation of Alternatives**) on the bank between approximately -1 ft and +10 ft NAVD88. A revetment with a +10 ft elevation will protect against storms with a 20 percent probability of occurrence (5 year) with wave run-up and water levels considered. Based on preliminary estimates, the design would be constructed using VDOT (Virginia Department of Transportation) Class III armor stone/rip rap with a minimum armor thickness of 3.5 ft and crest width of 5 ft. The preliminary design also includes an 8 ft wide toe for the revetment to protect against scour, a 0.75 -1 ft thick bedding layer under the armor stone composed of VDOT No. 1 aggregate stone, and geotextile fabric beneath the bedding layer. The remaining slope from +10 ft to +25 ft NAVD88 would be stabilized with biodegradable erosion control blankets.

8.5. Alternative 4- Living Shoreline with Vegetated Slope

This Alternative includes a living shoreline featuring a low crested offshore rock sill breakwaters and approximately 40 FT wide strip of wetland vegetation behind the sills. A salient is the preferred shoreline response for a detached breakwater system for the Corp as stated in EM 1100-2-1100/Coastal Engineering Manual (CEM) and EM 1110-2-1617 “Coastal Groins and Nearshore Breakwaters.” This is to allow longshore sediment transport to continue to move through the project area to downdrift beaches. Salient are likely to predominate when the breakwaters are sufficiently far from shore, short relative to incident wavelength, and relatively transmissible (low crested or large gaps with low sediment input). Wave action and longshore currents tend to keep the salient from connecting to the structure. Figure 8.3 displays the design variables considered for the preliminary design of the offshore sills. There are three dimensionless ratios, Y/d_s, L_s/L_g, and L_s/Y which are important to the design of breakwaters that will form. Short breakwaters at greater distances from the shore tend to favor salient formation.

The Coastal Engineering Manual (CEM) states that permeable structures systems that are partly submerged and have large gaps will help minimize the chance of tombolos forming, favoring a salient system. **Table 8.1** (Table 4-4 from the EM 1110-2-1617) helps guide on which L_s/Y ratio should be targeted to get a salients. For the preliminary design $L_s/Y < 1.5$ was used as the target ratio.

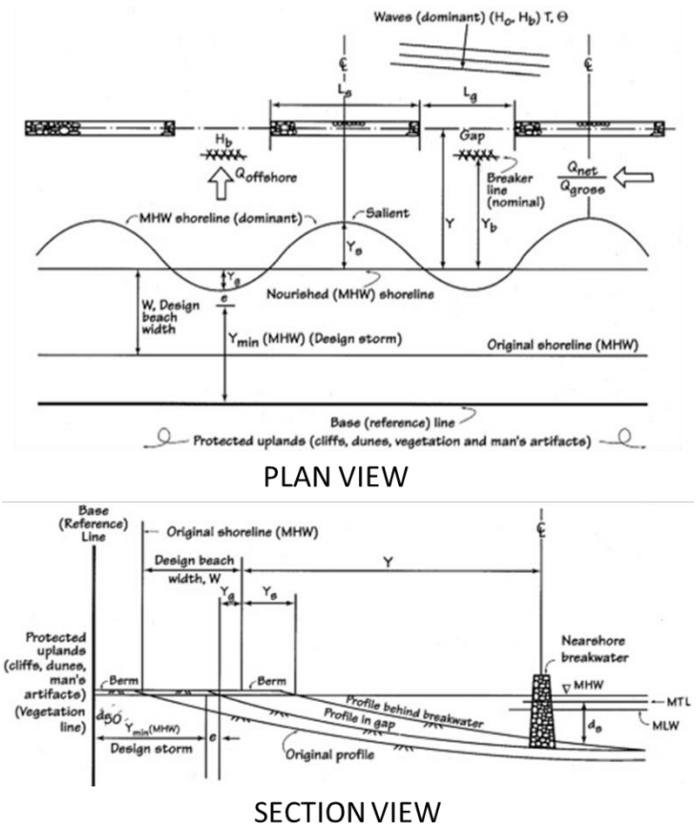

Figure 8.3 Salient Formation Diagram (Image courtesy of CEM V-3-21).

Table 8.1 Conditions for the Formation of Salient (Table V-3-6 from the CEM)

Conditions for the Formation of Salients		
$L_g/Y < 1.0$	No tombolo	*Shore Protection Manual* (1984)
$L_g/Y < 0.4$ to 0.5	Salient	Gourlay (1981)
$L_g/Y = 0.5$ to 0.67	Salient	Dally and Pope (1986)
$L_g/Y < 1.0$	No tombolo (single breakwater)	Suh and Dalrymple (1987)
$L_g/Y < 2\ b/L_s$	No tombolo (multiple breakwater)	Suh and Dalrymple (1987)
$L_g/Y < 1.5$	Well-developed salient	Ahrens and Cox (1990)
$L_g/Y < 0.8$ to 1.5	Subdued salient	Ahrens and Cox (1990)

Based on the information provided in these references, several combinations for sill length, gap width, and distance offshore were considered for the offshore sills. The length of the shoreline where these would be placed was also a consideration. The preliminary design of the offshore sills as sills with a length (L_s) of 70 ft, gap width (L_g) of 30 ft, and distance of 50 ft offshore (Y) which results in a ratio $L_s/Y = 1.4$ which should form a salient. Plotted on **Figure 8.4** (Figure V-3-22 in the CEM), the combinations (assuming $d_s = 1.2$ ft, the assumed depth at the sill) show that the ratio Y/d_s and $L_s/L_g = 2.33$ also support the theory that the preliminary design should form salient.

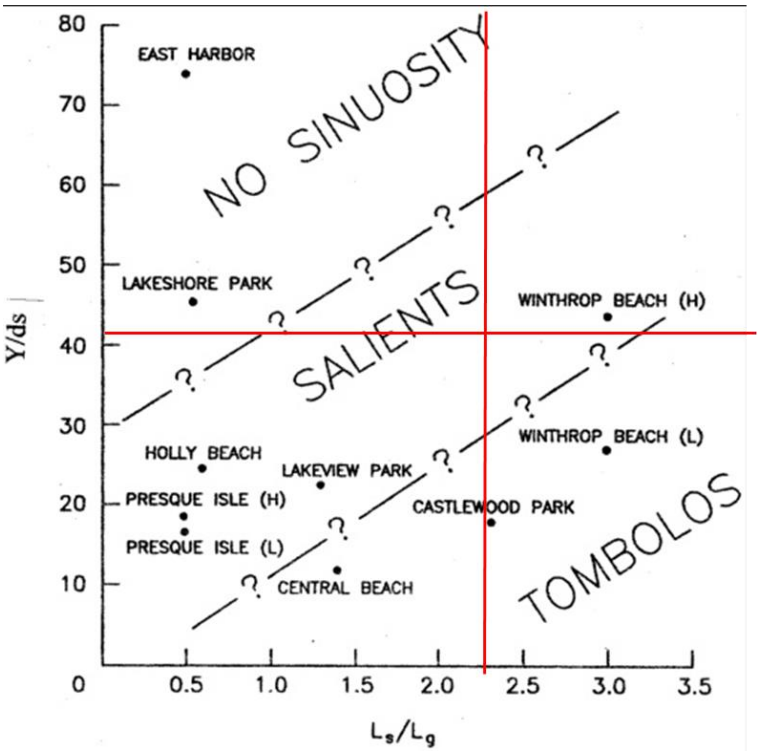

Figure 8.4 Dimensionless plot of nearshore breakwater projects for Y/d_s versus L_s/L_g.

Gaps are also required in the offshore sills to the area to be planted with wetland to be partially submerged during high tide, a requirement for the survival of intertidal wetland species such as *Spartina alterniflora*.

Based on preliminary estimates, the offshore rock sill design would be constructed using VDOT (Virginia Department of Transportation) Class III armor stone/rip rap with a minimum armor thickness of 3.5 ft and crest width of 5 ft. Class III stones shall weigh from 500 pounds to 1,500 lbs each with at least 50% weighing more than 900 pounds and approximately 10% weighing less than 500 pounds (VDOT 2016). The preliminary design also includes a 5 ft wide toe for the sill, a 0.75 - 1 ft thick bedding layer under the armor stone composed of VDOT No. 1 aggregate stone (100% stones finer than 4 inch sieve and maximum 5% of stones finer than ¾ inch sieve), and geotextile fabric beneath the bedding layer. Fill would be placed behind the wetlands from elevation +0.0 to +4.0 ft NAVD88 (on a 1V:10H slope), which are the heights used in a similar living shoreline project along the James River approximately 2.3 miles northeast of the project site at Kettle Pond (**Figure 8.5**). The slope landward of +4.0 ft NAVD88 would be filled to a 1V:4H slope (See **Geotechnical Engineering Evaluation of Alternatives**) and stabilized with biodegradable erosion control blankets.

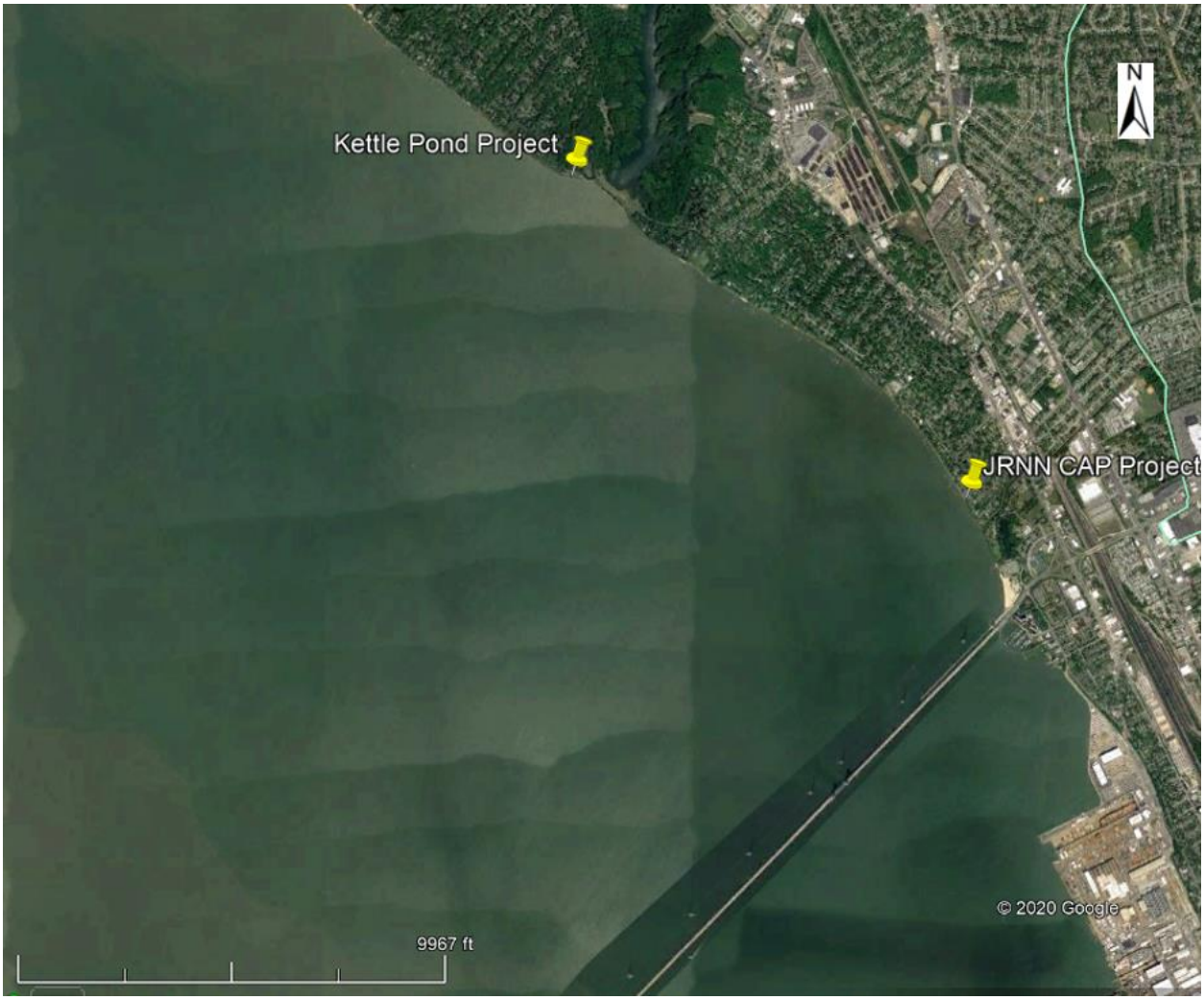

Figure 8.5 Location of Kettle Pond Relative to this Project

Similar to Alternative 1, the +5 ft elevation rock sill will protect against high tides. The low crested sill would be overtopped during severe storm events similar to Hurricane Isabel however the vegetation and grading of the slope behind would provide some protection against erosion during these events. Also, the success of a living shoreline depends on longshore sediment transport to continually help nourish the wetland salient, however many of the adjacent shorelines both north and south of the project site are already hardened with rock sills or revetments which would impact the amount of sediment available to help maintain the wetland salient. Sediment transport modeling, which was not part of this feasibility analysis, would be necessary to project the success of this alternative if constructed.

9.0 **Cost Analysis**

The cost of this project is explained in **Attachment 2: Cost Estimate Sub Appendix**. Since this is a CAP study and under 40 million dollars, a formal cost risk analysis using the Crystal Ball software was not required. Therefore, a cost contingency of 30% was used due to the feasibility (Class 4 estimate) phase of the project until an Abbreviated Risk Analysis can be performed within a reasonable time period.

10.0 Risk and Uncertainty

Risk is a measure of the probability (or likelihood) and consequences of uncertain future events. Risk analysis is a decision-making framework that explicitly evaluates the level of risk if no action is taken and recognizes the monetary and non-monetary costs and benefits of reducing risks when making decisions. A variety of variables and their associated uncertainties may be incorporated into the risk assessment of a coastal storm risk management study. Design conditions for major coastal and flood protection projects are often vague and design parameters contain large uncertainties. The primary factor of uncertainty is the confidence of the NACCS water levels and wave heights used in the design of the alternatives. Another risk to the project is the potential impacts of settlement after construction and sea level rise. The NOAA Relative Sea Level Change (RSLC) rates are subject to change and may add risk of increase or decrease.

Another factor of uncertainty is the condition of the existing rock protection on the private property with the pier. The analysis for this report assumes that the new rock sill constructed for Alternative 1 will tie into the existing rock sill. However, this also assumes that the private property owner will maintain their own rock sill. If the private property owner does not maintain their rock sill and it fails, this could make the USACE rock sill to be constructed for this project more vulnerable to failure itself.

11.0 Constructability

The primary constructability issue for this project is site access. Access by water will be difficult as the project site is located in shallow water. Access and staging by land will also be difficult as there is limited space available at the top of the slope bank on which to stage and stockpile materials and equipment without impacting the adjacent roadway. Construction in tight quarters tends to take longer, which increases costs, and may be more dangerous for the workers. Impacts to the roadways will need to be managed so as to ensure that the adjacent private property owners maintain access to their properties and driveways. A solution to this issue is potentially providing an offsite staging area to the contractor, one that is somewhat nearby the site where the majority of required equipment and materials can be staged which can be moved to the site as needed for construction. Therefore, at the site the contractor will only require smaller stockpiles**.** **Figure 11.1** shows potential laydown sites for the contractor to use which are all owned by the City of Newport News. The three areas total approximately 6,000 square feet. Area 2 is next to the project site.

Figure 11.1 Potential Laydown Areas

Working around the existing pier could also be difficult. If the pier is to remain, a lot of care will need to be taken in that area so as not to disturb the existing structure, especially while placing rock to tie into the existing rock protection on the private property with the pier.

Excavation and construction near and/or on top of the river bank may result in failure of the natural river bank. The Contractor shall proceed with extreme caution and will be required to provide whatever means necessary to prevent failure of the natural river bank. The Contractor shall take into consideration if construction may need to proceed from the toe of the bank until the bank is adequately supported.

Groundwater was encountered in the Geotechnical Engineering Data Report dated May 10, 2013 at approximate depths of 19 to 28 feet below the ground surface of the river bank. As indicated in the report, the final design should anticipate the fluctuation of the hydrostatic water table depending on variations in precipitation, surface runoff, pumping, tidal action, river levels, evaporation, leaking utilities, and similar factors. Excavations will encounter groundwater and seepage water which will require dewatering methods such as well points or wells to lower the groundwater and allow construction under dry conditions. If the groundwater is not properly controlled the soil may begin to slough and unravel during the slope excavation. The Contractor shall also consider the fluctuating river levels which may require construction of temporary cofferdam. To access areas of the river bank and river area that will require installation of geotextile that lie below MLLW, temporary cofferdams may also be required. Considerations for geotextile installation should be included in the design specifications during the design phase.

During construction, weather could also impact work and schedule. **Table 11.1** displays monthly anticipated adverse weather delays based on the National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the baseline for monthly weather time evaluations.

Table 11.1 Monthly Anticipated Adverse Weather Delay Work Days Based on (5) day Work Week

MONTH	WEATHER DAYS
January	10
February	9
March	8
April	6
May	7
June	7
July	9
August	6
September	5
October	5
November	6
December	9

12.0 Preconstruction Engineering and Design (PED) Consideration

During PED, design refinements will be conducted for the project based on new field investigation and analyses. This chapter will discuss, not only what information and field investigation will be needed to achieve a final design, but also what has been proposed in this study and how it may be changed or adjusted.

12.1. Updated Surveys

It is recommended that an updated topographic any bathymetric survey be performed during PED. New surveys may require an adjustment in the proposed sill and slope designs. The updated surveys should also make sure to take as many points as possible on the existing debris along the shoreline so as to help improve the cost estimate to remove this debris. The topographic survey shall also require locating utilities. A recent and comprehensive topographic and hydrographic survey will be required in order to develop construction plans and specifications. All surveys shall meet the requirements of EM 1110-2-1003 Hydrographic Surveying Manual (2013) and EM 1110-1-1005 Topographic Surveying Manual (2007).

12.2. Subsurface Geotechnical Exploration and Re-evaluation of Design Slope Stability

Although a Geotechnical Engineering Data Report was completed by Schnabel in 2013 and provided by the City of Newport News, it is recommended that another geotechnical exploration be performed during the design phase. Although the 2013 report provides in-situ soils data, additional Standard Penetration Testing (SPT) in accordance with American Society for Testing and Materials (ASTM) D1586 and soils laboratory testing is recommended to confirm the results provided by Schnabel in the 2013 report.

It is recommended that a minimum of four (4) SPT borings be performed within the proposed project limits of the river bank. The locations shall be evenly distributed over the proposed 600-foot length of the project site or over the project length as determined during the preconstruction design phase (PED). The minimum depth to which the borings shall extend is to 40 feet below ground surface. Soils laboratory testing shall consist a minimum of Atterberg limits in accordance with ASTM D4318, natural moisture content in accordance with ASTM D2216, and particle-size analysis of soils without hydrometer in accordance with ASTM D422 and D1140. If roadway repairs are determined to be required by the Contractor during the PED phase, California Bearing Ratio single point tests shall be required in accordance with ASTM D698 and the most recent version of the Virginia Department of Transportation (VDOT) Pavement Design Guide for Subdivision and Secondary Roads in Virginia.

After the geotechnical exploration data and soils laboratory results have been evaluated by the Geotechnical Engineer, a re-evaluation of the slope stability analysis shall be performed to verify that the design meets the factor of safety requirements in US Army Corps of Engineers Engineering Manual EM 1110-2-1902 Table 3-1.

12.3. Design Refinements

The assumptions made about the design conditions (wave conditions and water levels) should be reevaluated during PED and possibly updated as new SLR rates are provided through NOAA. The level of protection of the rock sill should also be reevaluated and refined to maximize the effectiveness of the rock sill against the most frequency erosive shoreline events. The toe design should be reviewed again to make sure that the design will minimize toe scour. Alternative materials should also be considered. For example, this study assumed biodegradable erosion control blankets for the vegetated slopes, but during PED other vegetated slope materials such as geotextile bags should be evaluated for their potential as an effective stabilization material. Additionally, marine mattresses could be a good product for the bedding layer and could potentially help increase the constructability of the project.

12.4. Existing Pier Assumptions

This study assumes that the existing pier is to remain in place and that the new rock sill will tie into the existing rock sill on the private property where the pier is located. This was an assumption made based on the site visit and conditions of the existing rock sill on the private parcel at the time of that site visit. During PED, more time should be taken to evaluate the condition of the private property rock sill (existing rock size and sill elevation) to confirm or refute that assumption. The PDT is also aware of existing requests for permits to construct two additional new private piers along the project shoreline which may be constructed prior to construction. If these piers are constructed during PED, the impacts of their construction on the project should be evaluated.

13.0 References

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14.0 List of Attachments

Attachment 1: James River Newport News Alternative Quantity Summaries

Attachment 2: Cost Estimate Sub Appendix

Attachment 3: Focused Alternatives 10% Drawings

Attachment 4: GeoStudio Slope Stability Analysis

Attachment 5: Schnabel Geotechnical Report Provided by Newport News

ATTACHMENT 1: JAMES RIVER NEWPORT NEWS ALTERNATIVE QUANTITY SUMMARIES

				Grading						
	Armor Rock [TONS]	**Bedding Stone [TONS]**	**Geotextile Filter Fabric [SY]**	**Cut [CY]**	**Fill [CY]**	**Extra Fill (trucked in if Cut volume isn't enough) [CY]**	**Slope Stabilization Area [SF]**	**Wetland Fill Material [CY]**	**# Wetland Plants**	**Estimated Demolition/Debris Removal Quantity [CY]**
Product:	(VDOT Class III)	(VDOT NO. 1)					Slope Stabilization Blanket	(Clean Sand Fill)	(Spartina Alterniflora and Spartina Patens)	
Alternative 1- Rock Sill with Vegetated Slope	2866	787	1596	3727	4258	531	49542			3590
Alternative 2- Full Rock Revetment	11980	2848	7459	6989	1766					718
Alternative 3- Partial Rock Revetment with Vegetated Slope	6329	1401	3909	3505	4747	1242	39239			3590
Alternative 4- Living Shoreline with Vegetated Slope	3023	613	1836	2450	9979	7529	62125	2376	20515	3590

Bulking factor for Cut: 1.2

Notes:
1) Assume all cut material can be used as fill where necessary.

ATTACHMENT 2: COST ESTIMATES

JAMES RIVER EMERGENCY STREAMBANK AND SHORELINE PROTECTION

Newport News, Virginia

Cap Section 14 of the 1946 Flood Control Act, as amended
Feasibility Report

COST ENGINEERING
APPENDIX
July 2021

Contents

SECTION 1. GENERAL

1.1 Guidance

1. ER 1110-2-1302, CIVIL WORKS COST ENGINEERING
2. ER 1110-2-1150, ENGINEERING AND DESIGN FOR CIVIL WORKS PROJECTS
3. ETL 1110-2-573, CONSTRUCTION COST ESTIMATING GUIDE FOR CIVIL WORKS
4. ECB 2007-17, APPLICATION OF COST RISK ANALYSIS TO DEVELOP CONTINGENCIES FOR CIVIL WORKS TOTAL PROJECT COSTS

1.2 Computer Aided Software

1. Micro-Computer Aided Cost Estimating System (MCACES), Second Generation (MII). MII 4.4.2
2. Abbreviated Risk Analysis Spreadsheet maintained by USACE Cost Center of Expertise, Walla Walla, WA.

SECTION 2. THE COST ESTIMATE REPORT

2.1 Report Description

This report is tentative in nature and is intended to be used for planning purposes only.

The estimate reflects the very early stages and concepts of design. The project area is located entirely within the City of Newport News, VA along the north bank of the James River, west of the James River Bridge (US Routes 17/258) and between New Market Creek and North Avenue, immediately adjacent to River Road. This civil works project includes stabilizing approximately 600 feet of riverbank along the James River, which has eroded over time. The resulting 25-foot high receding sandy bluff is an imminent threat to existing public facilities, causing continual loss of land, threatening exiting public utilities, including the adjacent River Road, electric, gas, communications, public water and sewer lines.

The Tentatively Selected Plan (TSP) was chosen based on economic factors indicating the greatest effectiveness. The Cost Estimate supporting the TSP is prepared using the MCACES, Second Generation (MII 4.4.2).

- MCACES references the MII English Cost Book 2016 as the source library for all construction based activities unless otherwise adjusted by the user.

- Equipment cost is referenced through the MII Equipment Region II – 2018 based on the EP 1110-1-8, Construction Equipment and Operation Expense Schedule 2018 version.

- MCACES Labor Defaults to Labor National – Seattle 2016. This data has been adjusted by the User to reflect region and Virginia labor rates as illustrated in the Department of Labor Wage Rates with a reasonable markup for payroll taxes, insurance, fringes and burdens. DOL Wage Rates are referenced in Section 8.

Based on economic evaluation, Alternative 1 was chosen as the TSP. This plan consists of constructing a continuous rock sill along parallel to the existing shoreline with a crest elevation of +5 ft NAVD88, crest width of 5 ft, and installing soil stabilization blankets from the top of the rock sill to the top of the shoreline bank on a 1V:3H slope to create a vegetated slope. It is estimated that this alternative will require approximately 2900 tons of VDOT Class III riprap, 800 tons of VDOT No. 1 Stone, 4300 CY of fill, 1600 SY of geotextile filter fabric, 700 CY of debris removal, and 35,000 SF of soil stabilization blankets.

The Current Working Estimate (CWE) for Construction of the TSP is approximately $1,488,403.00
These costs have been established to be the Baseline Cost Estimate for 1 October 2020 price levels. This value does not include contingency and escalation through the mid-point of construction, yielding the fully funded construction dollar value. Please see the TPCS for this value.

2.2 Estimate Qualifications

• The project construction cost estimate is prepared as though the Government were a prudent and well-equipped contractor estimating the proposed measures based on the current feasibility level design. The estimates are developed in as much detail as can be assumed based on the best information available at this time.

• The estimate adheres to the civil works work breakdown structure and was internally verified for quality control addressing cost, schedule and risk issues as practical. The estimate was developed based on a limited scope of work. Record of assumptions, construction methods, concerns, and unknowns are maintained within the MII estimate for each construction task.

• Parametric estimating techniques were used to develop the estimate. They are based on engineering parameters, historical information, practical construction practices and engineering principles. Project definition characteristics to include physical properties of the project site, functional purpose of the project and methods of construction were considered when developing the estimate.

• The structure of the cost estimate is planned so that all tasks are logical and are in accordance with appropriate plan of construction and good understanding of the project scope. A unit cost for each task is developed in an effort to increase the accuracy of the estimate and includes consideration given to site specific conditions as they pertain to constructability, biddability, and operability issues.

• The district developed a baseline cost estimate within which the project can be designed and constructed. An MII estimate was prepared with careful analysis of contingencies appropriate for each feature. No new surveys were collected to evaluate the final array of alternatives and only existing data was used. Up to date surveys and data will be required as the project moves forward towards solicitation.

• The estimated costs developed for this project are fair and reasonable to a well-equipped and competent contractor and include overhead costs and profit. Actual crew sizes, equipment and production rates that contractors have achieved previously on similar types of projects were implied in developing the unit costs for the work items contained in this project.

• Unit prices for construction features were developed using the MII Cost Book database and drew from expertise maintained within the Norfolk District.

2.3 Quantities

				Grading						
	Armor Rock [TONS]	Bedding Stone [TONS]	Geotextile Filter Fabric [SY]	Cut [CY]	Fill [CY]	Extra Fill (trucked in if Cut volume isn't enough) [CY]	Slope Stabilization Area [SF]	Wetland Fill Material [CY]	# Wetland Plants	Estimated Demolition/Debris Removal Quantity [CY]
Product:	(VDOT Class III)	(VDOT NO. 1)					Slope Stabilization Blanket	(Clean Sand Fill)	(Spartina Alterniflora and Spartina Patens)	
Alternative 1- Rock Sill with Vegetated Slope	2866	787	1596	3727	4258	531	49542			3590
Alternative 2- Full Rock Revetment	11980	2848	7459	6989	1766					718
Alternative 3- Partial Rock Revetment with Vegetated Slope	6329	1401	3909	3505	4747	1242	39239			3590
Alternative 4- Living Shoreline with Vegetated Slope	3023	613	1836	2450	9979	7529	62125	2376	20515	3590

Bulking factor for Cut: 1.2

Notes:
1) Assume all cut material can be used as fill where necessary.

2.4 Estimate Assumptions

- Bid Items and Tasks are based on the English 2016 MII Cost Book.
- Fuel rates are set at $2.24 for unleaded gasoline, $2.50 for Off-Road diesel, and $2.70 for on-road diesel.
- Prime Contractor's job office overhead is set at 15%, home office overhead is set at 10%, profit is set at 10%, and bond is set at 2%.
- It is anticipated that the prime contractor will be a site contractor performing the work herein for ALT 1.
- Construction Duration was estimated at 90 workdays – roughly 3 months, however additional time may be added for preconstruction submittals and closeout procedures as design develops.
- It is assumed that no temporary slope stabilization will be required during the demolition phase of the project.
- Preconstruction submittals and project closeout administration is anticipated to be included with the contractors HOOH. It is not detailed out in the construction estimate.
- It is not anticipated that a USACE field office will be required; therefore, no costs are included in the estimate for such.
- Construction Duration was estimated at 90 work days – roughly 3 months, however additional time may be added for preconstruction submittals and closeout procedures as design develops.

SECTION 3. CODE OF ACCOUNTS

3.1 Current Working Estimate (CWE)

The detailed CWE's are shown in the attached MCACES (Microcomputer Aided Cost Engineering System) files. The estimates are formatted into a Code of Accounts framework in compliance with Civil Works Breakdown Structure. The costs included under each Code of Accounts are described below.

3.2 Account 01: Lands and Damages

The costs included in this account were furnished by the Norfolk District's Real Estate Branch who assessed potential real estate impacts. A contingency of **20%** was established for this account by the Real Estate Division.

3.3 Account 16: Bank Stabilization

This plan consists of constructing a continuous rock sill along parallel to the existing shoreline with a crest elevation of +5 ft NAVD88, crest width of 5 ft, and installing soil stabilization blankets from the top of the rock sill to the top of the shoreline bank on a 1V:3H slope to create a vegetated slope. A contingency of **42%** was established for this account by the Abbreviated Cost Risk Analysis relative to the initial construction.

3.4 Account 30: Planning, Engineering, and Design

The costs included in this account were furnished by those responsible for performing each activity during PED. This account includes plans, specifications, cost estimates, field investigations, surveys, engineering during construction, environmental/physical monitoring, and project management. A contingency of **20%** was established for this account by the Abbreviated Cost Risk Analysis.

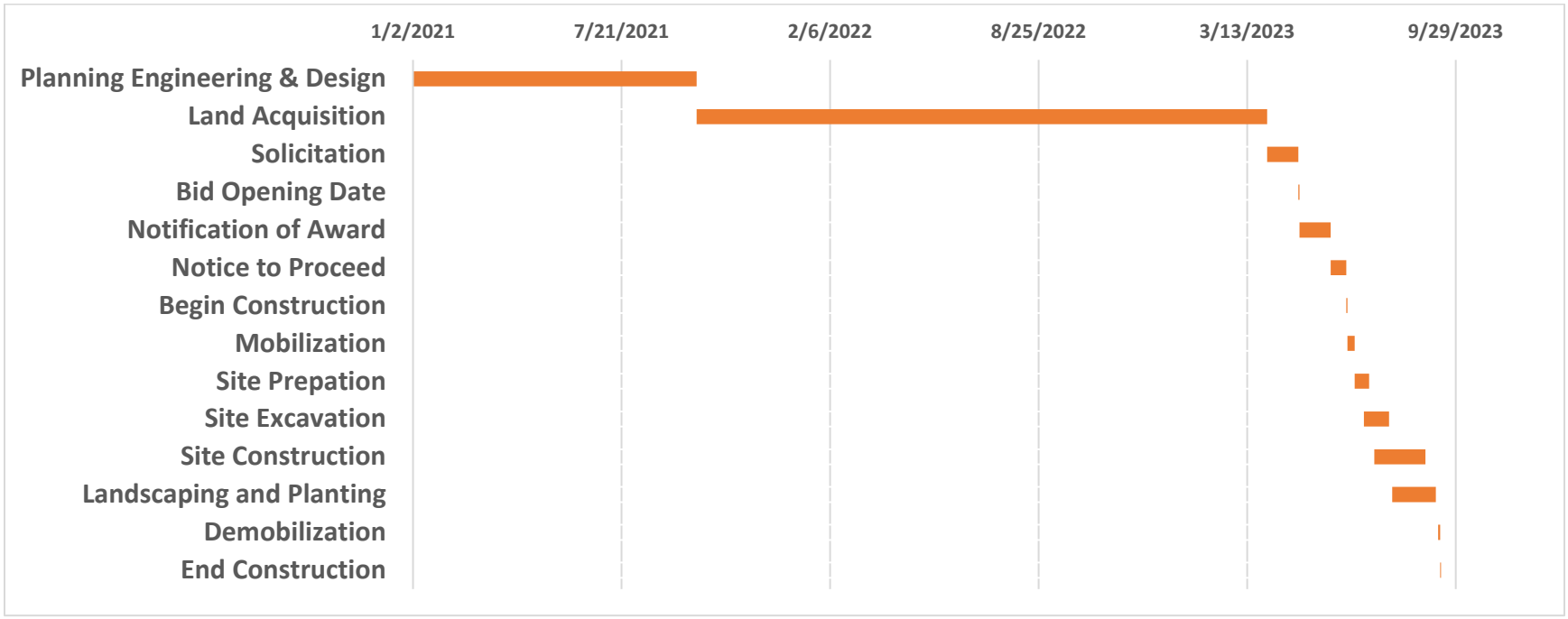
3.5 Account 31: Construction Management

This account includes supervision and administration of the contracts by construction management. A contingency of **22%** was established for this account by the Abbreviated Cost Risk Analysis.

SECTION 4
CONSTRUCTION SCHEDULE

Newport News James River Emergency Shoreline Stabilization

Assumed Schedule



SECTION 5
TOTAL PROJECT COST

****** TOTAL PROJECT COST SUMMARY ******

PROJECT: **James River Emergency Shoreline Protection**
PROJECT NO: **P2 # 452950**
LOCATION: **Newport News, Vriginia**

DISTRICT: **Norfolk District**
PREPARED: **7/9/2021**
POC: **CHIEF, COST ENGINEERING, Thomas Rice**

This Estimate reflects the scope and schedule in report; Report Name and date

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)			
						Program Year (Budget EC): 2021									
						Effective Price Level Date: 1-Oct- 20									
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	REMAINING COST ($K)	Spent Thru: 1-Oct-15 ($K)	TOTAL FIRST COST ($K)	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
02	RELOCATIONS	$1,488	$625	42%	$2,113		$1,488	$625	$2,113		$2,113	8.5%	$1,615	$678	$2,293
06	FISH & WILDLIFE FACILITIES		-			-						-			
			-			-						-			
			-			-						-			
	CONSTRUCTION ESTIMATE TOTALS:	$1,488	$625		$2,113		$1,488	$625	$2,113		$2,113	8.5%	$1,615	$678	$2,293
01	LANDS AND DAMAGES	$539	$108	20%	$647		$539	$108	$647		$647	5.3%	$568	$114	$681
30	PLANNING, ENGINEERING & DESIGN	$298	$60	20%	$358		$298	$60	$358		$358	3.7%	$309	$62	$371
31	CONSTRUCTION MANAGEMENT	$298	$66	22%	$364	0.0%	$298	$66	$364		$364	10.9%	$331	$73	$403
	PROJECT COST TOTALS:	$2,623	$858	33%	$3,481		$2,623	$858	$3,481		**$3,481**	7.7%	$2,822	$926	$3,748

_____ CHIEF, COST ENGINEERING, Thomas Rice

_____ PROJECT MANAGER, Richard Harr

_____ CHIEF, REAL ESTATE, Donna Carrier-Tal

_____ CHIEF, PLANNING, Susan Conner

_____ ACTING CHIEF, ENGINEERING, Wayne Miller

_____ CHIEF, OPERATIONS, XXX

_____ CHIEF, CONSTRUCTION, XXX

_____ CHIEF, CONTRACTING, Katya Oxley

_____ CHIEF, PM-PB, xxxx

_____ CHIEF, DPM, XXX

ESTIMATED TOTAL PROJECT COST:		**$3,748**
ESTIMATED FEDERAL COST:	**65%**	$2,436
ESTIMATED NON-FEDERAL COST:	**35%**	$1,312
22 - FEASIBILITY STUDY (CAP studies):		**$504**
ESTIMATED FEDERAL COST:	50%	$304
ESTIMATED NON-FEDERAL COST:	50%	$200
ESTIMATED FEDERAL COST OF PROJECT		**$2,740**

****** CONTRACT COST SUMMARY ******

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: James River Emergency Shoreline Protection
LOCATION: Newport News, Vriginia
This Estimate reflects the scope and schedule in report; Report Name and date

DISTRICT: Norfolk District
POC: CHIEF, COST ENGINEERING, Thomas Rice

PREPARED: 7/9/2021

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 22-Oct-20 Estimate Price Level: 1-Oct-20				Program Year (Budget EC): 2021 Effective Price Level Date: 1 -Oct-20								
				RISK BASED										
WBS NUMBER *A*	Civil Works Feature & Sub-Feature Description *B*	COST ($K) *C*	CNTG ($K) *D*	CNTG (%) *E*	TOTAL ($K) *F*	ESC (%) *G*	COST ($K) *H*	CNTG ($K) *I*	TOTAL ($K) *J*	Mid-Point Date *P*	ESC (%) *L*	COST ($K) *M*	CNTG ($K) *N*	FULL ($K) *O*
	PHASE 1 or CONTRACT 1													
16	BANK STABILIZATION	$1,488	$625	42.0%	$2,113		$1,488	$625	$2,113	2023Q4	8.5%	$1,615	$678	$2,293
	CONSTRUCTION ESTIMATE TOTALS:	$1,488	$625	42.0%	$2,113		$1,488	$625	$2,113			$1,615	$678	$2,293
01	LANDS AND DAMAGES	$539	$108	20.0%	$647		$539	$108	$647	2022Q4	5.3%	$568	$114	$681
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	$37	$7	20.0%	$44		$37	$7	$44	2021Q3	1.9%	$38	$8	$45
1.0%	Planning & Environmental Compliance	$15	$3	20.0%	$18		$15	$3	$18	2021Q3	1.9%	$15	$3	$18
8.5%	Engineering & Design	$126	$25	20.0%	$151		$126	$25	$151	2021Q3	1.9%	$128	$26	$154
1.0%	Reviews, ATRs, IEPRs, VE	$15	$3	20.0%	$18		$15	$3	$18	2021Q3	1.9%	$15	$3	$18
1.0%	Life Cycle Updates (cost, schedule, risks)	$15	$3	20.0%	$18		$15	$3	$18	2021Q3	1.9%	$15	$3	$18
1.0%	Contracting & Reprographics	$15	$3	20.0%	$18		$15	$3	$18	2023Q4	10.9%	$17	$3	$20
3.0%	Engineering During Construction	$45	$9	20.0%	$54		$45	$9	$54	2023Q4	10.9%	$50	$10	$60
1.0%	Planning During Construction	$15	$3	20.0%	$18		$15	$3	$18	2021Q3	1.9%	$15	$3	$18
	Adaptive Management & Monitoring			20.0%										
1.0%	Project Operations	$15	$3	20.0%	$18		$15	$3	$18	2021Q3	1.9%	$15	$3	$18
31	CONSTRUCTION MANAGEMENT													
10.0%	Construction Management	$149	$33	22.0%	$182		$149	$33	$182	2023Q4	10.9%	$165	$36	$202
7.6%	Project Operation:	$112	$25	22.0%	$137		$112	$25	$137	2023Q4	10.9%	$124	$27	$152
2.5%	Project Management	$37	$8	22.0%	$45		$37	$8	$45	2023Q4	10.9%	$41	$9	$50
	CONTRACT COST TOTALS:	$2,623	$858		$3,481		$2,623	$858	**$3,481**			$2,822	$926	**$3,748**

Filename: Alternative 1 - CAP TPCS - JRNN_7-19-2021 MCX Check TPCS

SECTION 6
TSP DETAIL ESTIMATE

James River Newport News Shoreline Protection - Alternatives
600 LF of Shoreline Protection
All work, exclusive of plat 272000261 (Pier).
There is no environmental remediation in this project.
Real Estate: Demolition Costs are included in Alternative 0 - No Action;
Right of way costs are included in Alternative 1

Estimated by	Keith R. Butler
Designed by	Norfolk District
Prepared by	Keith R. Butler
Preparation Date	10/28/2020
Effective Date of Pricing	10/1/2019
Estimated Construction Time	90 Days

Designed by
Norfolk District
Estimated by
Keith R. Butler
Prepared by
Keith R. Butler

Design Document	
Document Date	2/18/2020
District	Norfolk District
Contact	Keith R. Butler - 757-201-7133
Budget Year	2020
UOM System	Original

Direct Costs
LaborCost
EQCost
MatlCost
SubBidCost

Timeline/Currency

Preparation Date	10/28/2020
Escalation Date	1/1/2016
Eff. Pricing Date	10/1/2019
Estimated Duration	90 Day(s)
Currency	US dollars
Exchange Rate	1.000000

Costbook CB16EN: 2016 MII English Cost Book

Labor : General Decision Number: VA20200053 05/22/2020

x=wd is the website for current Davis Bacon & Service Labor Rates. Fringes paid to the laborers are taxable. In a non-union job the whole fringes are taxable. In a union job, the v

Labor Rates
LaborCost1
LaborCost2
LaborCost3
LaborCost4

Equipment EP18R02: MII Equipment 2018 Region 2

Region 02 - MIDEAST, (2018)

Sales Tax	6.00
Working Hours per Year	1,410
Labor Adjustment Factor	1.02
Cost of Money	1.13
Cost of Money Discount	25.00
Tire Recap Cost Factor	1.50
Tire Recap Wear Factor	1.80
Tire Repair Factor	0.15
Equipment Cost Factor	1.00
Standby Depreciation Factor	0.50

Fuel

Electricity	0.101
Gas	2.240
Diesel Off-Road	2.500
Diesel On-Road	2.700

Shipping Rates

Over 0 CWT	10.53
Over 240 CWT	7.72
Over 300 CWT	6.40
Over 400 CWT	5.57
Over 500 CWT	5.89
Over 700 CWT	5.89
Over 800 CWT	8.66

Date	Author	Note

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	ProjectCost
Project Cost Summary Report			**2,469,386**	**154,350**	**0**	**0**	**2,623,736**
			2,469,385.80				*2,623,735.71*
Feature Code 16 - Bank Stabilization	**1.00**	**EA**	**2,469,386**	**154,350**	**0**	**0**	**2,623,736**
			2,469,385.80				*2,623,735.71*
Alternative 1 - Rock Sill w/ Veg Slope	**1.00**	**EA**	**2,469,386**	**154,350**	**0**	**0**	**2,623,736**
			1,334,052.80				*1,488,402.71*
Construction	**1.00**	**EA**	**1,334,053**	**154,350**	**0**	**0**	**1,488,403**
			539,333.00				*539,333.00*
Real Estate	**1.00**	**EA**	**539,333**	**0**	**0**	**0**	**539,333**
Planning, Engineering and Design	**1.00**	**LS**	**298,000**	**0**	**0**	**0**	**298,000**
			298,000.00				*298,000.00*
Construction Management	**1.00**	**EA**	**298,000**	**0**	**0**	**0**	**298,000**

SECTION 7
COST RISK ANALYSIS

Abbreviated Risk Analysis

Project (less than $40M): **JRNN Emergency Shoreline Protection** **Alternative: Alt 1**

Project Development Stage/Alternative: **Feasibility (Recommended Plan)**

Risk Category: **Low Risk: Typical Construction, Simple** **Meeting Date: 6/16/2020**

Updated 7/16/2021

Total Estimated Construction Contract Cost = **$ 1,488,403**

	CWWBS	Feature of Work	Estimated Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	$ 539,333		20%	$ 107,867	$ 647,200
1	16 BANK STABILIZATION	Mob/Demob	$ 6,533		25%	$ 1,627	$ 8,160
2	16 BANK STABILIZATION	Site Prep/Earthwork	$ 1,023,266		48%	$ 493,822	$ 1,517,088
3	16 BANK STABILIZATION	Riprap Slope Treatment	$ 455,630		28%	$ 127,525	$ 583,155
4			$ -		0%	$ -	$ -
5			$ -		0%	$ -	$ -
6			$ -		0%	$ -	$ -
7			$ -		0%	$ -	$ -
8			$ -		0%	$ -	$ -
9			$ -		0%	$ -	$ -
10			$ -		0%	$ -	$ -
11			$ -		0%	$ -	$ -
12	All Other	Remaining Construction Items	$ 2,972	*0.2%*	32%	$ 960	$ 3,932
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	$ 298,000		20%	$ 61,040	$ 359,040
14	31 CONSTRUCTION MANAGEMENT	Construction Management	$ 298,000		22%	$ 66,465	$ 364,465
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					$ -	

Totals					
Real Estate	$ 539,333	20%	$ 107,867	$	647,199.60
Total Construction Estimate	$ 1,488,401	42%	$ 623,933	$	2,112,334
Total Planning, Engineering & Design	$ 298,000	20%	$ 61,040	$	359,040
Total Construction Management	$ 298,000	22%	$ 66,465	$	364,465
Total Excluding Real Estate	**$ 2,084,401**	**36%**	**$ 751,439**	**$**	**2,835,840**

	Base	**50%**	**80%**
Confidence Level Range Estimate ($000's)	$2,084k	$2,535k	$2,836k

* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.	

JRNN Emergency Shoreline Protection Alt 1

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: 16-Jun-20

Risk Level

	Negligible	Marginal	Moderate	Significant	Critical
Very Likely	2	3	4	5	5
Likely	1	2	3	4	5
Possible	0	1	2	3	4
Unlikely	0	0	1	2	3

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Management & Scope Growth				**Maximum Project Growth**		**40%**
PS-1	Mob/Demob	• Potential for scope growth, added features? • Project accomplishes intent? • Funding Difficulties? • Sufficent Staffing/Support?	The contractor may have a different means and method to do the perform the project. Project could be delayed due to unforseeable circumstances and weather. Funding availability will determine the outcome.	Marginal	Possible	1
PS-2	Site Prep/Earthwork	• Potential for scope growth, added features? • Project accomplishes intent? • Funding Difficulties? • Sufficent Staffing/Support?	The contractor may have a different means and method to do the perform the project. Possible dirrering site conditions. Project could be delayed due to unforseeable circumstances and weather. Funding availability will determine the outcome.	Marginal	Possible	1
PS-3	Riprap Slope Treatment	• Potential for scope growth, added features? • Project accomplishes intent? • Funding Difficulties? • Sufficent Staffing/Support?	The contractor may have a different means and method to do the perform the project. Possible dirrering site conditions. Project could be delayed due to unforseeable circumstances and weather. Funding availability will determine the outcome.	Negligible	Unlikely	0
PS-12	Remaining Construction Items	• Potential for scope growth, added features? • Project accomplishes intent? • Funding Difficulties? • Sufficent Staffing/Support?	The contractor may have a different means and method to do the perform the project. Possible dirrering site conditions. Project could be delayed due to unforseeable circumstances and weather. Funding availability will determine the outcome.	Marginal	Possible	1
PS-13	Planning, Engineering, & Design	• Potential for scope growth, added features? • Project accomplishes intent? • Funding Difficulties? • Sufficent Staffing/Support?	The contractor may have a different means and method to do the perform the project. Possible dirrering site conditions. Project could be delayed due to unforseeable circumstances and weather. Funding availability will determine the outcome.	Marginal	Possible	1
PS-14	Construction Management	• Potential for scope growth, added features? • Project accomplishes intent? • Funding Difficulties? • Sufficent Staffing/Support?	The contractor may have a different means and method to do the perform the project. Possible dirrering site conditions. Project could be delayed due to unforseeable circumstances and weather. Funding availability will determine the outcome.	Marginal	Possible	1
Acquisition Strategy				**Maximum Project Growth**		**30%**
AS-1	Mob/Demob	• Contracting plan firmly established? • 8a or small business likely? • Requirement for subcontracting? • Accelerated schedule or harsh weather schedule? • High-risk acquisition limits competition, design/build? • Limited bid competition anticipated? • Bid schedule developed to reduce quantity risks?	Small business 8a contract likely due to project magnitude.	Marginal	Likely	2

AS-2	Site Prep/Earthwork	• Contracting plan firmly established? • 8a or small business likely? • Requirement for subcontracting? • Accelerated schedule or harsh weather schedule? • High-risk acquisition limits competition, design/build? • Limited bid competition anticipated? • Bid schedule developed to reduce quantity risks?	Small business 8a contract likely due to project magnitude. Contractor must specialize in this field of work - slope stabilization.	Marginal	Likely	**2**
AS-3	Riprap Slope Treatment	• Contracting plan firmly established? • 8a or small business likely? • Requirement for subcontracting? • Accelerated schedule or harsh weather schedule? • High-risk acquisition limits competition, design/build? • Limited bid competition anticipated? • Bid schedule developed to reduce quantity risks?	Small business 8a contract likely due to project magnitude. Contractor must specialize in this field of work - slope stabilization.	Marginal	Likely	**2**
AS-12	Remaining Construction Items	• Contracting plan firmly established? • 8a or small business likely? • Requirement for subcontracting? • Accelerated schedule or harsh weather schedule? • High-risk acquisition limits competition, design/build? • Limited bid competition anticipated? • Bid schedule developed to reduce quantity risks?		Negligible	Unlikely	**0**
AS-13	Planning, Engineering, & Design	• Contracting plan firmly established? • 8a or small business likely? • Requirement for subcontracting? • Accelerated schedule or harsh weather schedule? • High-risk acquisition limits competition, design/build? • Limited bid competition anticipated? • Bid schedule developed to reduce quantity risks?		Negligible	Unlikely	**0**
AS-14	Construction Management	• Contracting plan firmly established? • 8a or small business likely? • Requirement for subcontracting? • Accelerated schedule or harsh weather schedule? • High-risk acquisition limits competition, design/build? • Limited bid competition anticipated? • Bid schedule developed to reduce quantity risks?		Negligible	Unlikely	**0**
Construction Elements				**Maximum Project Growth**		**15%**
CON-1	Mob/Demob	• Accelerated schedule or harsh weather schedule? • High risk or complex construction elements, site access, in-water? • Water care and diversion plan? • Unique construction methods? • Special mobilization? • Special equipment or subcontractors needed? • Potential for construction modification and claims?	project is onsteep slope and difficult to access. It is a complex process for construction.	Marginal	Possible	**1**
CE-2	Site Prep/Earthwork	• Accelerated schedule or harsh weather schedule? • High risk or complex construction elements, site access, in-water? • Water care and diversion plan? • Unique construction methods? • Special mobilization? • Special equipment or subcontractors needed? • Potential for construction modification and claims?	The contractor may have a different means and method to do the perform the project. Could require special equipment to perform certain aspects of preparation. Possible differing site conditions. Limited access due to road access and laydown area.	Moderate	Likely	**3**

CE-3	Riprap Slope Treatment	• Accelerated schedule or harsh weather schedule? • High risk or complex construction elements, site access, in-water? • Water care and diversion plan? • Unique construction methods? • Special mobilization? • Special equipment or subcontractors needed? • Potential for construction modification and claims?	The contractor may have a different means and method to do the perform the project. Could require special equipment to perform certain aspects of preparation. Possible differing site conditions. Limited access due to road access and laydown area.	Moderate	Likely	3
CE-12	Remaining Construction Items	• Accelerated schedule or harsh weather schedule? • High risk or complex construction elements, site access, in-water? • Water care and diversion plan? • Unique construction methods? • Special mobilization? • Special equipment or subcontractors needed? • Potential for construction modification and claims?	The contractor may have a different means and method to do the perform the project. Could require special equipment to perform certain aspects of preparation. Possible differing site conditions. Limited access due to road access and laydown area.	Significant	Very LIKELY	5
CE-13	Planning, Engineering, & Design	• Accelerated schedule or harsh weather schedule? • High risk or complex construction elements, site access, in-water? • Water care and diversion plan? • Unique construction methods? • Special mobilization? • Special equipment or subcontractors needed? • Potential for construction modification and claims?	The contractor may have a different means and method to do the perform the project. Could require special equipment to perform certain aspects of preparation. Possible differing site conditions. Limited access due to road access and laydown area.	Moderate	Likely	3
CE-14	Construction Management	• Accelerated schedule or harsh weather schedule? • High risk or complex construction elements, site access, in-water? • Water care and diversion plan? • Unique construction methods? • Special mobilization? • Special equipment or subcontractors needed? • Potential for construction modification and claims?	The contractor may have a different means and method to do the perform the project. Could require special equipment to perform certain aspects of preparation. Possible differing site conditions. Limited access due to road access and laydown area.	Moderate	Likely	3
Specialty Construction or Fabrication					**Maximum Project Growth**	**50%**
SC-1	Mob/Demob	• Atypical construction elements, unusual material or equipment manufactured or installed? • Confidence in constructibility or methodology? • One of a kind and confidence in fabrication and installation? • Ability to reasonably transport? • Risk of specialty equipment functioning first time? Testing?		Negligible	Unlikely	0
SC-2	Site Prep/Earthwork	• Atypical construction elements, unusual material or equipment manufactured or installed? • Confidence in constructibility or methodology? • One of a kind and confidence in fabrication and installation? • Ability to reasonably transport? • Risk of specialty equipment functioning first time? Testing?		Negligible	Unlikely	0
SC-3	Riprap Slope Treatment	• Atypical construction elements, unusual material or equipment manufactured or installed? • Confidence in constructibility or methodology? • One of a kind and confidence in fabrication and installation? • Ability to reasonably transport? • Risk of specialty equipment functioning first time? Testing?	vegetation will be needed for successful project.	Negligible	Unlikely	0

SC-12	Remaining Construction Items	• Atypical construction elements, unusual material or equipment manufactured or installed? • Confidence in constructibility or methodology? • One of a kind and confidence in fabrication and installation? • Ability to reasonably transport? • Risk of specialty equipment functioning first time? Testing?		Negligible	Unlikely	0
SC-13	Planning, Engineering, & Design	• Atypical construction elements, unusual material or equipment manufactured or installed? • Confidence in constructibility or methodology? • One of a kind and confidence in fabrication and installation? • Ability to reasonably transport? • Risk of specialty equipment functioning first time? Testing?		Negligible	Unlikely	0
SC-14	Construction Management	• Atypical construction elements, unusual material or equipment manufactured or installed? • Confidence in constructibility or methodology? • One of a kind and confidence in fabrication and installation? • Ability to reasonably transport? • Risk of specialty equipment functioning first time? Testing?		Negligible	Unlikely	0
Technical Design & Quantities				**Maximum Project Growth**		**20%**
T-1	Mob/Demob	• Level of confidence based on design and assumptions? • Possibility for increased quantities due to loss, waste, or subsidence? • Appropriate methods applied to calculate quantities? • Sufficient investigations to develop quantities? • Quality control check applied?		Negligible	Unlikely	0
T-2	Site Prep/Earthwork	• Level of confidence based on design and assumptions? • Possibility for increased quantities due to loss, waste, or subsidence? • Appropriate methods applied to calculate quantities? • Sufficient investigations to develop quantities? • Quality control check applied?	The estimated quanity of debris on the existing slope may be low. Change order might be needed. Possible differing site conditions may presesnt additional disposla and contaminated soil.	Significant	Very LIKELY	5
T-3	Riprap Slope Treatment	• Level of confidence based on design and assumptions? • Possibility for increased quantities due to loss, waste, or subsidence? • Appropriate methods applied to calculate quantities? • Sufficient investigations to develop quantities? • Quality control check applied?	depends on the contractor handling on-site issues/conditions	Marginal	Possible	1
T-12	Remaining Construction Items	• Level of confidence based on design and assumptions? • Possibility for increased quantities due to loss, waste, or subsidence? • Appropriate methods applied to calculate quantities? • Sufficient investigations to develop quantities? • Quality control check applied?		Negligible	Unlikely	0

T-13	Planning, Engineering, & Design	• Level of confidence based on design and assumptions? • Possibility for increased quantities due to loss, waste, or subsidence? • Appropriate methods applied to calculate quantities? • Sufficient investigations to develop quantities? • Quality control check applied?		Negligible	Unlikely	0
T-14	Construction Management	• Level of confidence based on design and assumptions? • Possibility for increased quantities due to loss, waste, or subsidence? • Appropriate methods applied to calculate quantities? • Sufficient investigations to develop quantities? • Quality control check applied?	unexpeted delays or site changes	Marginal	Possible	1
Cost Estimate Assumptions				**Maximum Project Growth**		**25%**
EST-1	Mob/Demob	• Reliability and number of key quotes? • Assumptions related to prime and subcontractor markups/assignments? • Assumptions regarding crew, productivity, overtime? • Site accessibility, transport delays, congestion? • Overuse of Cost Book, lump sum, allowances? • Lack confidence on critical cost items?	do not know what equipment contractor will bring or have far to deliver equipment from.	Marginal	Possible	1
EST-2	Site Prep/Earthwork	• Reliability and number of key quotes? • Assumptions related to prime and subcontractor markups/assignments? • Assumptions regarding crew, productivity, overtime? • Site accessibility, transport delays, congestion? • Overuse of Cost Book, lump sum, allowances? • Lack confidence on critical cost items?	Removal will be determined by contractor (means/methods)	Marginal	Possible	1
EST-3	Riprap Slope Treatment	• Reliability and number of key quotes? • Assumptions related to prime and subcontractor markups/assignments? • Assumptions regarding crew, productivity, overtime? • Site accessibility, transport delays, congestion? • Overuse of Cost Book, lump sum, allowances? • Lack confidence on critical cost items?	material cost could go up. Public safety issues for access and so forth	Marginal	Possible	1
EST-12	Remaining Construction Items	• Reliability and number of key quotes? • Assumptions related to prime and subcontractor markups/assignments? • Assumptions regarding crew, productivity, overtime? • Site accessibility, transport delays, congestion? • Overuse of Cost Book, lump sum, allowances? • Lack confidence on critical cost items?	construction means and methods	Marginal	Possible	1
EST-13	Planning, Engineering, & Design	• Reliability and number of key quotes? • Assumptions related to prime and subcontractor markups/assignments? • Assumptions regarding crew, productivity, overtime? • Site accessibility, transport delays, congestion? • Overuse of Cost Book, lump sum, allowances? • Lack confidence on critical cost items?		Negligible	Unlikely	0

EST-14	Construction Management	• Reliability and number of key quotes? • Assumptions related to prime and subcontractor markups/assignments? • Assumptions regarding crew, productivity, overtime? • Site accessibility, transport delays, congestion? • Overuse of Cost Book, lump sum, allowances? • Lack confidence on critical cost items?		Negligible	Unlikely	0
External Project Risks				**Maximum Project Growth**		**20%**
EX-1	Mob/Demob	• Potential for severe adverse weather? • Political influences, lack of support, obstacles? • Unanticipated inflations in fuel, key materials? • Potential for market volatility impacting competition, pricing? • Funding Constraints	Weather could be a factor during the duration of the project. There could be real estate. Fuel prices could rise and other costs due to the Covid-19 issues.	Moderate	Possible	2
EX-2	Site Prep/Earthwork	• Potential for severe adverse weather? • Political influences, lack of support, obstacles? • Unanticipated inflations in fuel, key materials? • Potential for market volatility impacting competition, pricing? • Funding Constraints	Weather could be a factor during the duration of the project. There could be real estate. Fuel prices could rise and other costs due to the Covid-19 issues.	Moderate	Possible	2
EX-3	Riprap Slope Treatment	• Potential for severe adverse weather? • Political influences, lack of support, obstacles? • Unanticipated inflations in fuel, key materials? • Potential for market volatility impacting competition, pricing? • Funding Constraints	Weather could be a factor during the duration of the project. There could be real estate. Fuel prices could rise and other costs due to the Covid-19 issues.	Moderate	Possible	2
EX-12	Remaining Construction Items	• Potential for severe adverse weather? • Political influences, lack of support, obstacles? • Unanticipated inflations in fuel, key materials? • Potential for market volatility impacting competition, pricing? • Funding Constraints	Weather could be a factor during the duration of the project. There could be real estate. Fuel prices could rise and other costs due to the Covid-19 issues.	Moderate	Possible	2
EX-13	Planning, Engineering, & Design	• Potential for severe adverse weather? • Political influences, lack of support, obstacles? • Unanticipated inflations in fuel, key materials? • Potential for market volatility impacting competition, pricing? • Funding Constraints	Weather could be a factor during the duration of the project. There could be real estate. Fuel prices could rise and other costs due to the Covid-19 issues.	Moderate	Possible	2
EX-14	Construction Management	• Potential for severe adverse weather? • Political influences, lack of support, obstacles? • Unanticipated inflations in fuel, key materials? • Potential for market volatility impacting competition, pricing? • Funding Constraints	NFS and homeowners support for project and willing to participate.	Moderate	Possible	2

SECTION 8
LABOR RATES

"General Decision Number: VA20200053 05/22/2020

Superseded General Decision Number: VA20190053

State: Virginia

Construction Types: Heavy (Heavy and Sewer and Water Line)

County: Newport News* County in Virginia.

*INDEPENDENT CITY

HEAVY CONSTRUCTION PROJECTS (Including Sewer and Water Lines)

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate,if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020
1	01/10/2020
2	04/10/2020

3 05/22/2020

ELEC1340-007 01/01/2020

	Rates	Fringes
ELECTRICIAN	$ 28.75	2%+13.61

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* IRON0079-007 05/01/2020

	Rates	Fringes
IRONWORKER, STRUCTURAL	$ 26.18	16.37

PLUM0110-002 11/01/2019

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 29.22	16.98

SUVA2010-054 09/03/2010

	Rates	Fringes
CARPENTER	$ 21.57	3.74
CEMENT MASON/CONCRETE FINISHER	$ 19.00	3.83
FORM WORKER	$ 17.00	
IRONWORKER, REINFORCING	$ 22.45	11.85
LABORERS		
Common or General	$ 10.50	1.53
Flagger	$ 7.39	0.20
Landscape	$ 10.00	
Pipelayer	$ 13.88	1.32
POWER EQUIPMENT OPERATOR:		
Backhoe	$ 17.61	2.57
Bobcat/Skid Loader	$ 11.40	
Bulldozer	$ 42.50	1.47
Crane (Tower)	$ 23.29	6.02
Crane	$ 23.38	
Excavator	$ 19.27	7.28

Loader	$ 15.00	1.75
Mechanic	$ 26.78	6.32
Trackhoe	$ 12.75	1.24
Tugboat	$ 19.00	
TRUCK DRIVER, Includes All Dump Trucks	$ 14.33	3.58

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical

order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate tha no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations

Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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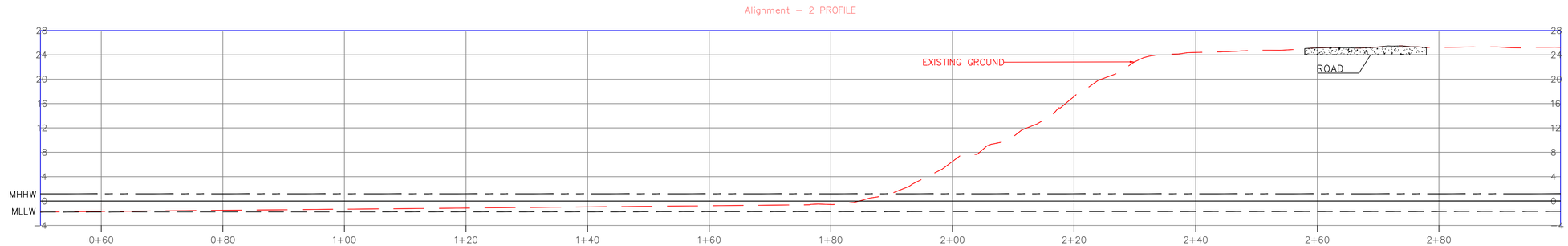
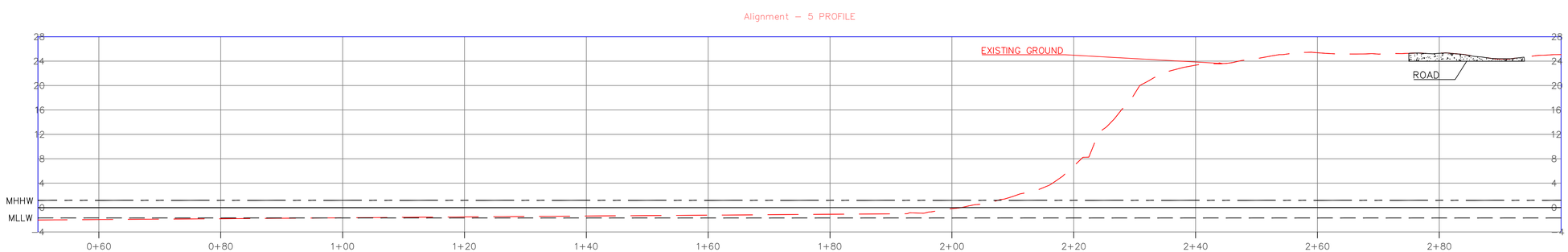
END OF GENERAL DECISION"

ATTACHMENT 3: FOCUSED ALTERNATIVES 10% DRAWINGS

DATUM DIAGRAM
1983-2001 NTDE
(SCALE 1"=1')

PROJECT SITE LOCATION (LONGITUDE: -76.460853, LATITUDE: 37.023014) NAVD88 – NOS MLW DATUM DIFFERENCE DERIVED BY NOAA VDATUM MODEL.





US Army Corps of Engineers®

MARK	DESCRIPTION	DATE

DESIGNED BY: K. MCELROY
DRAWN BY: K. MCELROY
CHECKED BY:
ISSUE DATE: 28 JANUARY 2020
SOLICITATION NO.:
CONTRACT NO.:
SUBMITTED BY:
NAO FILE NO.:
SIZE: ANSI D

U.S. ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
803 FRONT STREET
NORLFOLK, VA 23510

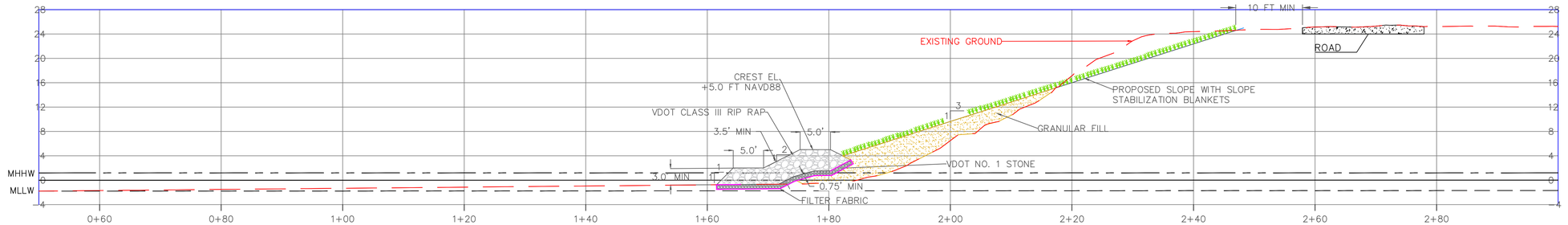
CONTINUING AUTHORITIES PROGRAM (CAP)
JAMES RIVER SHORELINE STABILIZATION PROJECT

EXISTING CONDITIONS

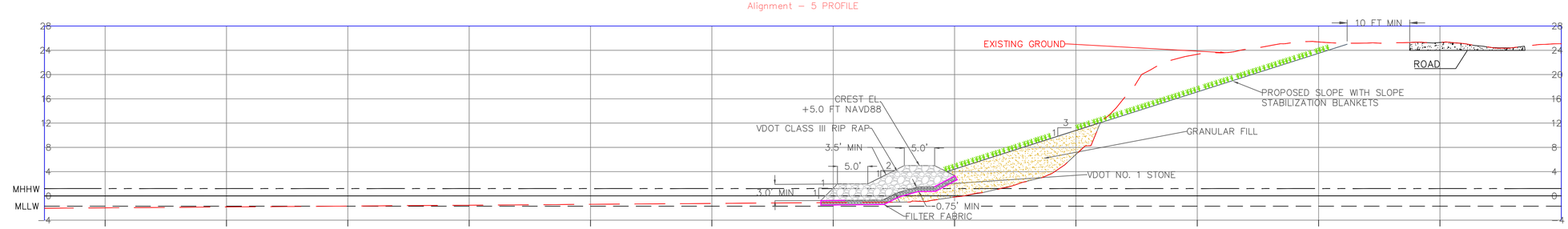
SHEET ID
C-001

10% DESIGN

Alignment – 2 PROFILE



Alignment – 5 PROFILE



US Army Corps of Engineers®

MARK	DESCRIPTION	DATE

DESIGNED BY: K. MCELROY
DRAWN BY: K. MCELROY
CHECKED BY:
ISSUE DATE: 28 JANUARY 2020
SOLICITATION NO.:
CONTRACT NO.:
NAO FILE NO.:
SUBMITTED BY:
SIZE: ANSI D

U.S. ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
803 FRONT STREET
NORLFOLK, VA 23510

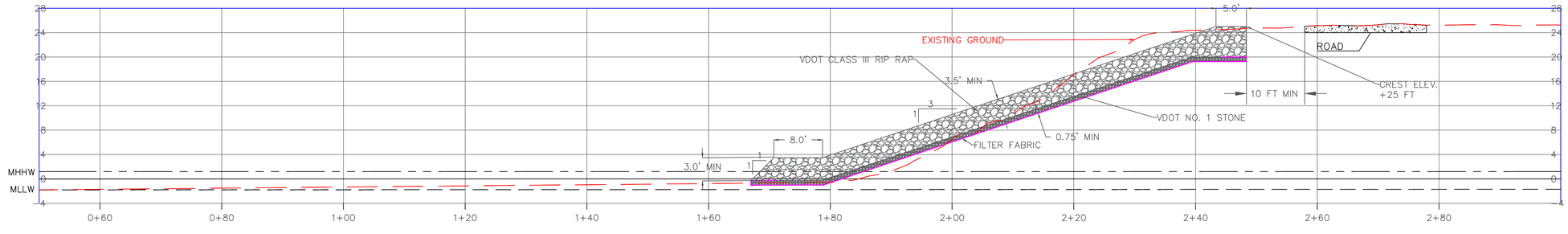
CONTINUING AUTHORITIES PROGRAM (CAP)
JAMES RIVER SHORELINE STABILIZATION PROJECT

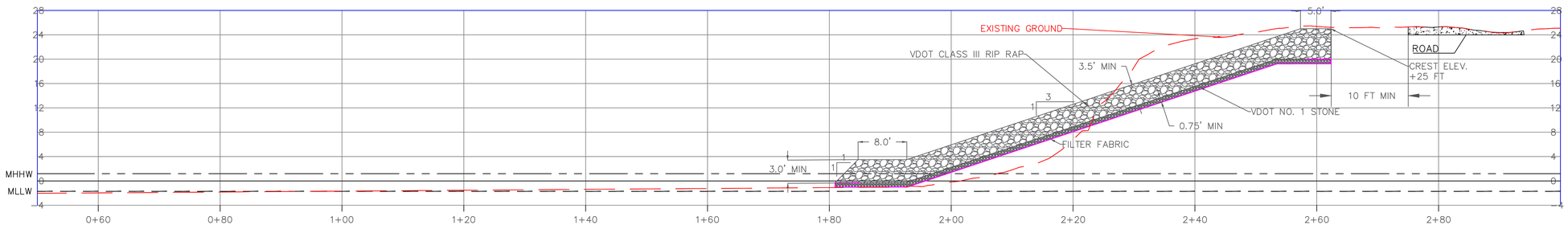
ALTERNATIVE 1

SHEET ID

C-002

10% DESIGN





US Army Corps of Engineers®

MARK	DESCRIPTION	DATE

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DRAWN BY: K. MCELROY	SOLICITATION NO.:
CHECKED BY:	CONTRACT NO.:
SUBMITTED BY:	NAO FILE NO.:
SIZE: ANSI D	

U.S. ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
803 FRONT STREET
NORFOLK, VA 23510

CONTINUING AUTHORITIES PROGRAM (CAP)
JAMES RIVER SHORELINE STABILIZATION PROJECT

ALTERNATIVE 2

SHEET ID

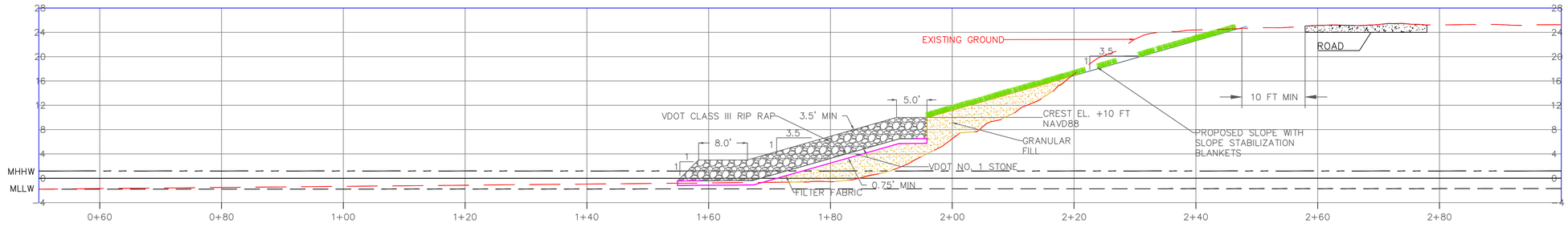
C-003

10% DESIGN

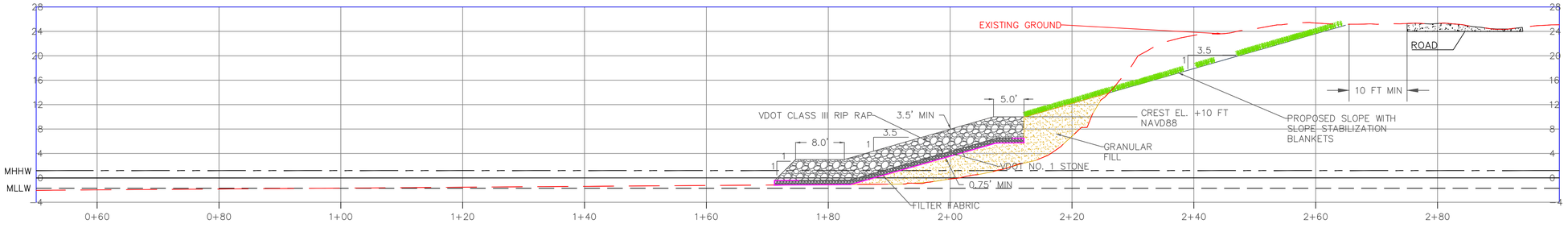
DATUM DIAGRAM
1983-2001 NTDE
(SCALE 1"=1')

PROJECT SITE LOCATION (LONGITUDE: -76.460853, LATITUDE: 37.023014) NAVD88 – NOS MLW DATUM DIFFERENCE DERIVED BY NOAA VDATUM MODEL.

Alignment – 2 PROFILE



Alignment – 5 PROFILE



US Army Corps of Engineers®

MARK	DESCRIPTION	DATE

DESIGNED BY: K. MCELROY	ISSUE DATE: 12 FEBRUARY 2020
DRAWN BY: K.MCELROY	SOLICITATION NO.:
CHECKED BY:	CONTRACT NO.:
SUBMITTED BY:	NAO FILE NO.:
SIZE: ANSI D	

U.S. ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
803 FRONT STREET
NORFOLK, VA 23510

CONTINUING AUTHORITIES PROGRAM (CAP)
JAMES RIVER SHORELINE STABILIZATION PROJECT

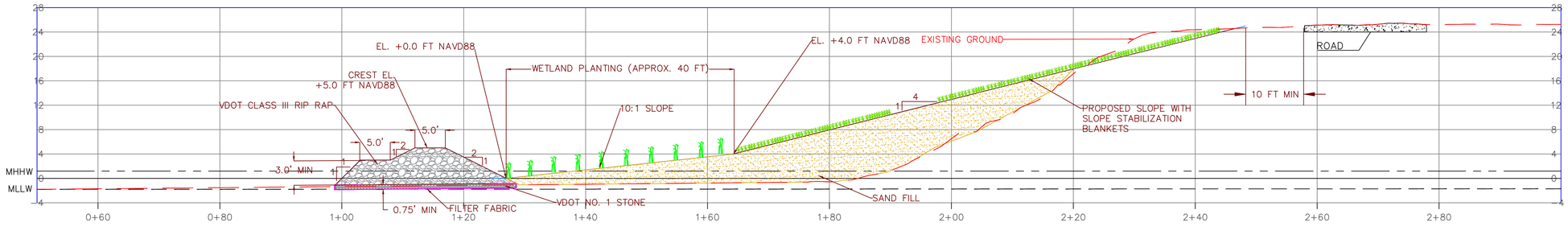
ALTERNATIVE 3

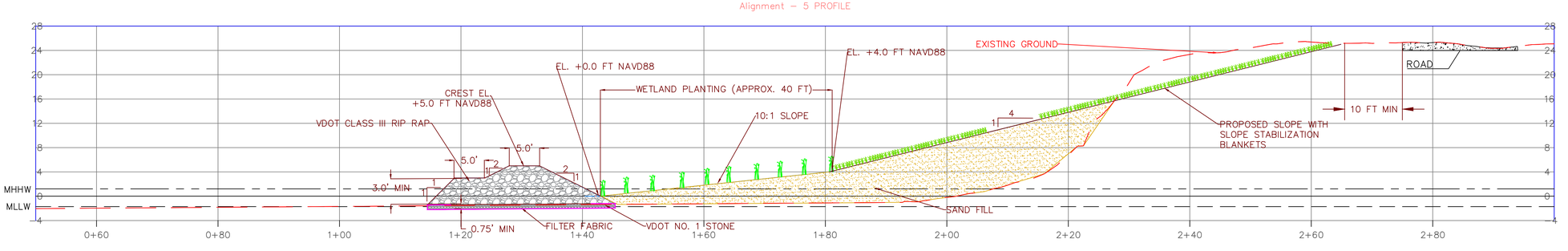
SHEET ID
C-004

10% DESIGN

DATUM DIAGRAM
1983-2001 NTDE
(SCALE 1"=1')

PROJECT SITE LOCATION (LONGITUDE: -76.460853, LATITUDE: 37.023014) NAVD88 – NOS MLW DATUM DIFFERENCE DERIVED BY NOAA VDATUM MODEL.





US Army Corps of Engineers®

MARK	DESCRIPTION	DATE

DESIGNED BY: K. MCELROY	ISSUE DATE: 18 FEBRUARY 2020	CONTRACT NO.:	NAO FILE NO.:
DRAWN BY: K. MCELROY	SOLICITATION NO.:		
CHECKED BY:		SUBMITTED BY:	SIZE: ANSI D

U.S. ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
803 FRONT STREET
NORLFOLK, VA 23510

CONTINUING AUTHORITIES PROGRAM (CAP)
JAMES RIVER SHORELINE STABILIZATION PROJECT

ALTERNATIVE 4

SHEET ID

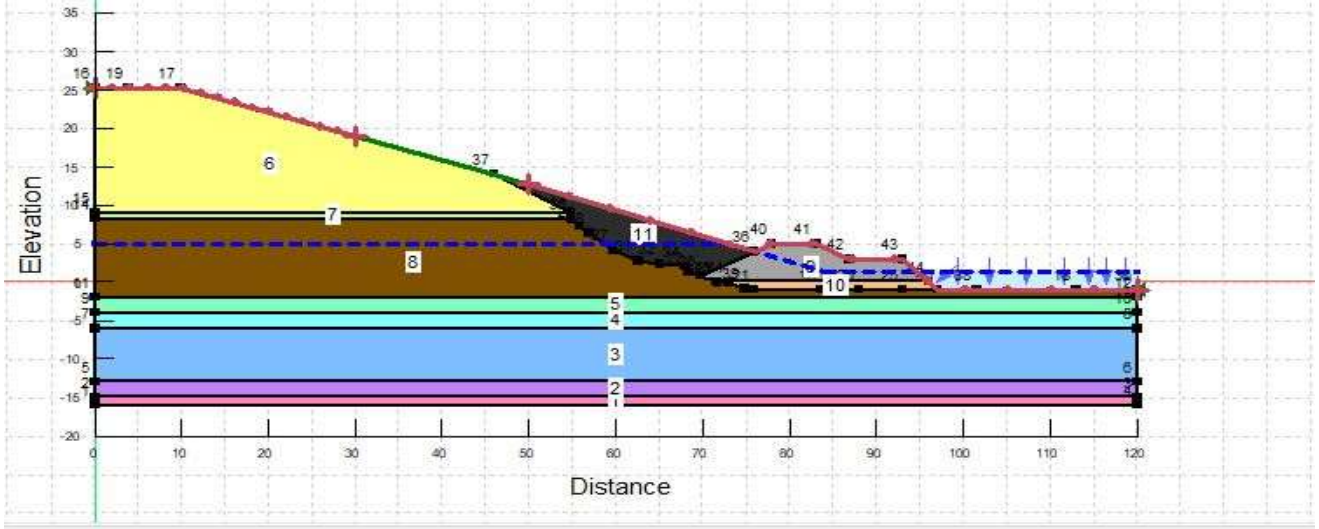
C-005

10% DESIGN

ATTACHMENT 4: GeoStudio Slope Stability Analysis

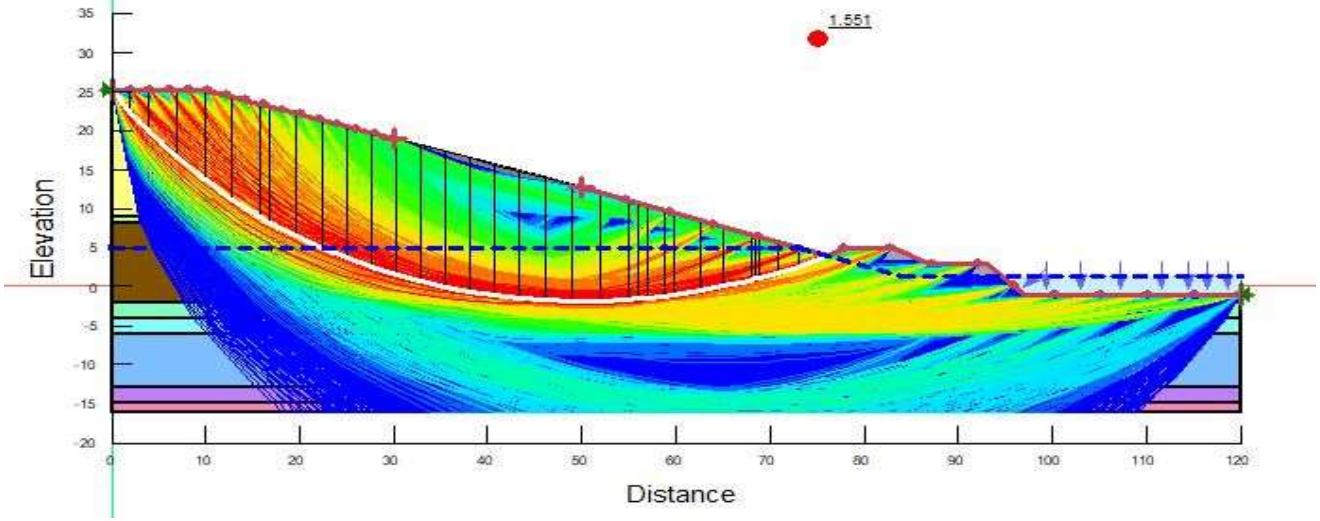
Newport News James River Shoreline Protection CAP Section 14
Newport News, Virginia
3H:1V Rock Sill with Vegetated Berm Case 1 end of construction

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
	Class II Rip-rap	Mohr-Coulomb	140	0	42	0	1
	CL-ML	Mohr-Coulomb	111	500	0	0	1
	CL-ML2	Mohr-Coulomb	114	1,200	0	0	1
	Compacted SM	Mohr-Coulomb	125	0	32	0	1
	ML Mixture	Mohr-Coulomb	114	1,000	0	0	1
	ML-SM	Mohr-Coulomb	114	0	30	0	1
	ML-SM2	Mohr-Coulomb	115	0	27	0	1
	No. 1 Stone	Mohr-Coulomb	125	0	37	0	1
	Sand and Gravel	Mohr-Coulomb	120	0	34	0	1
	Sand and Gravel 2	Mohr-Coulomb	117	0	32	0	1
	SW to SM	Mohr-Coulomb	117	0	34	0	1



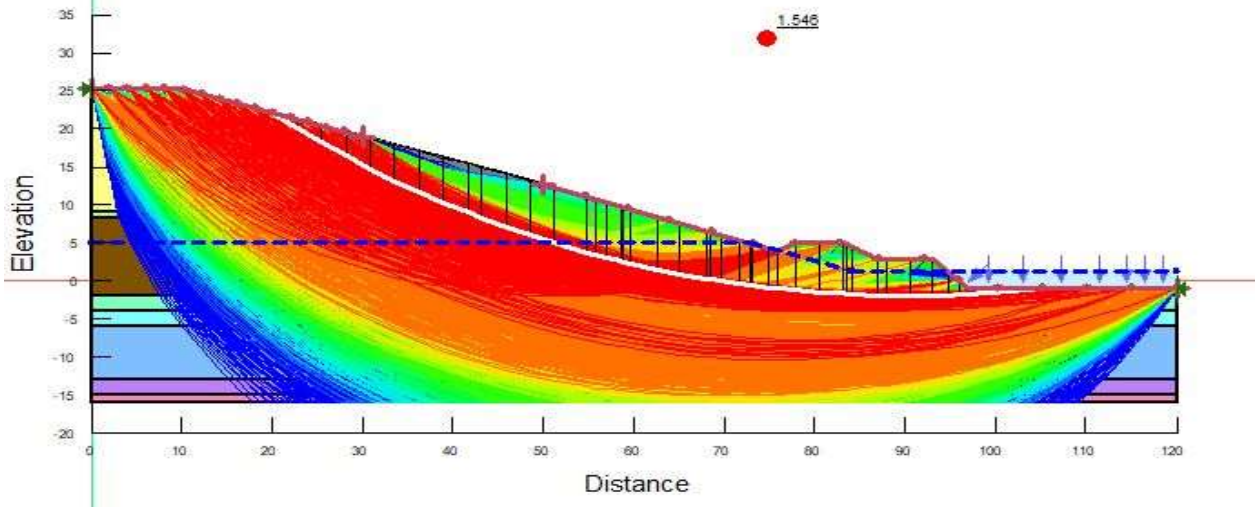
Newport News James River Shoreline Protection CAP Section 14
Newport News, Virginia
3H:1V Rock Sill with Vegetated Berm Case 1 end of construction

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
	Class II Rip-rap	Mohr-Coulomb	140	0	42	0	1
	CL-ML	Mohr-Coulomb	111	500	0	0	1
	CL-ML2	Mohr-Coulomb	114	1,200	0	0	1
	Compacted SM	Mohr-Coulomb	125	0	32	0	1
	ML Mixture	Mohr-Coulomb	114	1,000	0	0	1
	ML-SM	Mohr-Coulomb	114	0	30	0	1
	ML-SM2	Mohr-Coulomb	115	0	27	0	1
	No. 1 Stone	Mohr-Coulomb	125	0	37	0	1
	Sand and Gravel	Mohr-Coulomb	120	0	34	0	1
	Sand and Gravel 2	Mohr-Coulomb	117	0	32	0	1
	SW to SM	Mohr-Coulomb	117	0	34	0	1



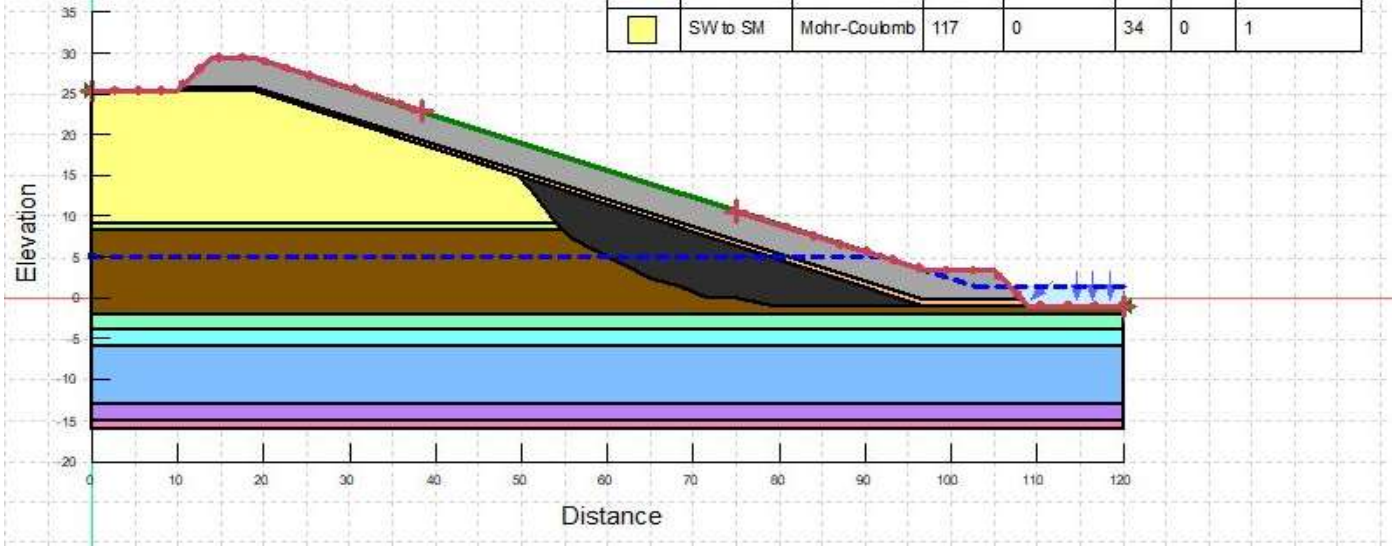
Newport News James River Shoreline Protection CAP Section 14
Newport News, Virginia
3H:1V Rock Sill with Vegetated Berm Case 2 Long Term

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
	Class III Rip-rap	Mohr-Coulomb	140	0	42	0	1
	CL-ML	Mohr-Coulomb	111	15	22	0	1
	CL-ML2	Mohr-Coulomb	114	20	26	0	1
	Compacted SM	Mohr-Coulomb	125	0	32	0	1
	ML Mixture	Mohr-Coulomb	114	10	25	0	1
	ML-SM	Mohr-Coulomb	114	0	30	0	1
	ML-SM2	Mohr-Coulomb	115	0	27	0	1
	No. 1 Stone	Mohr-Coulomb	125	0	37	0	1
	Sand and Gravel	Mohr-Coulomb	120	0	34	0	1
	Sand and Gravel 2	Mohr-Coulomb	117	0	32	0	1
	SW to SM	Mohr-Coulomb	117	0	34	0	1



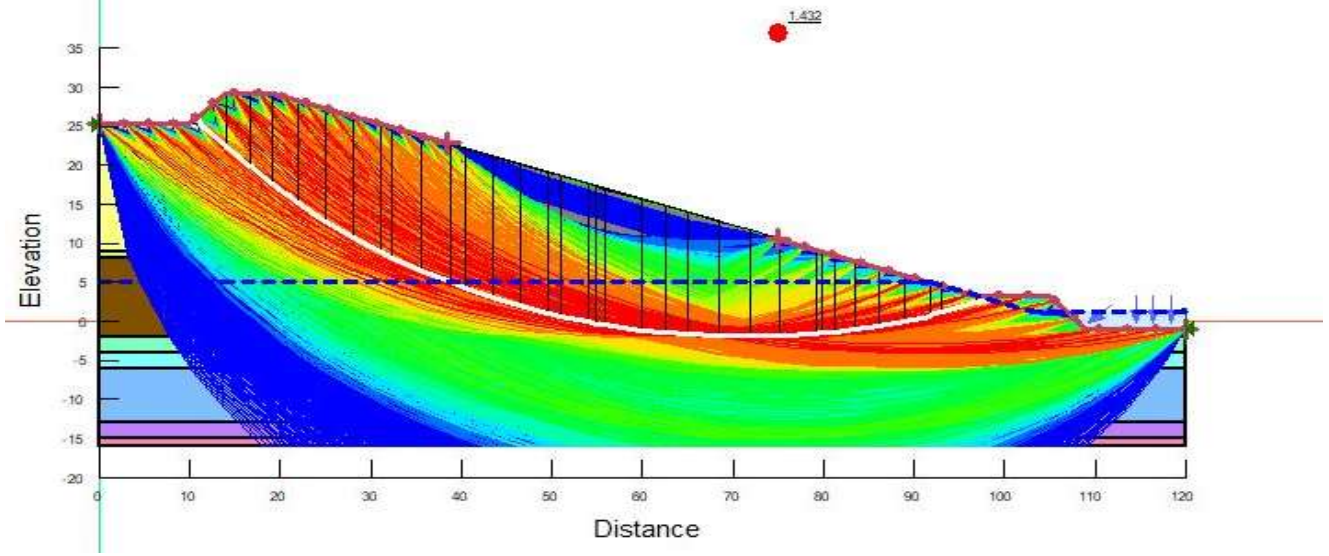
Newport News James River Shoreline Protection CAP Section 14
Newport News, Virginia
3H:1V Stone Revetment Case 1 End of Construction

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
	Class II Rip-rap	Mohr-Coulomb	140	0	42	0	1
	CL-ML	Mohr-Coulomb	111	500	0	0	1
	CL-ML2	Mohr-Coulomb	114	1,200	0	0	1
	Compacted SM	Mohr-Coulomb	125	0	32	0	1
	ML Mixture	Mohr-Coulomb	114	1,000	0	0	1
	ML-SM	Mohr-Coulomb	114	0	30	0	1
	ML-SM2	Mohr-Coulomb	115	0	27	0	1
	No. 1 Stone	Mohr-Coulomb	125	0	37	0	1
	Sand and Gravel	Mohr-Coulomb	120	0	34	0	1
	Sand and Gravel 2	Mohr-Coulomb	117	0	32	0	1
	SW to SM	Mohr-Coulomb	117	0	34	0	1



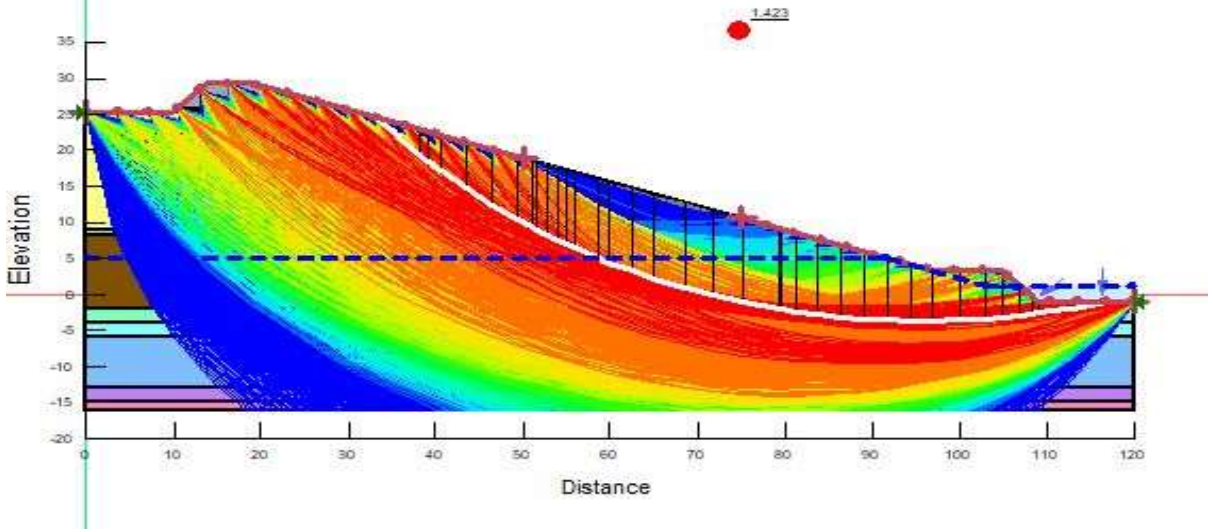
Newport News James River Shoreline Protection CAP Section 14
Newport News, Virginia
3H:1V Stone Revetment Case 1 End of Construction

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
	Class II Rip-rap	Mohr-Coulomb	140	0	42	0	1
	CL-ML	Mohr-Coulomb	111	500	0	0	1
	CL-ML2	Mohr-Coulomb	114	1,200	0	0	1
	Compacted SM	Mohr-Coulomb	125	0	32	0	1
	ML Mixture	Mohr-Coulomb	114	1,000	0	0	1
	ML-SM	Mohr-Coulomb	114	0	30	0	1
	ML-SM2	Mohr-Coulomb	115	0	27	0	1
	No. 1 Stone	Mohr-Coulomb	125	0	37	0	1
	Sand and Gravel	Mohr-Coulomb	120	0	34	0	1
	Sand and Gravel 2	Mohr-Coulomb	117	0	32	0	1
	SW to SM	Mohr-Coulomb	117	0	34	0	1



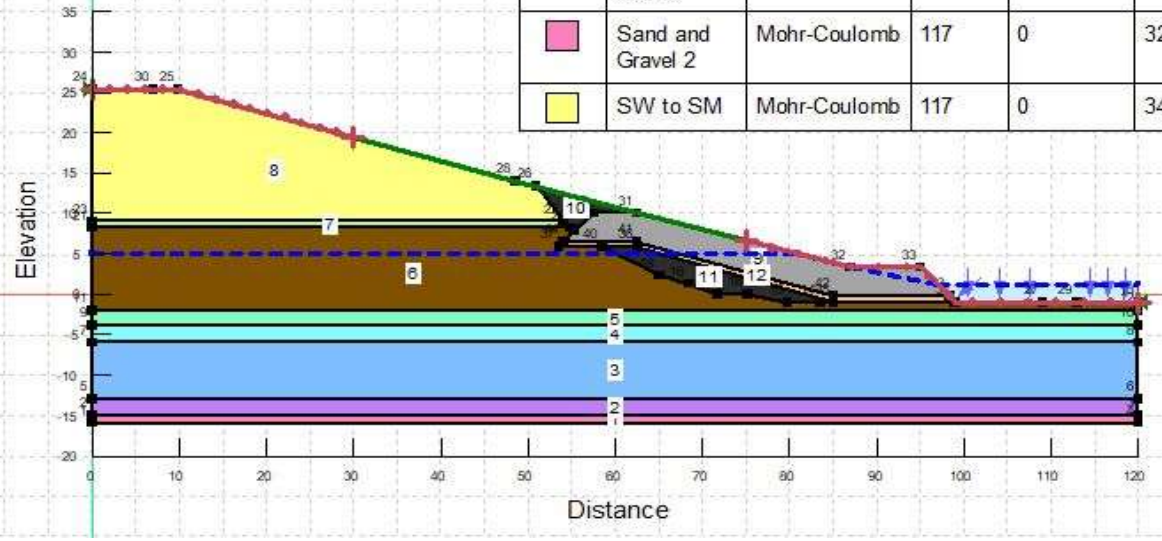
Newport News James River Shoreline Protection CAP Section 14
Newport News, Virginia
3H:1V Stone Revetment Case 2 Long Term

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
	Class III Rip-rap	Mohr-Coulomb	140	0	42	0	1
	CL-ML	Mohr-Coulomb	111	15	22	0	1
	CL-ML2	Mohr-Coulomb	114	20	26	0	1
	Compacted SM	Mohr-Coulomb	125	0	32	0	1
	ML Mixture	Mohr-Coulomb	114	10	25	0	1
	ML-SM	Mohr-Coulomb	114	0	30	0	1
	ML-SM2	Mohr-Coulomb	115	0	27	0	1
	No. 1 Stone	Mohr-Coulomb	125	0	37	0	1
	Sand and Gravel	Mohr-Coulomb	120	0	34	0	1
	Sand and Gravel 2	Mohr-Coulomb	117	0	32	0	1
	SW to SM	Mohr-Coulomb	117	0	34	0	1



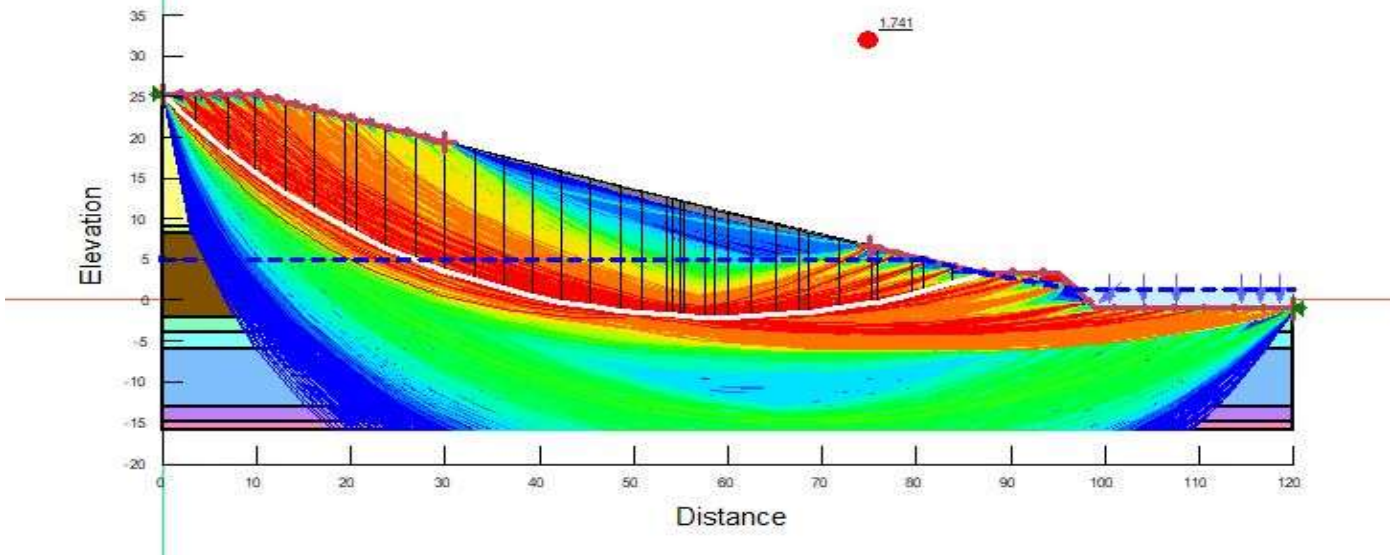
Newport News James River Shoreline Protection CAP Section 14
Newport News, Virginia
Revetment and Berm 3.5H:1V Case 1 End of Construction

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
	Class III Rip-rap	Mohr-Coulomb	140	0	42	0	1
	CL-ML	Mohr-Coulomb	111	500	0	0	1
	CL-ML2	Mohr-Coulomb	114	1,200	0	0	1
	Compacted SM	Mohr-Coulomb	125	0	32	0	1
	ML Mixture	Mohr-Coulomb	114	1,000	0	0	1
	ML-SM	Mohr-Coulomb	114	0	30	0	1
	ML-SM2	Mohr-Coulomb	115	0	27	0	1
	No. 1 Stone	Mohr-Coulomb	125	0	37	0	1
	Sand and Gravel	Mohr-Coulomb	120	0	34	0	1
	Sand and Gravel 2	Mohr-Coulomb	117	0	32	0	1
	SW to SM	Mohr-Coulomb	117	0	34	0	1



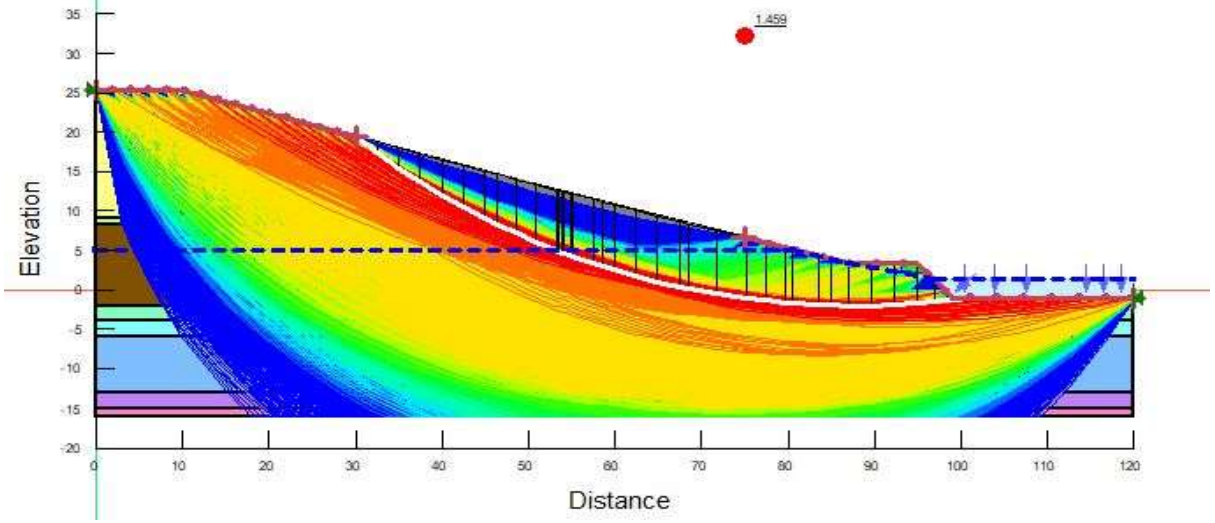
Newport News James River Shoreline Protection CAP Section 14
Newport News, Virginia
Revetment and Berm 3.5H:1V Case 1 End of Construction

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
	Class III Rip-rap	Mohr-Coulomb	140	0	42	0	1
	CL-ML	Mohr-Coulomb	111	500	0	0	1
	CL-ML2	Mohr-Coulomb	114	1,200	0	0	1
	Compacted SM	Mohr-Coulomb	125	0	32	0	1
	ML Mixture	Mohr-Coulomb	114	1,000	0	0	1
	ML-SM	Mohr-Coulomb	114	0	30	0	1
	ML-SM2	Mohr-Coulomb	115	0	27	0	1
	No. 1 Stone	Mohr-Coulomb	125	0	37	0	1
	Sand and Gravel	Mohr-Coulomb	120	0	34	0	1
	Sand and Gravel 2	Mohr-Coulomb	117	0	32	0	1
	SW to SM	Mohr-Coulomb	117	0	34	0	1



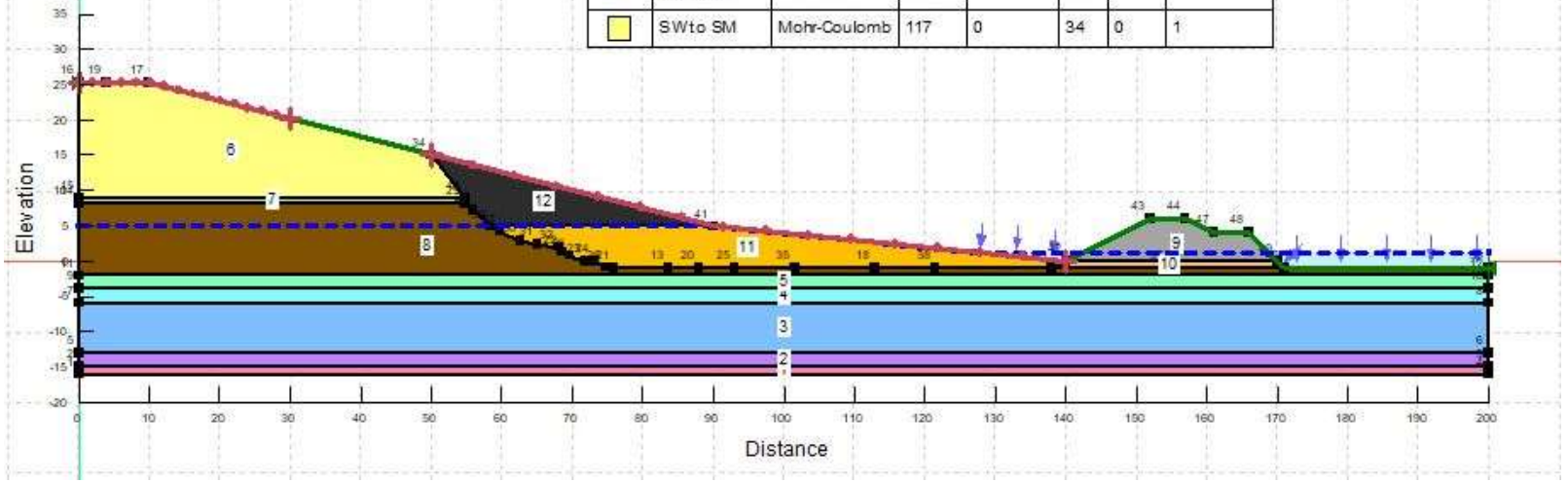
Newport News James River Shoreline Protection CAP Section 14
Newport News, Virginia
3.5H:1V Revetment and Berm Case 2 Long Term

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
	Class II Rip-rap	Mohr-Coulomb	140	0	42	0	1
	CL-ML	Mohr-Coulomb	111	15	22	0	1
	CL-ML2	Mohr-Coulomb	114	20	26	0	1
	Compacted SM	Mohr-Coulomb	125	0	32	0	1
	ML Mixture	Mohr-Coulomb	114	10	25	0	1
	ML-SM	Mohr-Coulomb	114	0	30	0	1
	ML-SM2	Mohr-Coulomb	115	0	27	0	1
	No. 1 Stone	Mohr-Coulomb	125	0	37	0	1
	Sand and Gravel	Mohr-Coulomb	120	0	34	0	1
	Sand and Gravel 2	Mohr-Coulomb	117	0	32	0	1
	SW to SM	Mohr-Coulomb	117	0	34	0	1



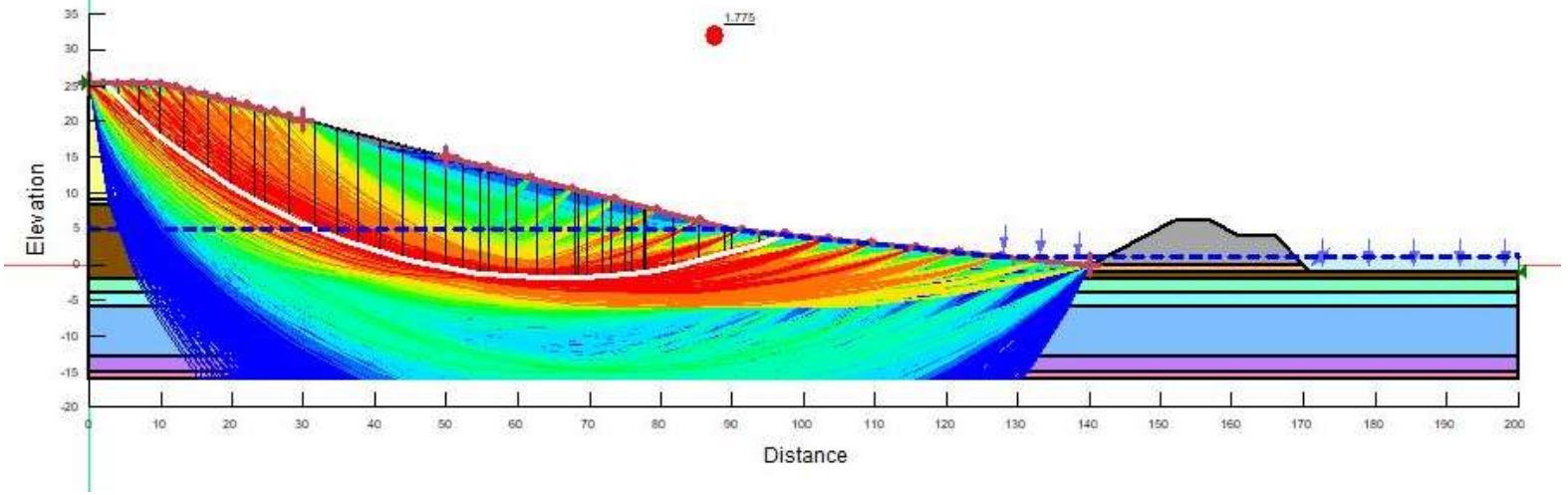
Newport News James River Shoreline Protection CAP Section 14
Newport News, Virginia
4H:1V Living Shoreline with Vegetated Berm Case 1 End of Construction

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
	Class II Rip-rap	Mohr-Coulomb	140	0	42	0	1
	CL-ML	Mohr-Coulomb	111	500	0	0	1
	CL-ML2	Mohr-Coulomb	114	1,200	0	0	1
	Compacted SM	Mohr-Coulomb	125	0	32	0	1
	ML Mixture	Mohr-Coulomb	114	1,000	0	0	1
	ML-SM	Mohr-Coulomb	114	0	30	0	1
	ML-SM2	Mohr-Coulomb	115	0	27	0	1
	No. 1 Stone	Mohr-Coulomb	125	0	37	0	1
	Sand and Gravel	Mohr-Coulomb	120	0	34	0	1
	Sand and Gravel 2	Mohr-Coulomb	117	0	32	0	1
	SP-Vegetated Sand Fill	Mohr-Coulomb	100	0	32	0	1
	SW to SM	Mohr-Coulomb	117	0	34	0	1



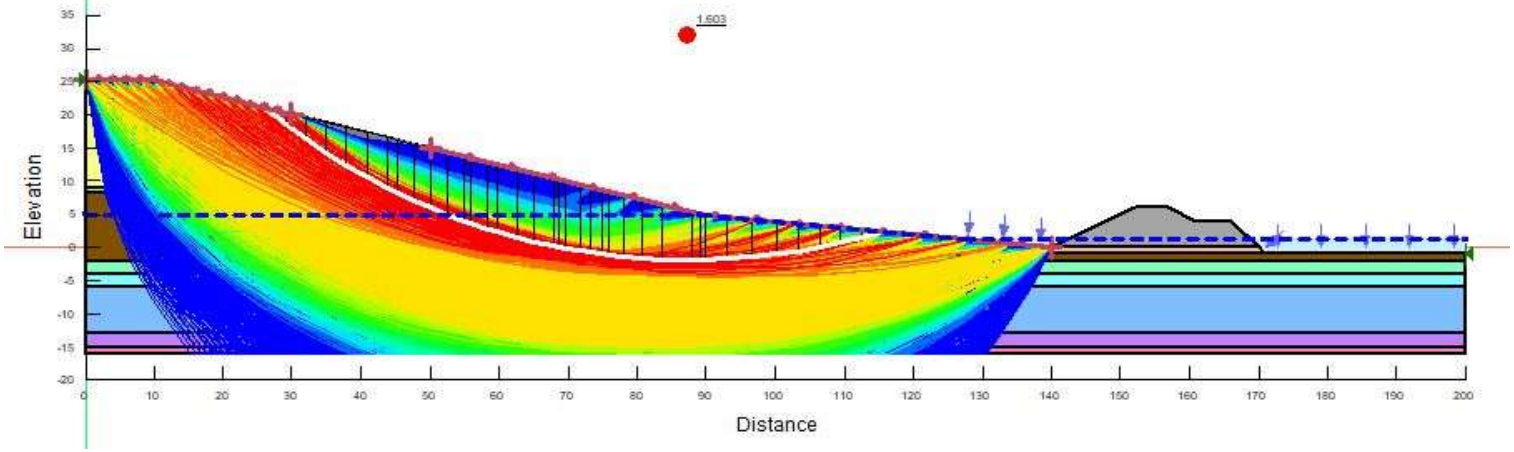
Newport News James River Shoreline Protection CAP Section 14
Newport News, Virginia
4H:1V Living Shoreline with Vegetated Berm Case 1 End of Construction

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
	Class III Rip-rap	Mohr-Coulomb	140	0	42	0	1
	CL-ML	Mohr-Coulomb	111	500	0	0	1
	CL-ML2	Mohr-Coulomb	114	1,200	0	0	1
	Compacted SM	Mohr-Coulomb	125	0	32	0	1
	ML Mixture	Mohr-Coulomb	114	1,000	0	0	1
	ML-SM	Mohr-Coulomb	114	0	30	0	1
	ML-SM2	Mohr-Coulomb	115	0	27	0	1
	No. 1 Stone	Mohr-Coulomb	125	0	37	0	1
	Sand and Gravel	Mohr-Coulomb	120	0	34	0	1
	Sand and Gravel 2	Mohr-Coulomb	117	0	32	0	1
	SP-Vegetated Sand Fill	Mohr-Coulomb	100	0	32	0	1
	SW to SM	Mohr-Coulomb	117	0	34	0	1



Newport News James River Shoreline Protection CAP Section 14
Newport News, Virginia
4H:1V Living Shoreline with Vegetated Berm Case 2 Long Term

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
	Class II Rip-rap	Mohr-Coulomb	140	0	42	0	1
	CL-ML	Mohr-Coulomb	111	15	22	0	1
	CL-ML2	Mohr-Coulomb	114	20	26	0	1
	Compacted SM	Mohr-Coulomb	125	0	32	0	1
	ML Mixture	Mohr-Coulomb	114	10	25	0	1
	ML-SM	Mohr-Coulomb	114	0	30	0	1
	ML-SM2	Mohr-Coulomb	115	0	27	0	1
	No. 1 Stone	Mohr-Coulomb	125	0	37	0	1
	Sand and Gravel	Mohr-Coulomb	120	0	34	0	1
	Sand and Gravel 2	Mohr-Coulomb	117	0	32	0	1
	SP-Vegetated Sand Fill	Mohr-Coulomb	100	0	32	0	1
	SW to SM	Mohr-Coulomb	117	0	34	0	1



ATTACHMENT 5: SCHNABEL GEOTECHNICAL REPORT PROVIDED BY NEWPORT NEWS

GEOTECHNICAL ENGINEERING DATA REPORT

James River Bank Stabilization Project
North Avenue and River Road
Newport News, Virginia

Schnabel Reference #13633033
May 10, 2013

Prepared For:
CH2M Hill

Schnabel ENGINEERING

Schnabel ENGINEERING

May 10, 2013

Tim Hare, PE
CH2M Hill
5700 Cleveland Street
Suite 101
Virginia Beach, VA 23462

Subject: **Project #13633033, Geotechnical Engineering Data Report, James River Bank Stabilization Project, North Avenue and River Road, Newport News, Virginia**

Dear Tim:

SCHNABEL ENGINEERING CONSULTANTS, INC. (Schnabel) is pleased to submit our geotechnical engineering data report for this project. This document includes tables, figures, and appendices with relevant data collected for this report. These services were performed in accordance with RFP Solicitation No. 432083-2013-02 as authorized by Purchase Order 432083-1000.

SCOPE OF SERVICES

The scope of services includes the following: subsurface exploration, field engineering services, and a geotechnical engineering data report. The subsurface exploration included four Cone Penetration Tests (CPT) for the project.

PROJECT DESCRIPTION

Site Description

The site is located along the east bank of the James River west of River Road between about North and South Avenues in Newport News, Virginia. The section of the bank is approximately 600 ft long. The shore line in this area has been severely eroded by wind and wave action from the James River. Slopes along this section of the river front are about 25 ft to 30 ft high with slope angles generally exceeding1H:1V. Several areas have sloughed on to the narrow shore line. Surface cracks along the top of the slope indicating potential slope failures were observed in several areas.

The shoreline at the toe of the slope visually appears stable. There is a mix of riprap, pieces of concrete, and other large debris along the toe of the slope and the shoreline. Vegetation on the slopes is generally brush and small saplings.

We obtained the site information from our site reconnaissance in January 2013 and May 2013. A Site Vicinity Map is included as Figure 1.

Regional Geology

We reviewed existing geologic data and information in our files. Based on this review, the project site is underlain by the Norfolk Formation, which overlies the Miocene Age deposits of the Yorktown Formation.

The Norfolk Formation is composed of fluvial and estuarine beach and nearshore marine sand, clayey sand, organic silt, peat, and clay. The Yorktown Formation typically consists of silty sands and clayey sands containing shell fragments. It is known to be a pre-consolidated and exhibits high strength and low compressibility.

The geologic data and information above is based on geologic map information for the site and test boring data from our files that we have obtained in the vicinity of the site. Test borings, including Standard Penetration Test (SPT) data, were not conducted as part of this study. Upon review of the CPT data and data in our files, it does not appear the Yorktown Formation was encountered during subsurface exploration.

SUBSURFACE EXPLORATION

We conducted a subsurface exploration and field testing program to identify the subsurface stratigraphy underlying the site and to evaluate the geotechnical properties of the materials encountered. This program included four Cone Penetrometer Tests. Exploration methods used are discussed below. The appendices contain the results of the exploration.

Subsurface Exploration Methods

Cone Penetrometer Test (CPT)

Schnabel's subcontractor, ConeTec, Inc., of Charles City, Virginia, performed four CPTs (CPT-01, CPT-02, CPT-03, and CPT-04) under our observation on May 2, 2013. The CPTs were conducted to a depth of 40 ft. Appendix A includes specific observations, remarks, and data for the soundings. Figure 2, included at the end of this report, indicates the approximate CPT locations. Coordinates for the CPT sounding locations were collected using a submeter GPS unit and are tabulated below in Table 1.

Table 1

CPT	Easting	Northing
CPT-01	12078855.511	3537765.570
CPT-02	12078916.381	3537650.199
CPT-03	12079030.246	3537432.179
CPT-04	12079099.605	3537311.010

SITE GEOLOGY AND SUBSURFACE CONDITIONS

Generalized Subsurface Stratigraphy

We characterized the following generalized subsurface stratigraphy and selected parameters at each CPT location based on the exploration included in the appendices. Detailed parameters versus depth are included in the Tables in Appendix B.

Ground Surface Material

Approximately 0.2 ft of rootmat and topsoil were measured at the CPT locations.

The CPT sounding data provided by ConeTec, Inc. generally indicates four strata types encountered during the subsurface exploration; sands and sand mixtures, silt mixtures, and clays. We have designated the strata as follows:

- Stratum A, sands and sand mixtures and gravelly sands (gravelly sands only encountered in CPT-04**.** Stratum A includes well-graded and poorly graded sands with varying amounts of gravel, silt, and clay, classifying (SW, SP, SW-SM, SW-SC, SP-SM, SP-SC, SM, SC, and SC-SM) and well-graded and poorly graded gravel with varying amounts of sand, silt, and clay (GW, GP, GW-GM, GW-GC, GP-GM, GP-GC, GM, GC, and GC-GM).
- Stratum B, Silt mixtures. Stratum B includes silts and elastic silts with varying amounts of clay, gravel, sand, and organics classifying (ML, OL, CL-ML, MH, and OH).
- Stratum C, clays. Stratum C includes clays with varying amounts of sand, gravel, and silt classifying (CL, CL-ML, and MH).

CPT-01

Stratum A sands were encountered from depths of about 0.2 ft to 13.8 ft and from about 28.1 ft to 29 ft. Soils at these depths indicated a relative density ranging from about 111 to 124 pcf, friction angles ranging from about 32 to 40 deg., and undrained shear strength values ranging from about 0.4 to 1.3 tsf.

Stratum B silt mixtures were encountered from a depth of about 13.8 ft to 15.6 ft. Soils at this depth indicated a relative density of about 114 pcf, friction angles ranging from about 30 to 31 deg., and undrained shear strength values ranging from 0.6 to 1 tsf.

Stratum C clays were encountered from a depth of about 15.6 ft to 28.1 ft. Soils at this depth indicated a relative density ranging from about 111 to about 115 pcf and undrained shear strength values ranging from 0.2 to 0.5 tsf.

Interbedded layers of Stratum B and C soils were encountered from depths of about 29 ft to 40 ft. Soils at this depth indicated a relative density ranging from about 111 to 121 pcf, friction angles ranging from about 0 to 37 deg., and undrained shear strength values ranging from about 0 to 2.6 tsf.

CPT-02

Stratum A sands were encountered from a depth of about 0.2 ft to 14.5 ft. Soils at this depth indicated a relative density ranging from about 114 to 124 pcf, friction angles ranging from about 0 to 41 deg., and undrained shear strength values ranging from about 0 to 1.1 tsf.

Interbedded layers of Stratum B and C soils were encountered from a depth of about 14.5 ft to 16.8 ft. Soils at this depth indicated a relative density ranging from about 111 to 114 pcf, friction angles ranging from about 0 to 32 deg., and undrained shear strength values ranging from about 0 to 0.8 tsf.

Stratum C clays were encountered from a depth of about 16.8 ft to 26.2 ft. Soils at this depth indicated a relative density ranging from about 111 to 114 pcf and undrained shear strength values ranging from about 0.2 to 0.5 tsf.

Interbedded layers of Stratum A, B, and C soils were encountered from a depth of about 26.2 ft to 40 ft. Soils at this depth indicate a relative density ranging from about 111 to 124 pcf, friction angles ranging from about 0 to 41 deg., and undrained shear strength values ranging from about 0 to 2.4 tsf.

CPT-03

Stratum A sands were encountered from a depth of about 0.2 ft to 14.6 ft. Soils at this depth indicate a relative density ranging from about 114 to 121 pcf, friction angles ranging from about 31 to 41 deg., and undrained shear strength values ranging from about 0 to 1.4 tsf.

Stratum B silt mixtures were encountered from a depth of about 14.6 ft to 16.1 ft. Soils at this depth indicate a relative density of about 114 pcf, friction angles ranging from about 0 to 32 deg., and undrained shear strength values ranging from about 0 to 0.8 tsf.

Stratum C clays were encountered from depths of about 16.1 ft to 26 ft and 30 ft to 38.6 ft. Soils at this depth indicate a relative density ranging from about 111 to 121 pcf and undrained shear strength values ranging from about 0 to 2.9 tsf.

Interbedded layers of Stratum A and B soils were encountered from a depth of about 26 ft to 30 ft. Soils at this depth indicate a relative density ranging from about 114 to 127 pcf, friction angles ranging from about 0 to 43 deg., and undrained shear strength values ranging from about 0 to 2.4 tsf.

Interbedded layers of Stratum B and C soils were encountered from a depth of about 38.6 ft to 40 ft. Soils at this depth indicate a relative density of about 114 to 121 pcf, friction angles ranging from about 28 to 34 deg., and undrained shear strength values of about 0 tsf.

CPT-04

Stratum A sands were encountered from a depth of about 0.2 ft to 14.6 ft. Soils at this depth indicate a relative density of about 114 to 121 pcf, friction angles ranging from about 0 to 42 deg., and undrained shear strength values ranging from about 0 to 1.3 tsf.

Stratum C clays were encountered from a depth of about 14.6 ft to 25 ft. Soils at this depth indicate a relative density ranging from about 114 to 127 pcf and undrained shear strengths ranging from about 0 to 0.2 tsf.

Stratum A, B, and C soils were encountered from a depth of about 25 ft to 40 ft. Soils at this depth indicate a relative density of about 114 to 127 pcf, friction angles ranging from about 0 to 43 deg., and undrained shear strength values ranging from about 0 to 2.8 tsf.

Groundwater

Groundwater was encountered in each of the four CPT locations at depths of about 19.0 to 28.0 ft below the ground surface. The sounding logs in Appendix A include groundwater observations obtained during the subsurface exploration.

The groundwater levels on the logs indicate the estimate of the hydrostatic water table at the time of the subsurface exploration. The final design should anticipate the fluctuation of the hydrostatic water table depending on variations in precipitation, surface runoff, pumping, tidal action, river levels, evaporation, leaking utilities, and similar factors.

General Recommendations

This report may be made available to prospective bidders for informational purposes. We recommend that the project specifications contain the following statement:

> *Schnabel Engineering Consultants, Inc., has prepared this geotechnical engineering data report for this project. This report is for informational purposes only and is not part of the contract documents. The opinions expressed represent the Geotechnical Engineer's interpretation of the subsurface conditions, tests, and the results of analyses conducted. Should the data contained in this report not be adequate for the Contractor's purposes, the Contractor may make, before bidding, independent exploration, tests and analyses. This report may be examined by bidders at the office of the Owner, or copies may be obtained from the Owner at nominal charge.*

Additional data and reports prepared by others that could have an impact upon the Contractor's bid should also be made available to prospective bidders for informational purposes.

LIMITATIONS

We submitted this data report based on the information revealed by the subsurface exploration. We attempted to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during construction.

This report has been prepared to aid in the evaluation of this site and to assist in the design of the project. It is intended for use concerning this specific project.

We have endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality

and under similar conditions as this project. No other representation, express or implied, is included or intended, and no warranty or guarantee is included or intended in this report, or other instrument of service.

We appreciate the opportunity to be of service for this project. Please call us if you have any questions regarding this report.

Sincerely,

SCHNABEL ENGINEERING CONSULTANTS, INC.

Russell W. Rountree
Senior Staff Scientist

Frank J. Romano, E.I.T.
Senior Staff Engineer

Gilbert T. Seese, PE
Principal

RWR:FJR:GTS:dah

Figures
Appendix A: Subsurface Exploration Data
Appendix B: ConeTec CPT Interpretations

Distribution:
CH2MHill
Attn: Tim Hare, PE

FIGURES

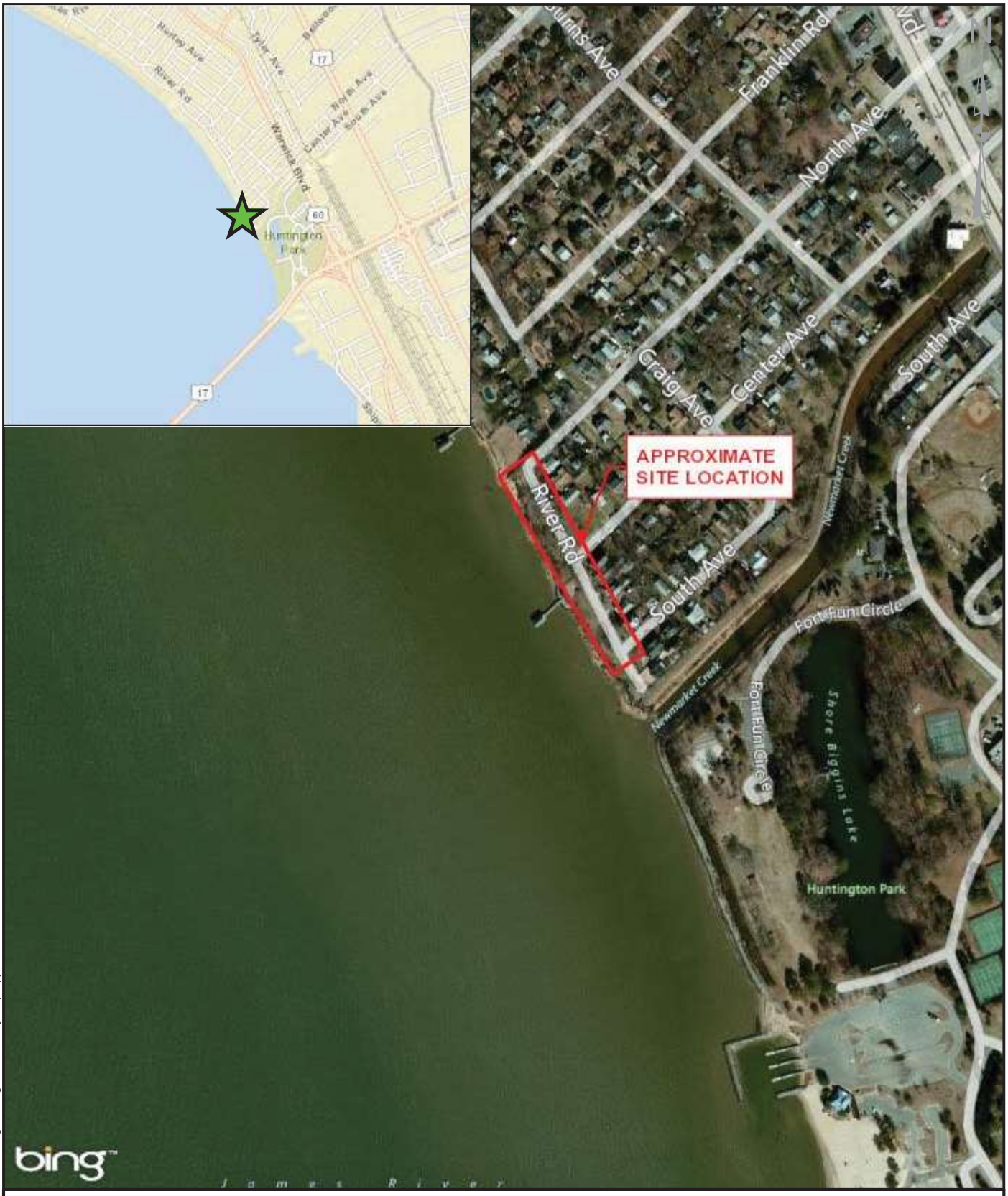


Image courtesy of USGS © 2013 Microsoft Corporation © 2010 NAVTEQ © AND
Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2012
Projection: WGS 1984 Web Mercator Auxiliary Sphere

0 250 500 1,000 Feet

Scale: 1 in = 500 feet

Schnabel ENGINEERING

JAMES RIVER BANK STABILIZATION
RIVER ROAD, NEWPORT NEWS, VIRGINIA

PROJECT NO. 13633033

SITE VICINITY MAP

FIGURE 1

Schnabel ENGINEERING	JAMES RIVER BANK STABILIZATION RIVER ROAD NEWPORT NEWS, VIRGINIA	Figure Name: CONE PENETROMETER LOCATION PLAN	Done: F. ROMANO	Figure Number: 2
		Project Number: 13633033	Reviewed: G. SEESE	Date: MAY 2013

APPENDIX A

SUBSURFACE EXPLORATION DATA

ConeTec, Inc., CPTu Testing Report (18 Pages)

ConeTec Inc.

Geotechnical and Environmental Site Investigation Contractors

606-S Roxbury Industrial Center, Charles City, VA 23030 • Tel: (804) 966-5696 • Fax: (804) 966-5697
• E-mail: virginia@conetec.com • Website: www.conetec.com

May 3, 2013

Mr. Gib Seese, P.E.
Schnabel Engineering
300 Ed Wright Lane
Suite I
Newport News, VA 23606

Dear Gib,

Re: CPTu Testing
James River Bank Stabilization; Newport News, VA

We are pleased to enclose our data submission for the CPTu testing that ConeTec performed for you at the above referenced site on May 2, 2013.

Four cone penetration tests (CPTu) were completed to depths up to approximately 40 feet beneath the existing ground surface. A compression model electronic piezo cone penetrometer, with a 15 cm^2 tip and a 225 cm^2 friction sleeve, was used. The cone is designed with an equal end area friction sleeve and a tip end area ratio of 0.80. At the beginning of the sounding, the cone was outfitted with a vacuum-saturated, six millimeter-thick, porous plastic pore pressure element that is located immediately behind the tip (the U_2 location).

The cone was advanced using a 25-ton truck-mounted cone penetration rig. As the cone was advanced into the ground, tip resistance (qc), sleeve friction (fs) and dynamic pore water pressure (U) were recorded every five centimeters (approximately every two inches) and are included in the attached file. A tabular output of this data and summary of engineering parameters, is included in the .xls files.

Thank you very much for using ConeTec. It was a pleasure working with you and your staff and we look forward to working with you again in the future. If you have any questions or require additional information, please do not hesitate to contact us.

Best regards,

Alan Sweeney
ConeTec, Inc.

James River Bank Stabilization

Thursday, May 02, 2013
13-54031

Table 1: Sounding Information Table

Test Type	Sounding Number	Filename	Depth (ft)	Estimated GWT (ft)	Comments
CPTu	CPT-01	13-54031_CP01	40.0	23	
CPTu	CPT-02	13-54031_CP02	40.0	19	
CPTu	CPT-03	13-54031_CP03	40.2	28	
CPTu	CPT-04	13-54031_CP04	40.0	25	

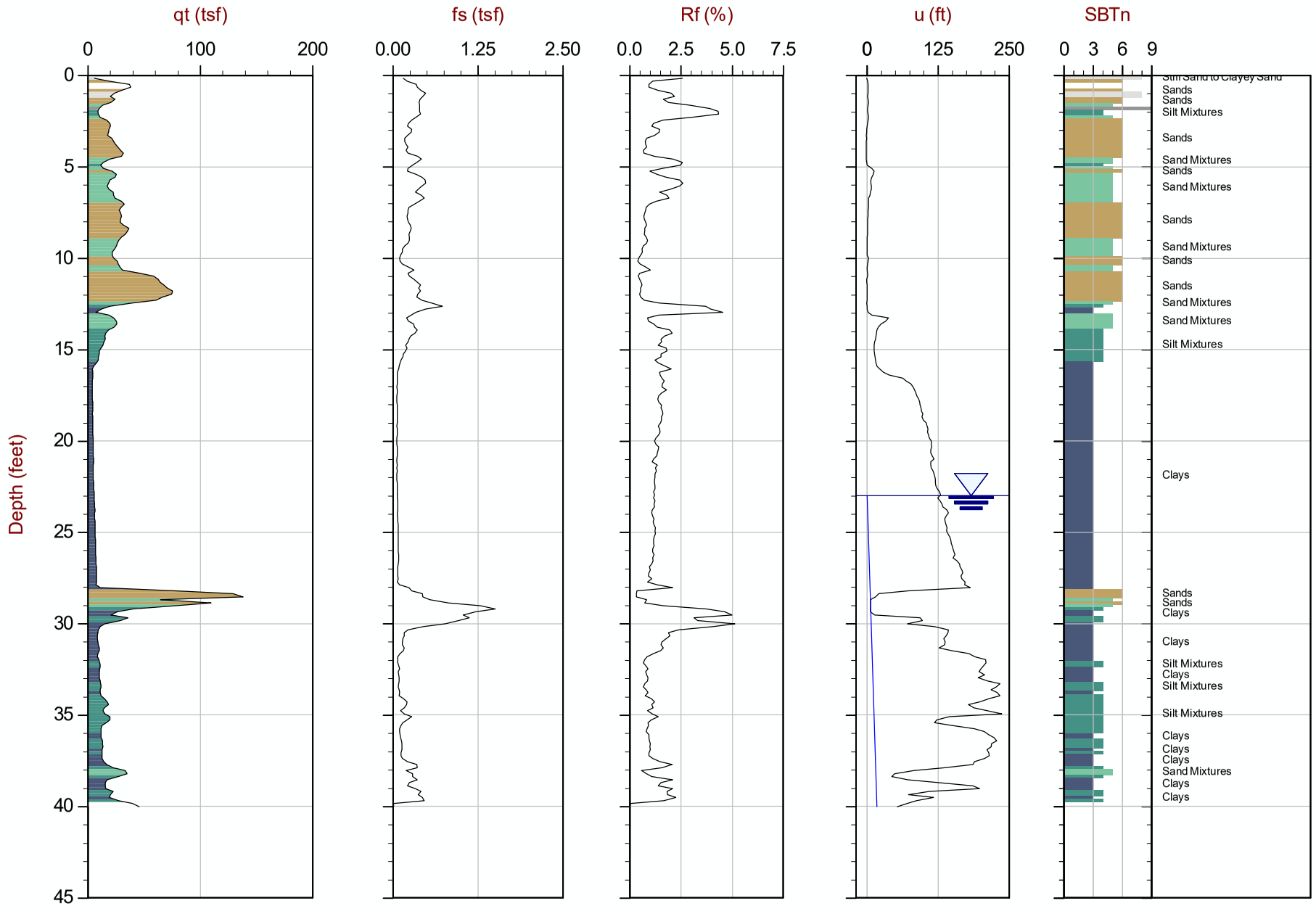
CPTu Plots

CONETEC

Schnabel

Job No: 13-54031
Date: 05:02:13 10:45
Site: James River Bank Stabilization

Sounding: CPT-01
Cone: 184:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 13-54031_CP01.COR
Unit Wt: SBT Chart Soil Zones

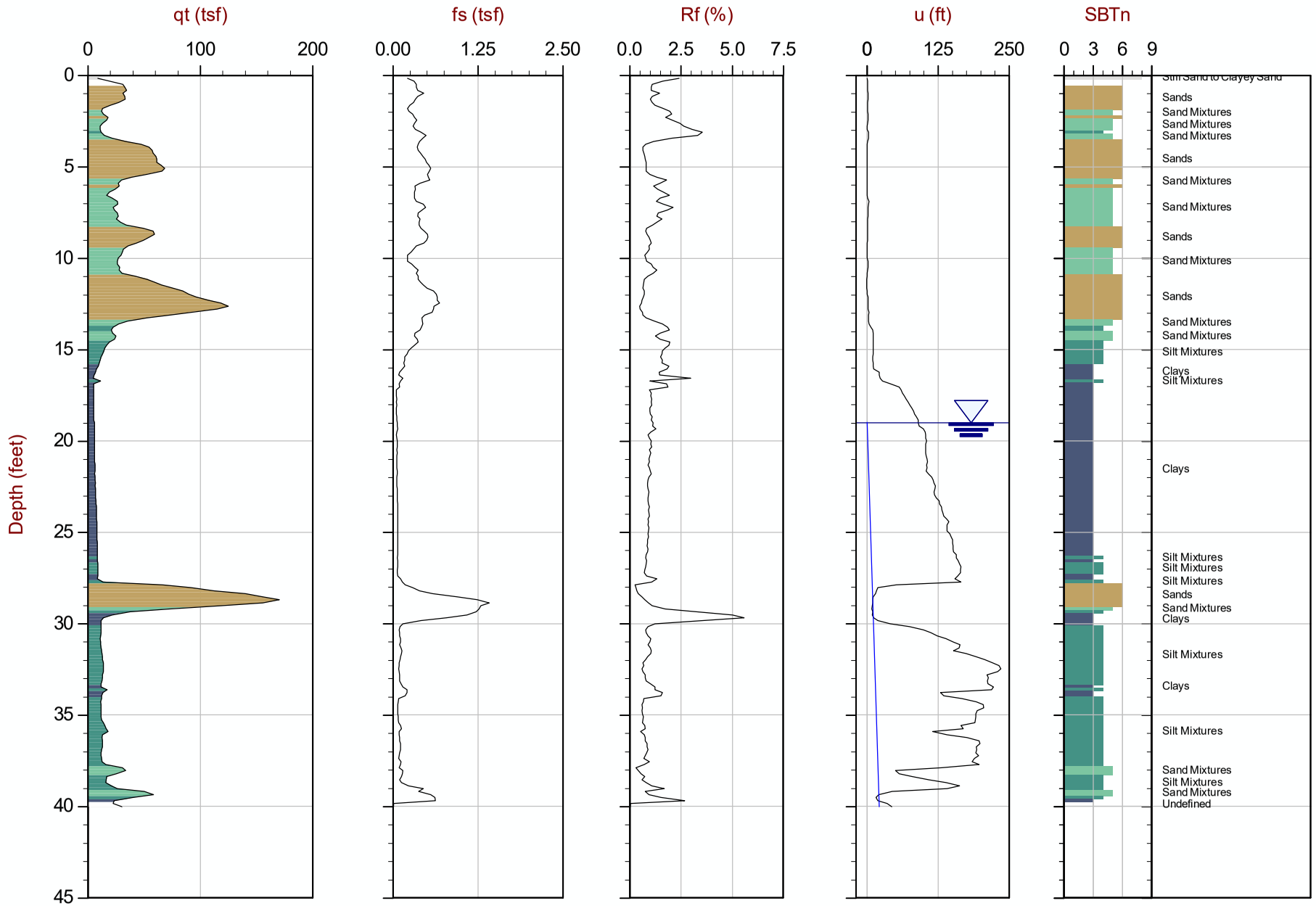
SBT: Lunne, Robertson and Powell, 1997

CONETEC

Schnabel

Job No: 13-54031
Date: 05:02:13 09:54
Site: James River Bank Stabilization

Sounding: CPT-02
Cone: 184:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 13-54031_CP02.COR
Unit Wt: SBT Chart Soil Zones

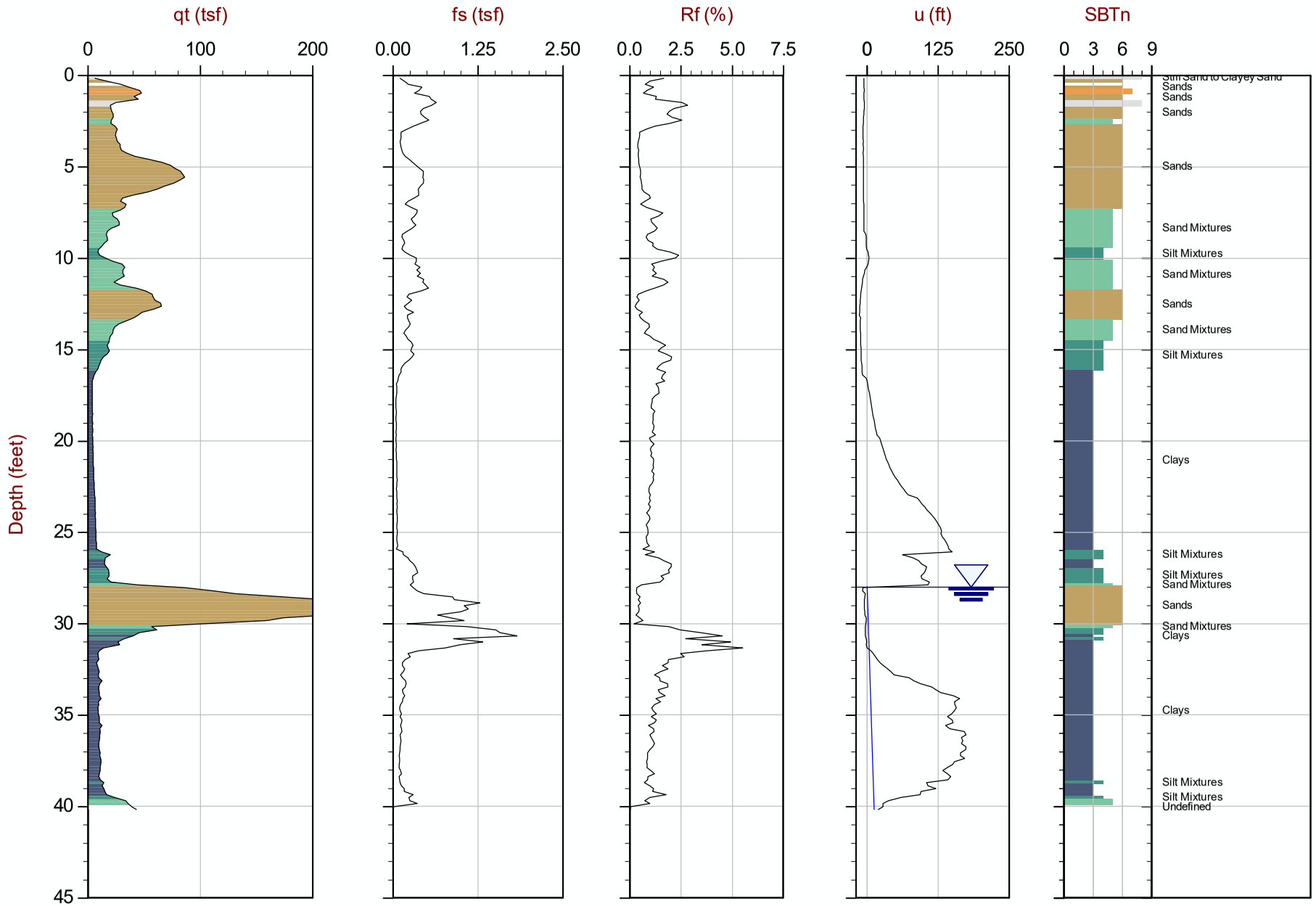
SBT: Lunne, Robertson and Powell, 1997

CONETEC

Schnabel

Job No: 13-54031
Date: 05:02:13 12:35
Site: James River Bank Stabilization

Sounding: CPT-03
Cone: 184:T1500F15U500



Max Depth: 12.250 m / 40.19 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 13-54031_CP03.COR
Unit Wt: SBT Chart Soil Zones

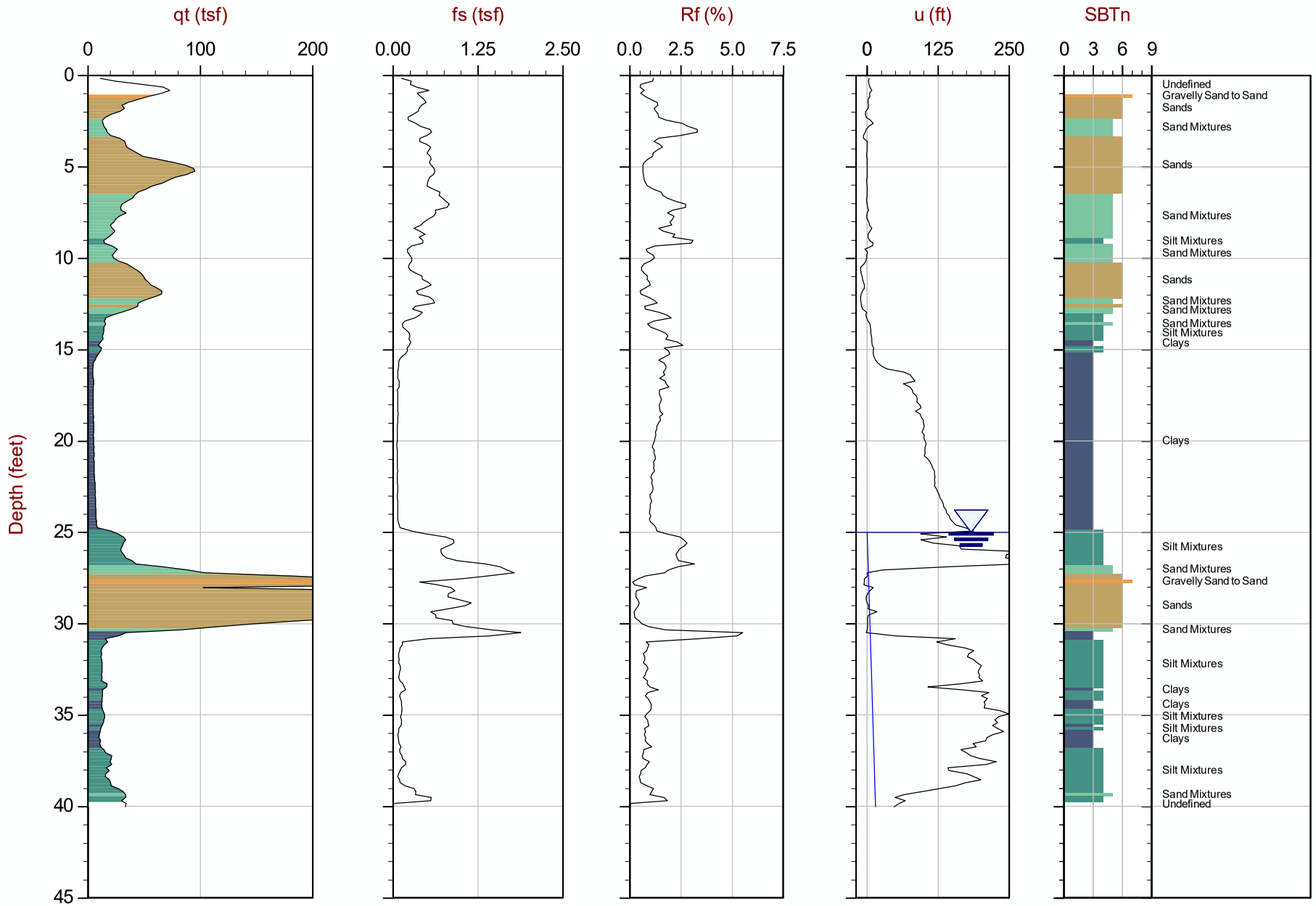
SBT: Lunne, Robertson and Powell, 1997

CONETEC

Schnabel

Job No: 13-54031
Date: 05:02:13 11:53
Site: James River Bank Stabilization

Sounding: CPT-04
Cone: 184:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 13-54031_CP04.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

Interpretation Methods

CONETEC INTERPRETATION METHODS

A Detailed Description of the Methods Used in ConeTec's CPT Interpretation and Plotting Software

Revision SZW-Rev 05B

Revised April 25, 2013

Prepared by Jim Greig

ConeTec Interpretations as of April 25, 2013

ConeTec's interpretation routine provides a tabular output of geotechnical parameters based on current published CPT correlations and is subject to change to reflect the current state of practice. The interpreted values are not considered valid for all soil types. The interpretations are presented only as a guide for geotechnical use and should be carefully scrutinized for consideration in any geotechnical design. Reference to current literature is strongly recommended. ConeTec does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the program and does not assume liability for any use of the results in any design or review. Representative hand calculations should be made for any parameter that is critical for design purposes. The end user of the interpreted output should also be fully aware of the techniques and the limitations of any method used in this program. The purpose of this document is to inform the user as to which methods were used and what the appropriate papers and/or publications are for further reference.

The CPT interpretations are based on values of tip, sleeve friction and pore pressure averaged over a user specified interval (e.g. 0.20m). Note that q_t is the tip resistance corrected for pore pressure effects and q_c is the recorded tip resistance. Since all ConeTec cones have equal end area friction sleeves, pore pressure corrections to sleeve friction, f_s, are not required.

The tip correction is: $q_t = q_c + (1-a) \cdot u_2$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the cone (typically 0.80 for ConeTec cones)

The total stress calculations are based on soil unit weights that have been assigned to the Soil Behavior Type zones, from a user defined unit weight profile or by using a single value throughout the profile.

Effective vertical overburden stresses are calculated based on a hydrostatic distribution of equilibrium pore pressures below the water table or from a user defined equilibrium pore pressure profile (this can be obtained from CPT dissipation tests). For over water projects the effects of the column of water have been taken into account as has the appropriate unit weight of water. How this is done depends on where the instruments were zeroed (i.e. on deck or at mud line).

Details regarding the interpretation methods for all of the interpreted parameters are provided in Table 1. The appropriate references cited in Table 1 are listed in Table 2. Where methods are based on charts or techniques that are too complex to describe in this summary the user should refer to the cited material.

The Soil Behavior Type classification charts (normalized and non-normalized) shown in Figures 1 and 2 are based on the charts developed by Dr. Robertson and Dr. Campanella at the University of British Columbia. These charts appear in many publications, most notably: Robertson, Campanella, Gillespie and Greig (1986); Robertson (1990) and Lunne, Robertson and Powell (1997). The Bq classification charts shown in Figures 3a and 3b are based on those described in Robertson (1990) and Lunne, Robertson and Powell (1997). The Jefferies and Davies SBT chart shown in Figure 3c is based on that discussed in Jefferies and Davies, 1993.

Where the results of a calculation/interpretation are declared *'invalid'* the value will be represented by the text strings "-9999" or "-9999.0". In some cases the value 0 will be used. Invalid results will occur because of (and not limited to) one or a combination of:

1. Invalid or undefined CPT data (e.g. drilled out section or data gap).

2. Where the interpretation method is inappropriate, for example, drained parameters in an undrained material (and vice versa).

3. Where interpretation input values are beyond the range of the referenced charts or specified limitations of the interpretation method.

4. Where pre-requisite or intermediate interpretation calculations are invalid.

The parameters selected for output from the program are often specific to a particular project. As such, not all of the interpreted parameters listed in Table 1 may be included in the output files delivered with this report.

The output files are provided in Microsoft Excel XLS format. The ConeTec software has several options for output depending on the number or types of interpreted parameters desired. Each output file will be named using the original COR file basename followed by a three or four letter indicator of the interpretation set selected (e.g. BSC, TBL, NLI or IFI) and possibly followed by an operator selected suffix identifying the characteristics of the particular interpretation run.

Table 1
CPT Interpretation Methods

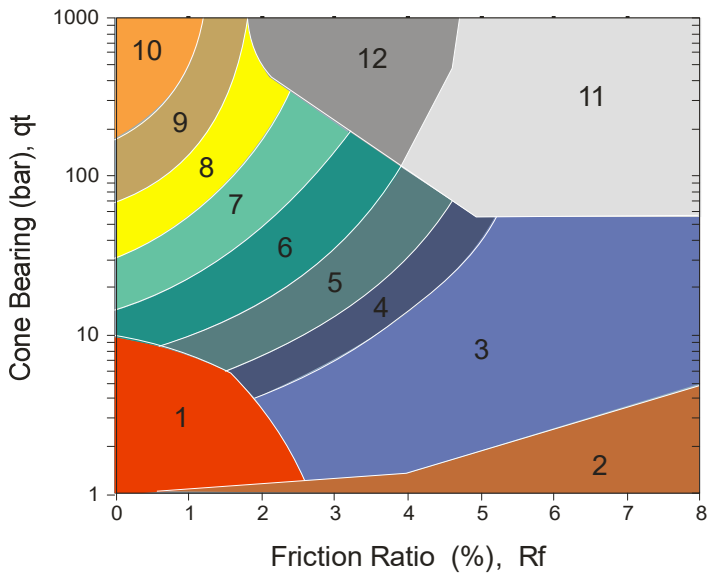
Interpreted Parameter	Description	Equation	Ref
Depth	Mid Layer Depth *(where interpretations are done at each point then Mid Layer Depth = Recorded Depth)*	*Depth (Layer Top) + Depth (Layer Bottom) / 2.0*	
Elevation	Elevation of Mid Layer based on sounding collar elevation supplied by client	Elevation = Collar Elevation - Depth	
Avgqc	Averaged recorded tip value (q_c)	$Avgqc = \frac{1}{n}\sum_{i=1}^{n} q_c$ *n=1 when interpretations are done at each point*	
Avgqt	Averaged corrected tip (q_t) where: $q_t = q_c + (1-a) \bullet u$	$Avgqt = \frac{1}{n}\sum_{i=1}^{n} q_t$ *n=1 when interpretations are done at each point*	
Avgfs	Averaged sleeve friction (f_s)	$Avgfs = \frac{1}{n}\sum_{i=1}^{n} fs$ *n=1 when interpretations are done at each point*	
AvgRf	Averaged friction ratio (Rf) where friction ratio is defined as: $Rf = 100\% \bullet \frac{fs}{qt}$	$AvgRf = 100\% \cdot \frac{Avgfs}{Avgqt}$ *n=1 when interpretations are done at each point*	
Avgu	Averaged dynamic pore pressure *(u)*	$Avgu = \frac{1}{n}\sum_{i=1}^{n} u_i$ *n=1 when interpretations are done at each point*	
AvgRes	Averaged Resistivity (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} RESISTIVITY_i$ *n=1 when interpretations are done at each point*	
AvgUVIF	Averaged UVIF ultra-violet induced fluorescence (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} UVIF_i$ *n=1 when interpretations are done at each point*	
AvgTemp	Averaged Temperature (this data is not always available since it is a specialized test)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} TEMPERATURE_i$ *n=1 when interpretations are done at each point*	

Interpreted Parameter	Description	Equation	Ref
AvgGamma	Averaged Gamma Counts (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} GAMMA_i$ *n=1 when interpretations are done at each point*	
SBT	Soil Behavior Type as defined by Robertson and Campanella	See Figure 1	2, 5
U.Wt.	Unit Weight of soil determined from one of the following user selectable options: 1) uniform value 2) value assigned to each SBT zone 3) user supplied unit weight profile	See references	5
T. Stress σ_v	Total vertical overburden stress at Mid Layer Depth. *A layer is defined as the averaging interval specified by the user. For data interpreted at each point the Mid Layer Depth is the same as the recorded depth.*	$TStress = \sum_{i=1}^{n} \gamma_i h_i$ *where* γ_i is layer unit weight h_i is layer thickness	
E. Stress σ_v'	Effective vertical overburden stress at Mid Layer Depth	*Estress = Tstress - u_{eq}*	
Ueq	Equilibrium pore pressure determined from one of the following user selectable options: 1) hydrostatic from water table depth 2) user supplied profile	For hydrostatic option: $u_{eq} = \gamma_w \cdot (D - D_{wt})$ where u_{eq} is equilibrium pore pressure γ_w is unit weight of water D is the current depth D_{wt} is the depth to the water table	
Cn	SPT N_{60} overburden correction factor	*$Cn=(\sigma_v')^{-0.5}$* where *σ_v' is in tsf* *$0.5 < C_n < 2.0$*	
N_{60}	SPT N value at 60% energy calculated from qt/N ratios assigned to each SBT zone. This method has abrupt N value changes at zone boundaries.	*See Figure 1*	4, 5
$(N_1)_{60}$	SPT N_{60} value corrected for overburden pressure	*$(N_1)_{60} = Cn \cdot N_{60}$*	4
$N_{60}I_c$	SPT N_{60} values based on the Ic parameter	(qt/pa)/ N_{60} = 8.5 (1 – Ic/4.6)	5
$(N_1)_{60}$Ic	SPT N_{60} value corrected for overburden pressure (using N_{60} $I_{c)}$. User has 2 options.	*1) $(N_1)_{60}Ic = Cn \cdot (N_{60}\, Ic)$* 2) q_{c1n}/ *$(N_1)_{60}Ic$* = 8.5 (1 – Ic/4.6)	4 5
$(N_1)_{60cs}$Ic	Clean sand equivalent SPT $(N_1)_{60}$Ic. User has 3 options.	1) $(N_1)_{60cs}Ic = \alpha + \beta((N_1)_{60}Ic)$ 2) $(N_1)_{60cs}Ic = K_{SPT} * ((N_1)_{60}Ic)$ 3) $q_{c1ncs})/ (N_1)_{60cs}Ic = 8.5 (1 – Ic/4.6)$ FC ≤ 5%: α = 0, β=1.0 FC ≥ 35% α = 5.0, β=1.2 5% < FC < 35% $\alpha = \exp[1.76 – (190/FC^2)]$ $\beta = [0.99 + (FC^{1.5}/1000)]$	10 10 5
Su	Undrained shear strength based on q_t Su factor N_{kt} is user selectable	$Su = \frac{qt - \sigma_v}{N_{kt}}$	1, 5
Su	Undrained shear strength based on pore pressure Su factor $N_{\Delta u}$ is user selectable	$Su = \frac{u_2 - u_{eq}}{N_{\Delta u}}$	1, 5
k	Coefficient of permeability (assigned to each SBT zone)		5

Interpreted Parameter	Description	Equation	Ref
Bq	Pore pressure parameter	$Bq = \frac{\Delta u}{qt - \sigma_v}$ *where:* $\Delta u = u - u_{eq}$ *and u = dynamic pore pressure* *u_{eq} = equilibrium pore pressure*	1, 5
Q_t	Normalized q_t for Soil Behavior Type classification as defined by Robertson, 1990	$Qt = \frac{qt - \sigma_v}{\sigma'_v}$	2, 5
F_r	Normalized Friction Ratio for Soil Behavior Type classification as defined by Robertson, 1990	$Fr = 100\% \cdot \frac{fs}{qt - \sigma_v}$	2, 5
Net qt	Net tip resistance	$qt - \sigma_v$	
qe	Effective tip resistance	$qt - u_2$	
qeNorm	Normalized effective tip resistance	$\frac{qt - u_2}{\sigma'_v}$	
SBTn	Normalized Soil Behavior Type as defined by Robertson and Campanella	See Figure 2	2, 5
SBT-BQ	Non-normalized Soil Behavior type based on the Bq parameter	See Figure 3	2, 5
SBT-BQn	Normalized Soil Behavior based on the Bq parameter	See Figure 3	2, 5
SBT-JandD	Soil Behaviour Type as defined by Jeffries and Davies	See Figure 3	7
SBT-BQn	Normalized Soil Behavior base on the Bq parameter	See Figure 3	2, 5
I_c	Soil index for estimating grain characteristics	$Ic = [(3.47 - \log_{10}Q)^2 + (\log_{10} Fr + 1.22)^2]^{0.5}$ *Where:* $Q = \left(\frac{qt - \sigma_v}{P_{a2}}\right)\left(\frac{P_a}{\sigma'_v}\right)^n$ *And Fr is in percent* *P_a = atmospheric pressure* *P_{a2} = atmospheric pressure* *n varies from 0.5 to 1.0 and is selected in an iterative manner based on the resulting I_c*	3, 8
FC	Apparent fines content (%)	*FC=1.75($Ic^{3.25}$) - 3.7* *FC=100 for Ic > 3.5* *FC=0 for Ic < 1.26* *FC = 5% if 1.64 < Ic < 2.6 AND F_r<0.5*	3
Ic Zone	This parameter is the Soil Behavior Type zone based on the Ic parameter (valid for zones 2 through 7 on SBTn chart)	Ic < 1.31 Zone = 7 1.31 < Ic < 2.05 Zone = 6 2.05 < Ic < 2.60 Zone = 5 2.60 < Ic < 2.95 Zone = 4 2.95 < Ic < 3.60 Zone = 3 Ic > 3.60 Zone = 2	3
PHI ϕ	Friction Angle determined from one of the following user selectable options: a) Campanella and Robertson b) Durgunoglu and Mitchel c) Janbu d) Kulhawy and Mayne	See reference	5 5 5 11

Interpreted Parameter	Description	Equation	Ref
Dr	Relative Density determined from one of the following user selectable options: a) Ticino Sand b) Hokksund Sand c) Schmertmann 1976 d) Jamiolkowski - All Sands	See reference	5
OCR	Over Consolidation Ratio	a) Based on Schmertmann's method involving a plot of S_u/σ_v' /($S_u/\sigma_v')_{NC}$ and OCR where the Su/p' ratio for NC clay is user selectable	9
State Parameter	The state parameter is used to describe whether a soil is contractive (SP is positive) or dilative (SP is negative) at large strains based on the work by Been and Jefferies	See reference	8, 6, 5
Es/qt	Intermediate parameter for calculating Young's Modulus, E, in sands. It is the Y axis of the reference chart.	Based on Figure 5.59 in the reference	5
Young's Modulus E	Young's Modulus based on the work done in Italy. There are three types of sands considered in this technique. The user selects the appropriate type for the site from: a) OC Sands b) Aged NC Sands c) Recent NC Sands Each sand type has a family of curves that depend on mean normal stress. The program calculates mean normal stress and linearly interpolates between the two extremes provided in the Es/qt chart.	Mean normal stress is evaluated from: $\sigma_m' = \frac{1}{3}\left(\sigma_v' + \sigma_h' + \sigma_h'\right)^3$ where σ_v'= vertical effective stress σ_h'= horizontal effective stress and $\sigma_h = K_o \cdot \sigma_v'$ with Ko assumed to be 0.5	5
q_{c1}	q_t normalized for overburden stress used for seismic analysis	$q_{c1} = q_t \cdot (Pa/\sigma_v')^{0.5}$ where: Pa = atm. Pressure q_t is in MPa	3
q_{c1n}	q_{c1} in dimensionless form used for seismic analysis	$q_{c1n} = (q_{c1} / Pa)(Pa/\sigma_v')^n$ where: Pa = atm. Pressure and n ranges from 0.5 to 1.0 based on Ic.	3
K_{SPT}	Equivalent clean sand factor for $(N_1)60$	$K_{SPT} = 1 + ((0.75/30) \cdot (FC - 5))$	10
K_{CPT}	Equivalent clean sand correction for q_{c1N}	$K_{cpt} = 1.0$ for $I_c \leq 1.64$ $K_{cpt} = f(I_c)$ for $I_c > 1.64$ (see reference)	10
q_{c1ncs}	Clean sand equivalent q_{c1n}	$q_{c1ncs} = q_{c1n} \cdot K_{cpt}$	3
CRR	Cyclic Resistance Ratio (for Magnitude 7.5)	$q_{c1ncs} < 50$: $CRR_{7.5} = 0.833\ [(q_{c1ncs}/1000] + 0.05$ $50 \leq q_{c1ncs} < 160$: $CRR_{7.5} = 93\ [(q_{c1ncs}/1000]^3 + 0.08$	10

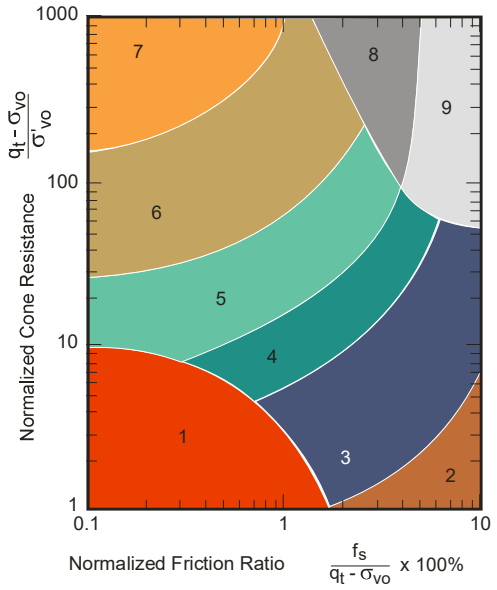
Interpreted Parameter	Description	Equation	Ref
CSR	Cyclic Stress Ratio	$CSR = (\tau_{av}/\sigma_v') = 0.65\ (a_{max} / g)\ (\sigma_v/ \sigma_v')\ r_d$ $r_d = 1.0 - 0.00765\ z$ $z \leq 9.15m$ $r_d = 1.174 - 0.0267\ z$ $9.15 < z \leq 23m$ $r_d = 0.744 - 0.008\ z$ $23 < z \leq 30m$ $r_d = 0.50$ $z > 30m$	10
MSF	Magnitude Scaling Factor	See Reference	10
FofS	Factor of Safety against Liquefaction	$FS = (CRR_{7.5} / CSR)\ MSF$	10
Liquefaction Status	Statement indicating possible liquefaction	Takes into account FofS and limitations based on I_c and q_{c1ncs}.	10
Cont/Dilat Tip	Contractive / Dilative qc1 Boundary based on $(N_1)_{60}$	$(\sigma_v')_{boundary} = 9.58 \times 10^{-4}\ [(N_1)_{60}]^{4.79}$ qc1 is calculated from specified qt(MPa)/N ratio	13
Cq	Normalizing Factor	$Cq = 1.8 / (0.8 + ((\sigma_v'/Pa))$	12
qc1 (Cq)	Normalized tip resistance based on Cq	$q_{c1} = C_q * q_t$ (some papers use q_c)	12
Su(Liq)/s'v	Liquefied Shear Strength Ratio	$\frac{Su(Liq)}{\sigma_v'} = 0.03 + 0.0143(q_{c1})$	13



Zone	qt / N	Soil Behavior Type
1	2	sensitive fine grained
2	1	organic material
3	1	clay
4	1.5	silty clay to clay
5	2	clayey silt to silty clay
6	2.5	sandy silt to clayey silt
7	3	silty sand to sandy silt
8	4	sand to silty sand
9	5	sand
10	6	gravelly sand to sand
11	1	very stiff fine grained *
12	2	sand to clayey sand *

* overconsolidated or cemented

Figure 1 Non-Normalized Behavior Type Classification Chart



Zone	Normalized Soil Behavior Type
1	sensitive fine grained
2	organic material
3	clay to silty clay
4	clayey silt to silty clay
5	silty sand to sandy silt
6	clean sands to silty sands
7	gravelly sand to sand
8	very stiff sand to clayey sand
9	very stiff fine grained

Figure 2 Normalized Behavior Type Classification Chart

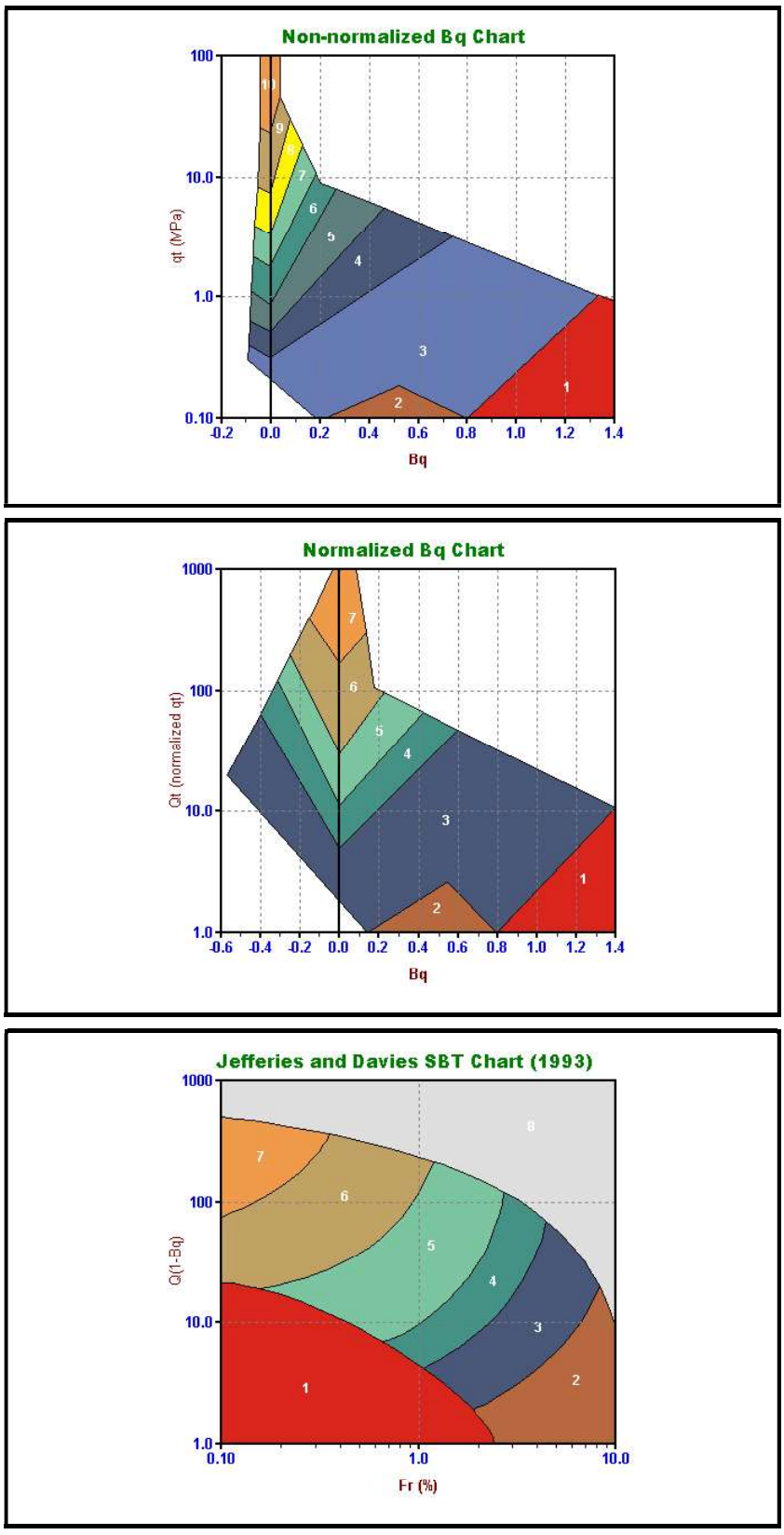


Figure 3 – Alternate Soil Behaviour Type Charts

Table 2 References

No.	References
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12	Olson, S.M. and Stark, T.D., 2002, "Liquefied strength ratio from liquefied flow filaure case histories", Canadian Geotechnical Journal, 39: 951-966.
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APPENDIX B

CPT DATA TABLES

ConeTec Interpretations (12 Pages)

	A	B	C	D	E	F	G	H	I	J
1		ConeTec CPT Interpretations								
2		Interpretation Output - SCREENzW Version 1.19 - Dec 18 2012								
3		DAS Version: W47								
4		Interpretation Format:			All but Liquefaction Parameters (NLI)					
5		Run ID:			1367593883					
6		Job No:			13-54031					
7		Client:			Schnabel					
8		Project:			James River Bank Stabilization					
9		Facility:			James River Bank Stabilization					
10		Sounding ID:			CPT-01					
11		Cone ID:			184:T1500F15U500					
12		Operator:			BK-AS					
13		CPT Date:			May-02-2013					
14		CPT Time:			10:45					
15		CPT File:			13-54031_CP01.COR					
16										
17		Tip Units:			tsf					
18		Sleeve Units:			tsf					
19		PP Units:			ft					
20		Tip Conversion to bar:			0.9580					
21		Sleeve Conversion to bar:			0.9580					
22		PP Conversion to meters:			0.3050					
23										
24		Col 5 (Extra Module) Parameter			N/A					
25		Col 5 (Extra Module) Units			N/A					
26										
27		Coord Source:			GPS					
28		Coord Type:			LATLONG					
29		UTM Zone:			N/A					
30		Easting / Long:			-76.458592					
31		Northing / Lat:			37.021410					
32		Elevation:			0.000					
33										
34		Tip Net Area Ratio:			0.80					
35		Unit Weight of Soil Base:			Based on Soil Zones					
36		Unit Weight of Soil (Def):			19.00	kN/m^3	120.91	pcf		
37		Unit Weight of Water:			9.81	kN/m^3	62.43	pcf		
38		Equilibrium U Profile Used:			No					
39		Soil Unit Weight Profile Used:			No					
40		Water Table			7.01	m	23.00	ft		
41		Averaging Interval:			0.00	m	0.00	ft		
42										
43		Su Factors Nkt and Ndu:			15.0	8.0				
44		Cn Exp. and Limits:			0.50	0.00	1.70			
45		Qc1 Exp. and Limits:			0.50	0.00	1.70			
46		State Parameter M:			1.20					
47		NC Su / p':			0.30					
48		Relative Density Method:			All Sands - Jamilokowski (1985)					
49		Phi Angle Method:			Kulhawy and Mayne (1990)					
50		Youngs Modulus Sand Type:			Recent					
51		N160Ic Method:			Based on qc1n					
52										

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR
53	Depth	Depth	Elev	Elev	Avg qt	Avg fs	Avg u	Avg Rf	SBT	SBTn	SBT Bq	SBT Bqn	SBT JandD	Unit Wt.	TStress	EStress	Equil u	Equil u	Cn	N(60)	N1(60)	N60 (Ic)	N160 (Ic)	Norm: Qt	Norm: Fr	Net qt	Delta U/qt	Bq	Q(1-Bq)	qe	qeNorm	Ic	FC	Dr	Phi	State Parm	Es/qt	Es	Su (Nkt)	Su (Ndu)	OCR	qc1 (Cn)	qc1	qc1n
54	m	ft	m	ft	tsf	tsf	ft	%						pcf	tsf	tsf	tsf	ft		bpf	bpf	bpf	bpf		%	tsf				MPa			%	%	deg			tsf	tsf	tsf		MPa		
55	0.050	0.164	-0.050	-0.164	6.077	0.157	-0.450	2.583	4	8	5	7	8	114.551	0.009	0.009	0.000	0.000	1.700	3.881	6.598	1.927	3.275	645.883	2.587	6.068	-0.002	-0.002	647.379	0.584	648.378	2.965	56.136	0.000	0.000	0.000	0.000	0.000	0.405	0.000	10.000	0.990	9.897	9.897
56	0.100	0.328	-0.100	-0.328	18.615	0.209	0.780	1.123	6	6	6	7	8	114.551	0.019	0.019	0.000	0.000	1.700	7.133	12.126	4.308	7.323	989.725	1.124	18.596	0.001	0.001	988.428	1.781	989.429	2.360	24.799	75.432	33.898	-0.419	3.727	69.412	0.000	0.000	0.000	3.032	30.316	30.316
57	0.150	0.492	-0.150	-0.492	36.800	0.343	1.650	0.932	7	0	8	0	0	117.733	0.028	0.028	0.000	0.000	1.700	11.752	19.978	7.537	12.813	1298.712	0.933	36.772	0.001	0.001	1296.892	3.521	1297.893	2.069	14.881	89.090	37.154	-0.421	2.680	98.683	0.000	0.000	0.000	5.993	59.933	59.933
58	0.200	0.656	-0.200	-0.656	38.020	0.362	1.560	0.952	7	0	8	0	8	117.733	0.038	0.038	0.000	0.000	1.700	12.141	20.640	7.768	13.206	1000.317	0.953	37.982	0.001	0.001	999.034	3.638	1000.035	2.063	14.702	85.820	37.310	-0.399	2.637	100.292	0.000	0.000	0.000	6.192	61.919	61.919
59	0.250	0.820	-0.250	-0.820	29.899	0.416	1.370	1.391	6	6	7	7	8	114.551	0.048	0.048	0.000	0.000	1.700	11.457	19.477	6.581	11.188	628.512	1.394	29.851	0.001	0.001	627.612	2.860	628.612	2.245	20.524	75.724	36.162	-0.403	2.981	89.179	0.000	0.000	0.000	4.869	48.693	48.693
60	0.300	0.984	-0.300	-0.984	23.779	0.482	1.380	2.027	6	8	7	7	8	114.551	0.057	0.057	0.000	0.000	1.700	9.112	15.490	5.666	9.632	416.980	2.032	23.722	0.002	0.002	416.223	2.274	417.223	2.424	27.406	66.573	35.068	-0.422	3.341	79.469	0.000	0.000	0.000	3.873	38.726	38.726
61	0.350	1.148	-0.350	-1.148	20.127	0.441	1.060	2.191	6	8	7	7	8	114.551	0.066	0.066	0.000	0.000	1.700	7.713	13.111	4.974	8.455	302.643	2.198	20.060	0.002	0.002	302.143	1.925	303.143	2.502	30.771	59.603	34.271	-0.401	3.605	72.593	0.000	0.000	0.000	3.278	32.778	32.778
62	0.400	1.312	-0.400	-1.312	24.372	0.401	1.960	1.645	6	6	7	7	8	114.551	0.076	0.076	0.000	0.000	1.700	9.339	15.877	5.640	9.589	321.050	1.650	24.297	0.003	0.003	320.241	2.329	321.241	2.360	24.801	63.189	35.186	-0.359	3.301	80.496	0.000	0.000	0.000	3.969	39.693	39.693
63	0.450	1.476	-0.450	-1.476	20.384	0.389	2.300	1.908	6	6	7	7	8	114.551	0.085	0.085	0.000	0.000	1.700	7.811	13.279	4.940	8.398	238.610	1.916	20.299	0.004	0.004	237.766	1.946	238.766	2.461	28.962	56.391	34.332	-0.351	3.585	73.114	0.000	0.000	0.000	3.320	33.198	33.198
64	0.500	1.640	-0.500	-1.640	13.100	0.390	1.550	2.977	5	5	6	6	8	114.551	0.095	0.095	0.000	0.000	1.700	6.275	10.667	3.635	6.180	137.668	2.999	13.005	0.004	0.004	137.156	1.250	138.156	2.732	42.171	0.000	0.000	0.000	0.000	0.000	0.867	0.006	10.000	2.133	21.334	21.334
65	0.550	1.804	-0.550	-1.804	9.947	0.391	1.080	3.931	3	9	6	6	8	111.369	0.104	0.104	0.000	0.000	1.700	9.529	16.199	3.036	5.161	94.889	3.972	9.843	0.003	0.003	94.564	0.950	95.564	2.902	52.092	0.000	0.000	0.000	0.000	0.000	0.656	0.004	10.000	1.620	16.199	16.199
66	0.600	1.968	-0.600	-1.968	8.986	0.390	1.020	4.340	3	4	5	6	8	111.369	0.113	0.113	0.000	0.000	1.700	8.609	14.635	2.847	4.839	78.620	4.395	8.874	0.004	0.004	78.338	0.858	79.338	2.963	56.054	0.000	0.000	0.000	0.000	0.000	0.592	0.004	10.000	1.464	14.635	14.635
67	0.650	2.133	-0.650	-2.133	9.373	0.408	2.070	4.353	3	4	5	6	8	111.369	0.122	0.122	0.000	0.000	1.700	8.979	15.265	2.945	5.007	75.828	4.410	9.251	0.007	0.007	75.298	0.892	76.298	2.950	55.190	0.000	0.000	0.000	0.000	0.000	0.617	0.008	10.000	1.526	15.265	15.265
68	0.700	2.297	-0.700	-2.297	11.144	0.338	2.240	3.033	4	5	6	6	4	114.551	0.131	0.131	0.000	0.000	1.700	7.117	12.099	3.198	5.437	83.898	3.069	11.013	0.006	0.006	83.365	1.061	84.365	2.793	45.614	0.000	0.000	0.000	0.000	0.000	0.734	0.009	10.000	1.815	18.149	18.149
69	0.750	2.461	-0.750	-2.461	16.881	0.275	1.740	1.629	6	6	6	6	5	114.551	0.141	0.141	0.000	0.000	1.700	6.469	10.997	4.142	7.041	119.014	1.643	16.740	0.003	0.003	118.628	1.612	119.628	2.487	30.104	43.779	33.431	-0.257	0.000	0.000	0.000	0.000	0.000	2.749	27.492	27.492
70	0.800	2.625	-0.800	-2.625	19.733	0.229	0.510	1.160	6	6	7	6	5	114.551	0.150	0.150	0.000	0.000	1.700	7.562	12.855	4.542	7.722	130.509	1.169	19.583	0.001	0.001	130.403	1.889	131.403	2.348	24.334	47.327	34.177	-0.228	3.636	71.786	0.000	0.000	0.000	3.214	32.137	32.137
71	0.850	2.789	-0.850	-2.789	20.128	0.216	-0.350	1.073	6	6	7	6	5	114.551	0.160	0.160	0.000	0.000	1.700	7.713	13.112	4.581	7.788	125.235	1.082	19.968	-0.001	-0.001	125.304	1.929	126.304	2.322	23.351	47.025	34.272	-0.216	3.605	72.595	0.000	0.000	0.000	3.278	32.780	32.780
72	0.900	2.953	-0.900	-2.953	18.824	0.277	-0.930	1.472	6	6	6	6	5	114.551	0.169	0.169	0.000	0.000	1.700	7.213	12.263	4.483	7.621	110.490	1.485	18.655	-0.002	-0.002	110.662	1.806	111.662	2.423	27.359	44.285	33.952	-0.238	3.710	69.866	0.000	0.000	0.000	3.066	30.657	30.657
73	0.950	3.117	-0.950	-3.117	18.433	0.267	-1.070	1.448	6	6	6	6	5	114.551	0.178	0.178	0.000	0.000	1.700	7.064	12.008	4.397	7.476	102.421	1.463	18.255	-0.002	-0.002	102.608	1.769	103.608	2.427	27.514	42.907	33.852	-0.228	3.743	69.015	0.000	0.000	0.000	3.002	30.021	30.021
74	1.000	3.281	-1.000	-3.281	17.622	0.214	-1.240	1.214	6	6	6	6	5	114.551	0.188	0.188	0.000	0.000	1.700	6.753	11.480	4.154	7.061	92.920	1.227	17.435	-0.002	-0.002	93.126	1.692	94.126	2.400	26.429	40.881	33.637	-0.200	0.000	0.000	0.000	0.000	0.000	2.870	28.700	28.700
75	1.050	3.445	-1.050	-3.445	21.226	0.176	-0.570	0.829	6	6	7	6	6	114.551	0.197	0.197	0.000	0.000	1.700	8.134	13.828	4.671	7.941	106.735	0.837	21.029	-0.001	-0.001	106.825	2.035	107.825	2.244	20.504	45.515	34.526	-0.177	3.521	74.775	0.000	0.000	0.000	3.457	34.569	34.569
76	1.100	3.609	-1.100	-3.609	22.923	0.175	-1.200	0.763	7	6	7	6	6	117.733	0.207	0.207	0.000	0.000	1.700	7.320	12.444	4.946	8.407	109.978	0.770	22.716	-0.002	-0.002	110.159	2.200	111.159	2.197	18.894	47.042	34.893	-0.173	3.399	77.947	0.000	0.000	0.000	3.733	37.332	37.332
77	1.150	3.773	-1.150	-3.773	24.522	0.195	-1.290	0.795	7	6	7	6	6	117.733	0.216	0.216	0.000	0.000	1.700	7.831	13.312	5.255	8.934	112.420	0.802	24.306	-0.002	-0.002	112.606	2.353	113.606	2.181	18.357	48.320	35.215	-0.178	3.292	80.752	0.000	0.000	0.000	3.994	39.936	39.936
78	1.200	3.937	-1.200	-3.937	26.812	0.222	-1.270	0.828	7	6	7	6	6	117.733	0.226	0.226	0.000	0.000	1.700	8.562	14.555	5.690	9.672	117.710	0.835	26.586	-0.001	-0.001	117.886	2.572	118.886	2.157	17.578	50.253	35.642	-0.186	3.150	84.504	0.000	0.000	0.000	4.367	43.666	43.666
79	1.250	4.101	-1.250	-4.101	29.242	0.195	-1.280	0.667	7	6	7	6	6	117.733	0.236	0.236	0.000	0.000	1.700	9.338	15.875	6.006	10.211	123.161	0.672	29.006	-0.001	-0.001	123.331	2.805	124.331	2.076	15.091	52.140	36.056	-0.171	3.015	88.215	0.000	0.000	0.000	4.762	47.624	47.624
80	1.300	4.265	-1.300	-4.265	31.412	0.221	-1.270	0.704	7	6	7	6	6	117.733	0.245	0.245	0.000	0.000	1.700	10.031	17.053	6.414	10.904	127.122	0.709	31.167	-0.001	-0.001	127.284	3.013	128.284	2.061	14.657	53.616	36.398	-0.179	2.907	91.350	0.000	0.000	0.000	5.116	51.158	51.158
81	1.350	4.429	-1.350	-4.429	30.032	0.367	-1.210	1.222	7	6	7	6	5	117.733	0.255	0.255	0.000	0.000	1.700	9.590	16.304	6.518	11.080	116.854	1.232	29.778	-0.001	-0.001	117.002	2.881	118.002	2.211	19.366	51.775	36.183	-0.223	2.975	89.373	0.000	0.000	0.000	4.891	48.911	48.911
82	1.400	4.593	-1.400	-4.593	19.822	0.419	-1.260	2.114	6	5	7	6	5	114.551	0.264	0.264	0.000	0.000	1.700	7.596	12.913	4.894	8.320	73.984	2.142	19.558	-0.002	-0.002	74.132	1.903	75.132	2.500	30.691	39.340	34.199	-0.241	3.629	71.970	0.000	0.000	0.000	3.228	32.282	32.282
83	1.450	4.757	-1.450	-4.757	13.724	0.353	-1.000	2.572	5	5	6	6	4	114.551	0.274	0.274	0.000	0.000	1.700	6.574	11.175	3.706	6.301	49.133	2.625	13.450	-0.002	-0.002	49.247	1.318	50.247	2.680	39.415	0.000	0.000	0.000	0.000	0.000	0.897	0.000	10.000	2.235	22.351	22.351
84	1.500	4.921	-1.500	-4.921	11.561	0.288	0.090	2.491	5	4	6	6	4	114.551	0.283	0.283	0.000	0.000	1.700	5.538	9.414	3.209	5.456	39.830	2.554	11.277	0.000	0.000	39.820	1.107	40.820	2.733	42.206	0.000	0.000	0.000	0.000	0.000	0.752	0.000	10.000	1.883	18.828	18.828
85	1.550	5.085	-1.550	-5.085	13.923	0.223	8.460	1.602	6	5	6	6	5	114.551	0.293	0.293	0.000	0.000	1.700	5.335	9.070	3.529	6.000	46.593	1.636	13.630	0.019	0.019	45.690	1.309	46.691	2.555	33.191	0.000	32.511	-0.158	0.000	0.000	0.000	0.000	0.000	2.267	22.675	22.675
86	1.600	5.249	-1.600	-5.249	21.808	0.216	12.550	0.990	6	6	6	6	5	114.551	0.302	0.302	0.000	0.000	1.700	8.357	14.207	4.864	8.269	71.230	1.004	21.506	0.018	0.018	69.932	2.052	70.932	2.275	21.623	40.173	34.655	-0.154	3.478	75.888	0.000	0.000	0.000	3.552	35.517	35.517
87	1.650	5.413	-1.650	-5.413	25.474	0.345	10.330	1.354	6	5	7	6	5	114.551	0.311	0.311	0.000	0.000	1.700	9.762	16.595	5.732	9.745	80.826	1.371	25.163	0.013	0.013	79.790	2.410	80.790	2.296	22.375	44.187	35.397	-0.196	3.231	82.347	0.000	0.000	0.000	4.149	41.488	41.488
88	1.700	5.577	-1.700	-5.577	23.992	0.430	8.250	1.792	6	5	7	6	5	114.551	0.321	0.321	0.000	0.000	1.700	9.194	15.629	5.630	9.571	73.805	1.817	23.671	0.011	0.011	73.002	2.274	74.002	2.391	26.034	42.042	35.111	-0.218	3.326	79.840	0.000	0.000	0.000	3.907	39.073	39.073
89	1.750	5.741	-1.750	-5.741	19.573	0.478	6.960	2.442	5	5	6	6	4	114.551	0.330	0.330	0.000	0.000	1.700	9.376	15.939	4.938	8.394	58.293	2.484	19.243	0.011	0.011	57.634	1.854	58.635	2.545	32.725	0.000	0.000	0.000	0.000	0.000	1.283	0.027	10.000	3.188	31.877	31.877
90	1.800	5.905	-1.800	-5.905	18.461	0.482	6.540	2.611	5	5	6	6	4	114.551	0.340	0.340	0.000	0.000	1.700	8.843	15.033	4.746	8.068	53.375	2.660	18.121	0.011	0.011	52.774	1.749	53.774	2.583	34.547	0.000	0.000	0.000	0.000	0.000	1.209	0.026	10.000	3.007	30.065	30.065
91	1.850	6.069	-1.850	-6.069	17.316	0.424	7.300	2.449	5	5	6	6	4	114.551	0.349	0.349	0.000	0.000	1.700	8.294	14.100	4.461	7.584	48.628	2.499	16.967	0.013	0.013	47.975	1.637	48.975	2.588	34.763	0.000	0.000	0.000	0.000	0.000	1.132	0.029	10.000	2.820	28.200	28.200
92	1.900	6.234	-1.900	-6.234	18.897	0.374	7.480	1.979	6	5	6	6	5	114.551	0.358	0.358	0.000	0.000	1.700	7.241	12.310	4.666	7.933	51.740	2.017	18.538	0.012	0.013	51.088	1.788	52.088	2.501	30.706	33.612	33.970	-0.193	3.704	70.022	0.000	0.000	0.000	3.078	30.775	30.775
93	1.950	6.398	-1.950	-6.398	22.465	0.331	5.660	1.473	6	5	7	6	5	114.551	0.368	0.368	0.000	0.000	1.685	8.609	14.505	5.213	8.784	60.098	1.498	22.098	0.008	0.008	59.617	2.135	60.618	2.366	25.043	38.199	34.754	-0.176	3.445	77.433	0.000	0.000	0.000	3.626	36.262	36.262
94	2.000	6.562	-2.000	-6.562	23.119	0.421	4.620	1.821	6	5	7	6	5	114.551	0.377	0.377	0.000	0.000	1.664	8.859	14.740	5.488	9.130	60.309	1.851	22.742	0.006	0.006	59.926	2.201	60.927	2.416	27.060	38.660	34.831	-0.200	3.420	79.094	0.000	0.000	0.000	3.685	36.849	36.849
95	2.050	6.726	-2.050	-6.726	24.287	0.464	2.750	1.910	6	5	7	6	5	114.551	0.387	0.387	0.000	0.000	1.643	9.307	15.295	5.765	9.475	61.842	1.941	23.901	0.004	0.004	61.619	2.318	62.620	2.416	27.068	39.720	35.007	-0.208	3.361	81.659	0.000	0.000	0.000	3.824	38.238	38.238
96	2.100	6.890	-2.100	-6.890	30.016	0.386	2.560	1.286	7	5	7	6	5	117.733	0.396	0.396	0.000	0.000	1.624	9.585	15.562	6.599	10.713	74.797	1.303	29.620	0.003	0.003	74.595	2.868	75.595	2.242	20.422	45.441	35.961	-0.185	3.046	91.470	0.000	0.000	0.000	4.669	46.686	46.686
97	2.150	7.054	-2.150	-7.054	32.628	0.317	2.890	0.972	7	6	7	6	5	117.733	0.406	0.406	0.000	0.000	1.604	10.419	16.714	6.892	11.055	79.431	0.984	32.222	0.003	0.003	79.209	3.117	80.209	2.146	17.219	47.488	36.302	-0.164	2.937	95.870	0.000	0.000	0.000	5.014	50.141	50.141
98	2.200	7.218	-2.200	-7.218	29.464	0.238	2.220	0.808	7	6	7	6	5	117.733	0.415	0.415	0.000	0.000	1.585	9.409	14.916	6.218	9.858	69.943	0.819	29.049	0.002	0.002	69.776	2.816	70.776	2.143	17.152	44.227	35.759	-0.136	3.112	91.730	0.000	0.000	0.000	4.475	44.749	44.749
99	2.250	7.382	-2.250	-7.382	28.041	0.219	1.810	0.781	7	6	7	6	5	117.733	0.425	0.425	0.000	0.000	1.567	8.955	14.034	5.955	9.332	64.984	0.793	27.616	0.002	0.002	64.851	2.681	65.851	2.159	17.634	42.479	35.467	-0.126	3.208	89.992	0.000	0.000	0.000	4.210	42.102	42.102
100	2.300	7.546	-2.300	-7.546	29.210	0.219	1.640	0.750	7	6	7	6	6	117.733	0.435	0.435	0.000	0.000	1.550	9.328	14.456	6.152	9.534	66.207	0.761	28.776	0.002	0.002	66.089	2.793	67.089	2.138	16.991	43.328	35.609	-0.125	3.161	92.379	0.000	0.000	0.000	4.337	43.367	43.367

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR
101	2.350	7.710	-2.350	-7.710	30.039	0.209	1.400	0.696	7	6	7	6	6	117.733	0.444	0.444	0.000	0.000	1.533	9.592	14.703	6.268	9.608	66.611	0.706	29.594	0.001	0.001	66.513	2.874	67.513	2.115	16.279	43.815	35.690	-0.119	3.135	94.197	0.000	0.000	0.000	4.411	44.110	44.110
102	2.400	7.874	-2.400	-7.874	29.297	0.212	1.150	0.724	7	6	7	6	6	117.733	0.454	0.454	0.000	0.000	1.516	9.356	14.187	6.168	9.354	63.540	0.735	28.843	0.001	0.001	63.461	2.803	64.461	2.138	16.968	42.790	35.519	-0.118	3.191	93.520	0.000	0.000	0.000	4.256	42.561	42.561
103	2.450	8.038	-2.450	-8.038	28.836	0.229	0.940	0.794	7	6	7	6	5	117.733	0.464	0.464	0.000	0.000	1.501	9.208	13.817	6.148	9.225	61.200	0.807	28.372	0.001	0.001	61.137	2.760	62.137	2.168	17.949	42.033	35.393	-0.122	3.233	93.252	0.000	0.000	0.000	4.145	41.452	41.452
104	2.500	8.202	-2.500	-8.202	31.406	0.257	0.910	0.818	7	6	7	6	5	117.733	0.473	0.473	0.000	0.000	1.485	10.029	14.894	6.638	9.859	65.361	0.831	30.932	0.001	0.001	65.301	3.006	66.301	2.147	17.271	44.185	35.752	-0.131	3.114	97.848	0.000	0.000	0.000	4.468	44.683	44.683
105	2.550	8.366	-2.550	-8.366	36.396	0.272	0.920	0.747	7	6	8	6	6	117.733	0.483	0.483	0.000	0.000	1.470	11.622	17.088	7.474	10.988	74.368	0.757	35.913	0.001	0.001	74.309	3.484	75.309	2.075	15.073	48.122	36.408	-0.135	2.904	105.731	0.000	0.000	0.000	5.126	51.263	51.263
106	2.600	8.530	-2.600	-8.530	35.475	0.258	0.790	0.727	7	6	8	6	6	117.733	0.493	0.493	0.000	0.000	1.456	11.328	16.491	7.305	10.634	71.021	0.738	34.982	0.001	0.001	70.971	3.396	71.971	2.082	15.281	47.104	36.238	-0.129	2.957	104.953	0.000	0.000	0.000	4.947	49.474	49.474
107	2.650	8.694	-2.650	-8.694	33.243	0.236	0.490	0.710	7	6	7	6	6	117.733	0.502	0.502	0.000	0.000	1.442	10.616	15.304	6.908	9.959	65.192	0.721	32.741	0.000	0.000	65.162	3.183	66.162	2.105	15.959	44.963	35.881	-0.119	3.072	102.164	0.000	0.000	0.000	4.591	45.913	45.913
108	2.700	8.858	-2.700	-8.858	30.043	0.242	0.450	0.806	7	6	7	6	5	117.733	0.512	0.512	0.000	0.000	1.428	9.594	13.700	6.423	9.172	57.692	0.819	29.531	0.000	0.000	57.664	2.877	58.664	2.175	18.164	41.789	35.352	-0.118	3.246	97.562	0.000	0.000	0.000	4.110	41.100	41.100
109	2.750	9.022	-2.750	-9.022	27.412	0.242	0.320	0.883	7	5	7	6	5	117.733	0.522	0.522	0.000	0.000	1.415	8.754	12.384	6.006	8.496	51.561	0.900	26.890	0.000	0.000	51.542	2.625	52.542	2.234	20.139	38.894	34.870	-0.116	3.407	93.424	0.000	0.000	0.000	3.715	37.152	37.152
110	2.800	9.186	-2.800	-9.186	26.391	0.221	0.180	0.837	7	5	7	6	5	117.733	0.531	0.531	0.000	0.000	1.402	8.428	11.814	5.796	8.125	48.684	0.855	25.860	0.000	0.000	48.673	2.528	49.673	2.239	20.341	37.544	34.645	-0.106	3.482	91.924	0.000	0.000	0.000	3.544	35.442	35.442
111	2.850	9.350	-2.850	-9.350	25.481	0.172	0.110	0.675	7	5	7	6	5	117.733	0.541	0.541	0.000	0.000	1.389	8.137	11.304	5.527	7.678	46.113	0.690	24.940	0.000	0.000	46.107	2.441	47.107	2.210	19.322	36.279	34.434	-0.084	3.552	90.536	0.000	0.000	0.000	3.391	33.912	33.912
112	2.900	9.514	-2.900	-9.514	23.650	0.140	-0.050	0.592	7	5	7	6	5	117.733	0.551	0.551	0.000	0.000	1.377	7.552	10.399	5.142	7.081	41.961	0.606	23.099	-0.000	-0.000	41.964	2.266	42.964	2.216	19.523	33.888	34.035	-0.065	3.683	87.131	0.000	0.000	0.000	3.120	31.198	31.198
113	2.950	9.678	-2.950	-9.678	21.809	0.136	-0.140	0.633	7	5	7	6	5	117.733	0.560	0.560	0.000	0.000	1.365	6.964	9.507	4.840	6.607	37.334	0.649	21.249	-0.000	-0.000	37.942	2.090	38.942	2.264	21.211	31.316	33.607	-0.061	0.000	0.000	0.000	0.000	0.000	2.852	28.521	28.521
114	3.000	9.842	-3.000	-9.842	21.749	0.114	-0.210	0.524	7	5	7	6	5	117.733	0.570	0.570	0.000	0.000	1.353	6.945	9.400	4.763	6.446	37.169	0.538	21.179	-0.000	-0.000	37.180	2.084	38.180	2.232	20.100	30.992	33.553	-0.045	0.000	0.000	0.000	0.000	0.000	2.820	28.200	28.200
115	3.050	10.006	-3.050	-10.006	22.807	0.099	2.670	0.434	7	6	7	6	6	117.733	0.580	0.580	0.000	0.000	1.342	7.283	9.775	4.892	6.566	38.358	0.445	22.227	0.004	0.004	38.214	2.177	39.214	2.183	5.000	32.113	33.740	-0.032	0.000	0.000	0.000	0.000	0.000	2.932	29.325	29.325
116	3.100	10.170	-3.100	-10.170	26.269	0.103	1.450	0.392	7	6	7	6	6	117.733	0.589	0.589	0.000	0.000	1.331	8.389	11.166	5.474	7.287	43.590	0.401	25.680	0.002	0.002	43.514	2.512	44.514	2.112	5.000	35.927	34.375	-0.036	3.571	93.847	0.000	0.000	0.000	3.350	33.499	33.499
117	3.150	10.335	-3.150	-10.335	27.153	0.141	0.540	0.519	7	6	7	6	6	117.733	0.599	0.599	0.000	0.000	1.320	8.671	11.449	5.752	7.595	44.348	0.531	26.555	0.001	0.001	44.320	2.600	45.320	2.153	17.446	36.643	34.495	-0.059	3.532	95.933	0.000	0.000	0.000	3.435	34.346	34.346
118	3.200	10.499	-3.200	-10.499	28.601	0.234	0.140	0.818	7	5	7	6	5	117.733	0.609	0.609	0.000	0.000	1.310	9.133	11.963	6.256	8.194	46.008	0.836	27.992	0.000	0.000	46.001	2.740	47.001	2.232	20.008	37.903	34.705	-0.099	3.462	99.051	0.000	0.000	0.000	3.589	35.889	35.889
119	3.250	10.663	-3.250	-10.663	30.742	0.308	0.400	1.002	7	5	7	6	5	117.733	0.618	0.618	0.000	0.000	1.300	9.817	12.758	6.789	8.823	48.738	1.022	30.124	0.000	0.000	48.718	2.944	49.718	2.252	20.797	39.747	35.012	-0.121	3.359	103.318	0.000	0.000	0.000	3.827	38.273	38.273
120	3.300	10.827	-3.300	-10.827	46.287	0.224	1.180	0.484	8	6	8	6	6	120.915	0.628	0.628	0.000	0.000	1.289	11.086	14.294	9.021	11.632	72.721	0.491	45.659	0.001	0.001	72.663	4.431	73.663	1.940	5.000	51.251	36.929	-0.097	2.746	127.135	0.000	0.000	0.000	5.718	57.176	57.176
121	3.350	10.991	-3.350	-10.991	58.406	0.242	0.890	0.414	8	6	8	6	6	120.915	0.638	0.638	0.000	0.000	1.279	13.988	17.895	10.898	13.942	90.575	0.419	57.768	0.000	0.000	90.532	5.593	91.532	1.822	5.000	57.692	38.003	-0.104	2.458	143.607	0.000	0.000	0.000	7.158	71.581	71.581
122	3.400	11.155	-3.400	-11.155	62.784	0.308	-0.900	0.491	8	6	8	6	6	120.915	0.648	0.648	0.000	0.000	1.269	15.037	19.089	11.760	14.929	95.934	0.496	62.137	-0.000	-0.000	95.977	6.017	96.977	1.832	5.000	59.543	38.311	-0.123	2.387	149.917	0.000	0.000	0.000	7.636	76.357	76.357
123	3.450	11.319	-3.450	-11.319	64.277	0.360	-0.410	0.560	8	6	8	6	6	120.915	0.658	0.658	0.000	0.000	1.260	15.394	19.395	12.143	15.299	96.743	0.566	63.620	-0.000	-0.000	96.762	6.159	97.762	1.856	9.351	59.999	38.387	-0.134	2.370	152.415	0.000	0.000	0.000	7.758	77.581	77.581
124	3.500	11.483	-3.500	-11.483	67.528	0.408	-0.250	0.604	8	6	8	6	6	120.915	0.668	0.668	0.000	0.000	1.250	16.173	20.224	12.767	15.965	100.161	0.610	66.861	-0.000	-0.000	100.172	6.470	101.172	1.858	9.398	61.199	38.587	-0.144	2.328	157.286	0.000	0.000	0.000	8.090	80.897	80.897
125	3.550	11.647	-3.550	-11.647	70.780	0.380	-0.020	0.537	8	6	8	6	6	120.915	0.678	0.678	0.000	0.000	1.241	16.952	21.042	13.179	16.360	103.479	0.542	70.102	-0.000	-0.000	103.480	6.781	104.480	1.816	8.460	62.335	38.777	-0.137	2.291	162.198	0.000	0.000	0.000	8.417	84.169	84.169
126	3.600	11.811	-3.600	-11.811	75.421	0.404	0.110	0.536	8	6	8	6	6	120.915	0.688	0.688	0.000	0.000	1.232	18.063	22.260	13.937	17.174	108.724	0.541	74.733	0.000	0.000	108.719	7.225	109.719	1.794	8.001	63.948	39.045	-0.141	2.241	169.084	0.000	0.000	0.000	8.904	89.039	89.039
127	3.650	11.975	-3.650	-11.975	74.581	0.366	0.140	0.491	8	6	8	6	6	120.915	0.698	0.698	0.000	0.000	1.224	17.862	21.855	13.718	16.784	105.959	0.691	73.495	0.000	0.000	105.936	7.144	106.784	1.831	7.852	63.421	38.928	-0.097	2.746	127.135	0.000	0.000	0.000	8.742	87.419	87.419
128	3.700	12.139	-3.700	-12.139	66.830	0.351	-0.020	0.525	8	6	8	6	6	120.915	0.707	0.707	0.000	0.000	1.215	16.006	19.446	12.555	15.253	93.469	0.531	66.123	-0.000	-0.000	93.500	6.402	94.500	1.840	9.003	60.074	38.400	-0.126	2.368	158.288	0.000	0.000	0.000	7.778	77.782	77.782
129	3.750	12.303	-3.750	-12.303	60.659	0.428	-0.180	0.706	8	6	8	6	6	120.915	0.717	0.717	0.000	0.000	1.206	14.528	17.528	11.854	14.302	83.587	0.714	59.942	-0.000	-0.000	83.595	5.812	84.595	1.947	11.558	57.097	37.904	-0.141	2.482	150.604	0.000	0.000	0.000	7.011	70.110	70.110
130	3.800	12.467	-3.800	-12.467	39.347	0.572	-0.410	1.454	7	5	8	6	5	117.733	0.727	0.727	0.000	0.000	1.198	12.565	15.057	8.818	10.567	53.130	1.481	38.621	-0.000	-0.000	53.148	3.771	54.148	2.287	22.027	44.496	35.803	-0.163	3.097	121.923	0.000	0.000	0.000	4.517	45.171	45.171
131	3.850	12.631	-3.850	-12.631	19.569	0.728	-0.220	3.720	4	4	7	5	3	114.551	0.737	0.737	0.000	0.000	1.191	12.498	14.879	5.460	7.449	25.572	3.866	18.832	-0.000	-0.000	25.582	1.875	26.582	2.742	42.729	0.000	0.000	0.000	0.000	0.000	0.000	1.256	0.000	10.000	2.232	22.319	25.572
132	3.900	12.795	-3.900	-12.795	12.122	0.480	0.380	3.960	3	3	6	5	3	111.369	0.746	0.746	0.000	0.000	1.183	11.613	13.740	3.782	4.968	15.256	4.219	11.377	0.001	0.001	15.241	1.160	16.241	2.938	54.418	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.672	1.374	13.740	15.256
133	3.950	12.959	-3.950	-12.959	7.421	0.338	1.840	4.554	3	3	6	5	4	111.369	0.755	0.755	0.000	0.000	1.176	7.110	8.361	2.699	3.352	8.832	5.070	6.667	0.008	0.009	8.756	0.705	9.756	3.174	71.010	0.000	0.000	0.000	0.000	0.000	0.000	0.445	0.007	2.145	0.836	8.361	8.832
134	4.000	13.123	-4.000	-13.123	18.750	0.268	0.870	1.429	6	5	6	5	5	111.369	0.764	0.764	0.000	0.000	1.169	7.185	8.398	2.766	3.570	23.539	1.490	17.986	0.013	0.014	23.510	1.772	24.510	2.561	39.195	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.641	1.100	16.410	17.399
135	4.050	13.287	-4.050	-13.287	22.916	0.202	37.870	0.881	7	5	7	6	5	117.733	0.774	0.774	0.000	0.000	1.162	7.318	8.501	5.345	6.208	28.622	0.912	22.143	0.052	0.053	27.094	2.082	28.094	3.277	25.486	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.550	25.502	25.502
136	4.100	13.451	-4.100	-13.451	25.222	0.232	32.420	0.920	7	5	6	5	5	117.733	0.784	0.784	0.000	0.000	1.154	8.054	9.298	5.817	6.715	31.201	0.949	24.439	0.040	0.041	29.909	2.319	30.909	2.352	24.501	30.679	33.501	-0.069	0.000	0.000	0.000	0.000	0.000	2.789	27.894	27.894
137	4.150	13.615	-4.150	-13.615	25.954	0.306	24.610	1.179	6	5	7	5	5	114.551	0.793	0.793	0.000	0.000	1.147	9.945	11.412	6.117	7.019	31.737	1.216	25.161	0.030	0.031	30.767	2.413	31.768	2.400	26.428	31.325	33.608	-0.092	0.000	0.000	0.000	0.000	0.000	2.853	28.530	28.530
138	4.200	13.779	-4.200	-13.779	23.514	0.317	19.910	1.348	6	5	6	5	5	114.551	0.803	0.803	0.000	0.000	1.141	9.011	10.279	5.727	6.532	28.313	1.396	22.712	0.026	0.027	27.538	2.193	28.538	2.471	29.412	0.000	33.109	-0.092	0.000	0.000	0.000	0.000	0.000	2.570	25.697	25.697
139	4.250	13.943	-4.250	-13.943	18.406	0.362	17.000	1.967	6	4	6	5	4	114.551	0.812	0.812	0.000	0.000	1.134	7.053	7.999	4.838	5.949	21.679	2.057	17.595	0.029	0.030	21.025	1.712	22.025	2.628	36.727	0.000	31.911	-0.098	0.000	0.000	0.000	0.000	0.000	2.000	19.998	21.679
140	4.300	14.107	-4.300	-14.107	15.730	0.327	16.030	2.079	5	4	6	5	4	114.551	0.821	0.821	0.000	0.000	1.128	7.535	8.496	4.307	5.190	18.160	2.193	14.909	0.032	0.034	17.550	1.459	18.551	2.706	40.799	0.000	0.000	0.000	0.000	0.000	0.000	0.994	0.063	6.097	1.699	16.992	18.160
141	4.350	14.271	-4.350	-14.271	15.278	0.263	15.720	1.721	6	4	6	5	4	114.551	0.831	0.831	0.000	0.000	1.121	5.855	6.564	4.117	4.894	17.389	1.820	14.448	0.032	0.034	16.808	1.417	17.808	2.676	39.195	0.000	30.966	-0.064	0.000	0.000	0.000	0.000	0.000	1.641	16.410	17.399
142	4.400	14.436	-4.400	-14.436	15.350	0.237	14.460	1.544	6	4	6	5	4	114.551	0.840	0.840	0.000	0.000	1.115	5.882	6.558	4.087	4.802	17.279	1.633	14.510	0.029	0.031	16.741	1.427	17.742	2.653	31.997	0.000	30.962	-0.055	0.000	0.000	0.000	0.000	0.000	1.640	16.395	17.279
143	4.450	14.600	-4.450	-14.600	14.100	0.219	12.760	1.553	6	4	6	5	4	114.551	0.850	0.850	0.000	0.000	1.109	5.403	5.990	3.833	4.428	15.604	1.653	13.250	0.028	0.030	15.135	1.313	16.135	2.693	40.082	0.000	30.529	-0.045	0.000	0.000	0.000	0.000	0.000	1.498	14.976	15.604
144	4.500	14.764	-4.500	-14.764	13.546	0.190	12.110	1.403	6	4	6	5	4	114.551	0.859	0.859	0.000	0.000	1.103	5.191	5.723	3.678	4.188	14.777	1.498	12.687	0.028	0.030	14.337	1.261	15.337	2.691	39.953	0.000	30.312	-0.032	0.000	0.000	0.000	0.000	0.000	1.431	14.309	14.777
145	4.550	14.928	-4.550	-14.928	11.715	0.210	11.960	1.793	5	4	5	4	4	114.551	0.868	0.868	0.000	0.000	1.097	5.611	6.154	3.395	3.781	12.497	1.936	10.847	0.032	0.034	12.067	1.087	13.067	2.811	46.643	0.000	0.000	0.000	0.000	0.000	0.000	0.723	0.047	3.476	1.231	12.307	12.497
146	4.600	15.092	-4.600	-15.092	10.117	0.185	12.320	1.829	5	4	5	4	4	114.551	0.878	0.878	0.000	0.000	1.091	4.846	5.286	3.053	3.317	10.531	2.002	9.240	0.038	0.042	10.093	0.932	11.093	2.882	50.875	0.000	0.000	0.000	0.000	0.000	0.000	0.616	0.048	2.724	1.057	10.572	10.531
147	4.650	15.256	-4.650	-15.256	10.153	0.155	13.260	1.527	5	4	5	4	4	114.551	0.887	0.887	0.000	0.000	1.085	4.863	5.276	2.998	3.221	10.450	1.673	9.266	0.041	0.045	9.983	0.933	10.983	2.844	48.599	0.000	0.000	0.000	0.000	0.000	0.000	0.618	0.052	2.694	1.055	10.553	10.450
148	4.700	15.420	-4.700	-15.420	9.387	0.145	13.970	1.545	5	4	5	4	4	114.551	0.897	0.897	0.000	0.000	1.079	4.496	4.853	2.839	2.991	9.475	1.708	8.491	0.046	0.051	8.988	0.859	9.989	2.886	51.102	0.000	0.000	0.000	0.000	0.000	0.000	0.566	0.055	2.358	0.971	9.706	9.475
149	4.750	15.584	-4.750	-15.584	9.404	0.117	15.040	1.244	5	4	5	4	4	114.551	0.906	0.906	0.000	0.000	1.074	4.504	4.836	2.775	2.891	9.385	1.377	8.498	0.050	0.055	8.866	0.864	9.867	2.943	48.535	0.000	0.000	0.000	0.000	0.000	0.000	0.567	0.059	2.326	0.967	9.672	9.385
150	4.800	15.748	-4.800	-15.748	7.840	0.109	15.950	1.390	5	3	5	4	4	114.551	0.915	0.915	0.000	0.000	1.068	3.755	4.011	2.468	2.487	7.569	1.574	6.925	0.064	0.072	7.024	0.703	8.024	2.953	55.385	0.000	0.000	0.000	0.000	0.000	0.000	0.462	0.062	1.760	0.802	8.022	7.569
151	4.850	15.912	-4.850	-15.912	5.270	0.092	17.550	1.746	4	3	4	3	3	114.551	0.925	0.925	0.000	0.000	1.063	3.365	3.576	1.946	1.813	4.701	2.117	4.345	0.104	0.126	4.108	0.452	5.108	3.196	72.719	0.000	0.000	0.000	0.000	0.000	0.000	0.290	0.069	1.042	0.536	5.365	4.701
152	4.900	16.076	-4.900	-16.076	4.096	0.083	21.760	2.026	3	3	3	3	3	111.369	0.934	0.934	0.000	0.000	1.057	3.924	4.149	1.721	1.486	3.387	2.625	3.162	0.166	0.215	2.659	0.327	3.660	3.366	86.713	0.000	0.000	0.000	0.000	0.000	0.000	0.211	0.085	0.792	0.415	4.149	3.387
153	4.950	16.240	-4.950	-16.240	4.221	0.062	29.000	1.469	1	3	3	3	3	111.369	0.943	0.943	0.000	0.000	1.052	2.022	2.128	0.000	0.000	3.478	1.891	3.278	0.215	0.276	2.517	0.318	3.517	3.289	0.000	0.000	0.000	0.000	0.000	0.000	0.219	0.113	0.808	0.426	4.255	3.478
154	5.000	16.404	-5.000	-16.404	4.179	0.062	38.280	1.484	1	3	3	3	3	111.369	0.952	0.952	0.000	0.000	1.047	2.002	2.096	0.000	0.000	3.390	1.921	3.227	0.286	0.370	2.135	0.286	3.135	3.302	0.000	0.000	0.000	0.000	0.000	0.000	0.215	0.149	0.793	0.419	4.192	3.390
155	5.050	16.568	-5.050	-16.568	4.172	0.066	62.780	1.592	1	3	3	3	3	111.369	0.961	0.961	0.000	0.000	1.042	1.998	2.083	0.000	0.000	3.341	2.035	3.211	0.470	0.611	1.301	0.212	2.302	3.321	0.000	0.000	0.000	0.000	0.000	0.000	0.214	0.245	0.785	0.417	4.165	3.341
156	5.100	16.732	-5.100	-16.732	3.841	0.065	69.000	1.692	1	3	3	3	3	111.369	0.971	0.971	0.000	0.000	1.037	1.840	1.908	0.000	0.000	2.959	2.264	2.871	0.561	0.751	0.738	0.162	1.739	3.197	0.000	0.000	0.000	0.000	0.000	0.000	0.191	0.269	0.723	0.382	3.817	2.959
157	5.150	16.896	-5.150	-16.896	3.849	0.062	76.700	1.611	1	3	3	3	3	111.369	0.980	0.980	0.000	0.000	1.032	1.844	1.903	0.000	0.000	2.930	2.161	2.870	0.622	0.835	0.485	0.139	1.486	3.382	0.000	0.000	0.000	0.000	0.000	0.000	0.191	0.300	0.719	0.381	3.807	2.930
158	5.200	17.060	-5.200	-17.060	3.876	0.061	81.070	1.574	1	3	3	3	3	111.369	0.989	0.989	0.000	0.000	1.028	1.857	1.908	0.000	0.000	2.922	2.112	2.888	0.653	0.877	0.360	0.129	1.361	3.378	0.000	0.000	0.000	0.000	0.000	0.000	0.193	0.317	0.718	0.382	3.816	2.922
159	5.250	17.224	-5.250	-17.224	3.779	0.068	83.140	1.799	1	3	3	3	3	111.369	0.998	0.998	0.000	0.000	1.023	1.810	1.852	0.000	0.000	2.788	2.445	2.781	0.687	0.933	0.186	0.113	1.187	3.426	0.000	0.000	0.000	0.000	0.000	0.000	0.186	0.325	0.698	0.370	3.703	2.788
160	5.300	17.388	-5.300	-17.388	3.966	0.062	85.790	1.563	1	3	3	3	3	111.369	1.007	1.007	0.000	0.000	1.018	1.900	1.934	0.000	0.000	2.939	2.095	2.959	0.676	0.905	0.278	0.123	1.279	3.374	0.000	0.000	0.000	0.000	0.000	0.000	0.197	0.335	0.720	0.387	3.869	2.939
161	5.350	17.552	-5.350	-17.552	3.957	0.056	87.690	1.415	1	3	3	3	3	111.369	1.016	1.016	0.000	0.000

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR
201	7.350	24.114	-7.350	-24.114	5.998	0.068	138.980	1.134	1	3	3	3	0	111.369	1.382	1.347	0.035	1.115	0.881	2.873	2.530	0.000	0.000	3.429	1.473	4.616	0.718	0.933	0.231	0.159	1.233	3.247	0.000	0.000	0.000	0.000	0.000	0.000	0.308	0.538	0.800	0.506	5.059	3.429
202	7.400	24.278	-7.400	-24.278	6.171	0.073	136.320	1.183	1	3	3	3	0	111.369	1.391	1.351	0.040	1.279	0.879	2.956	2.599	0.000	0.000	3.540	1.527	4.781	0.683	0.882	0.418	0.184	1.419	3.241	0.000	0.000	0.000	0.000	0.000	0.000	0.319	0.527	0.819	0.520	5.198	3.540
203	7.450	24.442	-7.450	-24.442	6.340	0.073	137.700	1.151	1	3	3	3	0	111.369	1.400	1.355	0.045	1.443	0.878	3.037	2.666	0.000	0.000	3.648	1.478	4.940	0.671	0.861	0.506	0.196	1.507	3.223	0.000	0.000	0.000	0.000	0.000	0.000	0.329	0.532	0.837	0.533	5.332	3.648
204	7.500	24.606	-7.500	-24.606	6.399	0.076	139.250	1.188	1	3	3	3	0	111.369	1.409	1.359	0.050	1.607	0.877	3.065	2.687	0.000	0.000	3.674	1.523	4.991	0.672	0.861	0.510	0.197	1.511	3.226	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.537	0.842	0.537	5.374	3.674
205	7.550	24.770	-7.550	-24.770	6.310	0.079	140.970	1.252	1	3	3	3	0	111.369	1.418	1.363	0.055	1.771	0.875	3.023	2.646	0.000	0.000	3.591	1.615	4.892	0.689	0.888	0.401	0.183	1.402	3.246	0.000	0.000	0.000	0.000	0.000	0.000	0.326	0.544	0.827	0.529	5.291	3.591
206	7.600	24.934	-7.600	-24.934	6.432	0.079	139.720	1.228	1	3	3	3	0	111.369	1.427	1.367	0.060	1.936	0.874	3.081	2.693	0.000	0.000	3.663	1.578	5.005	0.669	0.860	0.514	0.198	1.516	3.234	0.000	0.000	0.000	0.000	0.000	0.000	0.334	0.538	0.840	0.539	5.386	3.663
207	7.650	25.098	-7.650	-25.098	6.387	0.080	142.140	1.252	1	3	3	3	0	111.369	1.437	1.371	0.066	2.100	0.873	3.060	2.670	0.000	0.000	3.613	1.616	4.951	0.685	0.883	0.422	0.187	1.423	3.244	0.000	0.000	0.000	0.000	0.000	0.000	0.330	0.547	0.831	0.534	5.340	3.613
208	7.700	25.262	-7.700	-25.262	6.609	0.079	145.650	1.195	1	3	3	3	0	111.369	1.446	1.375	0.071	2.264	0.871	3.166	2.759	0.000	0.000	3.757	1.530	5.164	0.677	0.867	0.500	0.198	1.501	3.218	0.000	0.000	0.000	0.000	0.000	0.000	0.344	0.560	0.857	0.552	5.518	3.757
209	7.750	25.426	-7.750	-25.426	6.752	0.079	147.670	1.170	1	3	3	3	0	111.369	1.455	1.379	0.076	2.428	0.870	3.234	2.814	0.000	0.000	3.843	1.491	5.298	0.672	0.856	0.553	0.205	1.554	3.204	0.000	0.000	0.000	0.000	0.000	0.000	0.353	0.567	0.873	0.563	5.629	3.843
210	7.800	25.590	-7.800	-25.590	6.726	0.079	148.380	1.174	1	3	3	3	0	111.369	1.464	1.383	0.081	2.592	0.869	3.222	2.800	0.000	0.000	3.807	1.501	5.263	0.677	0.865	0.514	0.201	1.515	3.209	0.000	0.000	0.000	0.000	0.000	0.000	0.351	0.569	0.866	0.560	5.599	3.807
211	7.850	25.754	-7.850	-25.754	6.776	0.081	150.010	1.195	1	3	3	3	0	111.369	1.473	1.387	0.086	2.756	0.868	3.246	2.816	0.000	0.000	3.825	1.527	5.304	0.679	0.867	0.509	0.201	1.510	3.211	0.000	0.000	0.000	0.000	0.000	0.000	0.354	0.575	0.869	0.563	5.633	3.825
212	7.900	25.918	-7.900	-25.918	6.876	0.078	151.550	1.134	1	3	3	3	0	111.369	1.482	1.391	0.091	2.920	0.866	3.294	2.854	0.000	0.000	3.880	1.446	5.394	0.675	0.860	0.542	0.206	1.543	3.195	0.000	0.000	0.000	0.000	0.000	0.000	0.360	0.580	0.879	0.571	5.707	3.880
213	7.950	26.082	-7.950	-26.082	6.956	0.079	153.140	1.136	1	3	3	3	0	111.369	1.491	1.395	0.096	3.084	0.865	3.332	2.883	0.000	0.000	3.919	1.445	5.465	0.674	0.857	0.559	0.208	1.560	3.191	0.000	0.000	0.000	0.000	0.000	0.000	0.365	0.586	0.887	0.577	5.765	3.919
214	8.000	26.246	-8.000	-26.246	6.976	0.083	154.800	1.190	1	3	3	3	0	111.369	1.500	1.399	0.101	3.249	0.864	3.342	2.887	0.000	0.000	3.916	1.516	5.477	0.678	0.864	0.532	0.205	1.533	3.200	0.000	0.000	0.000	0.000	0.000	0.000	0.365	0.592	0.886	0.577	5.774	3.916
215	8.050	26.410	-8.050	-26.410	7.296	0.082	151.490	1.124	1	3	3	3	0	111.369	1.510	1.403	0.106	3.413	0.863	3.495	3.015	0.000	0.000	4.126	1.417	5.787	0.634	0.799	0.829	0.246	1.830	3.167	0.000	0.000	0.000	0.000	0.000	0.000	0.386	0.578	0.926	0.603	6.030	4.126
216	8.100	26.574	-8.100	-26.574	7.158	0.082	158.290	1.146	1	3	3	3	0	111.369	1.519	1.407	0.112	3.577	0.861	3.429	2.954	0.000	0.000	4.010	1.454	5.640	0.675	0.857	0.575	0.212	1.576	3.183	0.000	0.000	0.000	0.000	0.000	0.000	0.376	0.604	0.904	0.591	5.908	4.010
217	8.150	26.739	-8.150	-26.739	7.268	0.078	163.090	1.073	1	3	3	3	0	111.369	1.528	1.411	0.117	3.741	0.860	3.481	2.995	0.000	0.000	4.070	1.359	5.741	0.685	0.867	0.542	0.209	1.544	3.164	0.000	0.000	0.000	0.000	0.000	0.000	0.383	0.622	0.915	0.599	5.990	4.070
218	8.200	26.903	-8.200	-26.903	7.442	0.072	163.740	0.967	1	3	3	3	0	111.369	1.537	1.415	0.122	3.905	0.859	3.565	3.062	0.000	0.000	4.175	1.219	5.906	0.671	0.845	0.647	0.223	1.648	3.134	0.000	0.000	0.000	0.000	0.000	0.000	0.394	0.624	0.935	0.612	6.124	4.175
219	8.250	27.067	-8.250	-27.067	7.452	0.075	166.960	1.006	1	3	3	3	0	111.369	1.546	1.419	0.127	4.069	0.858	3.570	3.062	0.000	0.000	4.164	1.270	5.907	0.683	0.861	0.578	0.215	1.580	3.143	0.000	0.000	0.000	0.000	0.000	0.000	0.394	0.636	0.933	0.612	6.124	4.164
220	8.300	27.231	-8.300	-27.231	7.693	0.072	168.680	0.936	1	3	3	3	0	111.369	1.555	1.423	0.132	4.233	0.857	3.685	3.157	0.000	0.000	4.315	1.173	6.138	0.668	0.837	0.705	0.233	1.707	3.114	0.000	0.000	0.000	0.000	0.000	0.000	0.409	0.642	0.963	0.631	6.313	4.315
221	8.350	27.395	-8.350	-27.395	7.734	0.071	165.580	0.918	1	3	3	3	0	111.369	1.564	1.427	0.137	4.398	0.855	3.704	3.169	0.000	0.000	4.325	1.151	6.170	0.651	0.816	0.797	0.246	1.798	3.110	0.000	0.000	0.000	0.000	0.000	0.000	0.411	0.629	0.965	0.634	6.337	4.325
222	8.400	27.559	-8.400	-27.559	7.482	0.080	166.990	1.069	1	3	3	3	0	111.369	1.574	1.431	0.142	4.562	0.854	3.584	3.061	0.000	0.000	4.131	1.354	5.910	0.678	0.858	0.585	0.217	1.587	3.158	0.000	0.000	0.000	0.000	0.000	0.000	0.394	0.634	0.927	0.612	6.123	4.131
223	8.450	27.723	-8.450	-27.723	7.676	0.068	172.330	0.886	1	3	3	3	0	111.369	1.583	1.435	0.147	4.726	0.853	3.677	3.136	0.000	0.000	4.248	1.116	6.094	0.682	0.859	0.599	0.220	1.601	3.112	0.000	0.000	0.000	0.000	0.000	0.000	0.406	0.654	0.949	0.627	6.272	4.248
224	8.500	27.887	-8.500	-27.887	7.391	0.100	171.590	1.353	5	3	3	3	0	114.551	1.592	1.439	0.153	4.890	0.852	3.540	3.016	2.764	1.574	4.031	1.724	5.800	0.704	0.898	0.413	0.195	1.415	3.214	74.064	0.000	0.000	0.000	0.000	0.000	0.387	0.651	0.908	0.603	6.031	4.031
225	8.550	28.051	-8.550	-28.051	11.143	0.234	181.500	2.100	5	3	3	3	3	114.551	1.601	1.444	0.158	5.054	0.850	5.338	4.540	3.852	2.386	6.612	2.452	9.542	0.494	0.577	2.794	0.525	3.796	3.100	65.492	0.000	0.000	0.000	0.000	0.000	0.636	0.689	1.495	0.908	9.079	6.612
226	8.600	28.215	-8.600	-28.215	78.539	0.279	71.970	0.355	8	6	8	6	6	120.915	1.611	1.448	0.163	5.218	0.849	18.810	15.973	14.743	12.519	53.142	0.363	76.929	0.027	0.027	51.702	7.305	52.703	1.838	5.000	54.435	37.460	-0.043	2.738	215.153	0.000	0.000	0.000	6.389	63.892	63.892
227	8.650	28.379	-8.650	-28.379	79.327	0.311	20.330	0.333	9	6	9	6	6	124.097	1.625	1.452	0.168	5.382	0.848	24.779	21.006	22.579	20.141	97.320	0.337	117.706	0.004	0.004	97.598	12.329	88.593	2.729	68.683	0.000	0.000	0.000	0.000	0.000	0.483	0.729	289.707	0.000	0.000	105.029	105.029
228	8.700	28.543	-8.700	-28.543	138.101	0.443	14.510	0.321	9	6	9	6	6	124.097	1.631	1.458	0.173	5.547	0.846	26.460	22.392	23.851	20.184	93.627	0.325	136.470	0.002	0.002	93.435	13.187	94.435	1.598	4.331	70.513	40.140	-0.086	2.195	303.223	0.000	0.000	0.000	11.196	111.959	111.959
229	8.750	28.707	-8.750	-28.707	64.698	0.541	6.140	0.836	8	5	8	6	5	120.915	1.641	1.463	0.178	5.711	0.845	15.495	13.091	13.400	11.320	43.116	0.858	63.058	0.000	0.000	43.106	6.180	44.106	2.097	15.712	48.731	36.509	-0.095	3.027	195.933	0.000	0.000	0.000	5.236	52.363	52.363
230	8.800	28.871	-8.800	-28.871	109.822	0.815	6.660	0.742	9	6	9	6	6	124.097	1.651	1.468	0.183	5.875	0.843	21.042	17.747	20.903	17.629	73.714	0.753	108.171	0.000	0.000	73.697	10.501	74.697	1.876	9.824	63.849	39.029	-0.134	2.377	261.188	0.000	0.000	0.000	8.873	88.734	88.734
231	8.850	29.035	-8.850	-29.035	78.238	1.287	6.040	1.645	7	5	8	6	5	117.733	1.661	1.473	0.188	6.039	0.842	24.984	21.037	16.962	14.282	52.014	1.681	76.577	0.000	0.000	52.014	7.477	53.014	2.209	19.284	54.083	37.401	-0.174	2.760	216.025	0.000	0.000	0.000	6.311	63.112	63.112
232	8.900	29.199	-8.900	-29.199	40.164	1.509	5.430	3.757	5	4	8	5	4	114.551	1.671	1.477	0.194	6.203	0.841	19.239	16.175	11.194	7.584	26.068	3.920	38.494	-0.001	-0.001	26.085	3.831	27.085	2.740	42.605	0.000	0.000	0.000	0.000	0.000	2.567	0.000	10.000	3.235	32.350	26.068
233	8.950	29.363	-8.950	-29.363	26.237	1.219	5.960	4.646	3	3	7	5	3	111.369	1.680	1.481	0.199	6.367	0.840	25.135	21.103	8.271	5.457	16.584	4.964	24.558	-0.000	-0.001	16.593	2.496	17.593	2.955	55.528	0.000	0.000	0.000	0.000	0.000	1.638	0.000	5.303	2.110	21.103	16.584
234	9.000	29.527	-9.000	-29.527	20.582	1.033	13.210	5.019	3	3	6	5	3	111.369	1.690	1.485	0.204	6.531	0.839	21.119	16.533	6.977	4.502	12.725	3.467	18.894	0.010	0.011	12.584	1.932	13.584	3.010	61.116	0.000	0.000	0.000	0.000	0.000	1.260	0.025	3.568	1.653	16.510	12.725
235	9.050	29.691	-9.050	-29.691	35.681	1.124	93.070	3.150	5	4	6	5	3	114.551	1.699	1.490	0.209	6.696	0.837	17.091	14.310	9.923	6.626	22.824	3.308	33.983	0.076	0.079	21.012	3.140	22.013	2.736	42.387	0.000	0.000	0.000	0.000	0.000	2.266	0.337	8.772	2.862	28.621	22.824
236	9.100	29.855	-9.100	-29.855	29.120	0.967	97.730	3.321	5	4	6	5	3	114.551	1.708	1.494	0.214	6.860	0.836	13.949	11.662	8.514	5.603	18.358	3.528	27.413	0.097	0.104	16.458	2.497	17.459	2.827	47.560	0.000	0.000	0.000	0.000	0.000	1.828	0.355	6.200	2.332	23.325	18.358
237	9.150	30.019	-9.150	-30.019	14.904	0.766	71.050	5.140	3	3	5	3	2	111.369	1.717	1.498	0.219	7.024	0.835	14.278	11.921	5.564	3.432	8.807	5.809	13.187	0.134	0.152	7.471	1.215	8.472	3.211	73.888	0.000	0.000	0.000	0.000	0.000	0.880	0.250	2.137	1.192	11.921	8.807
238	9.200	30.183	-9.200	-30.183	10.972	0.447	118.830	4.074	3	3	3	3	2	111.369	1.726	1.502	0.224	7.188	0.834	10.511	8.764	4.336	2.540	6.158	4.834	9.246	0.318	0.377	3.836	0.696	4.837	3.288	80.076	0.000	0.000	0.000	0.000	0.000	0.617	0.436	1.378	0.876	8.764	6.158
239	9.250	30.347	-9.250	-30.347	9.252	0.222	142.940	2.399	5	3	3	3	3	114.551	1.736	1.506	0.229	7.352	0.833	4.432	3.690	3.544	1.996	4.993	2.953	7.517	0.458	0.563	2.181	0.459	3.182	3.246	76.668	0.000	0.000	0.000	0.000	0.000	0.501	0.529	1.104	0.738	7.381	4.993
240	9.300	30.511	-9.300	-30.511	8.757	0.166	142.140	1.896	5	3	3	3	2	114.551	1.745	1.510	0.235	7.516	0.831	4.195	3.488	3.301	1.828	4.645	2.367	7.013	0.480	0.599	1.861	0.414	2.862	3.225	74.933	0.000	0.000	0.000	0.000	0.000	0.468	0.526	1.030	0.698	6.976	4.645
241	9.350	30.675	-9.350	-30.675	8.389	0.164	140.180	1.955	5	3	3	3	2	114.551	1.754	1.515	0.240	7.680	0.830	4.018	3.336	3.236	1.764	4.382	2.472	6.635	0.490	0.619	1.670	0.387	2.671	3.256	75.438	0.000	0.000	0.000	0.000	0.000	0.443	0.514	0.976	0.667	6.673	4.382
242	9.400	30.840	-9.400	-30.840	8.412	0.150	134.910	1.783	5	3	3	3	2	114.551	1.764	1.519	0.245	7.845	0.829	4.029	3.341	3.199	1.738	4.379	2.256	6.649	0.472	0.597	1.766	0.402	2.767	3.237	75.894	0.000	0.000	0.000	0.000	0.000	0.443	0.496	0.976	0.668	6.682	4.379
243	9.450	31.004	-9.450	-31.004	8.777	0.138	137.350	1.572	5	3	3	3	2	114.551	1.773	1.523	0.250	8.009	0.828	4.204	3.481	3.227	1.765	4.601	1.970	7.005	0.460	0.577	1.948	0.430	2.949	3.190	72.194	0.000	0.000	0.000	0.000	0.000	0.467	0.505	1.021	0.696	6.962	4.601
244	9.500	31.168	-9.500	-31.168	9.182	0.141	136.400	1.536	5	3	3	3	3	114.551	1.783	1.528	0.255	8.173	0.827	4.398	3.636	3.312	1.825	4.846	1.905	7.400	0.436	0.541	2.224	0.472	3.225	3.163	70.145	0.000	0.000	0.000	0.000	0.000	0.494	0.501	1.072	0.727	7.273	4.846
245	9.550	31.332	-9.550	-31.332	10.021	0.164	126.640	1.637	5	3	3	3	3	114.551	1.792	1.532	0.260	8.337	0.826	4.800	3.963	3.541	1.982	5.375	1.993	8.229	0.369	0.449	2.962	0.581	3.963	3.133	67.886	0.000	0.000	0.000	0.000	0.000	0.549	0.462	1.190	0.793	7.926	5.375
246	9.600	31.496	-9.600	-31.496	10.286	0.156	149.940	1.517	5	3	3	3	3	114.551	1.801	1.536	0.265	8.501	0.825	4.927	4.062	3.568	2.001	5.526	1.838	8.485	0.429	0.521	2.650	0.537	3.651	3.105	65.866	0.000	0.000	0.000	0.000	0.000	0.566	0.552	1.225	0.812	8.125	5.526
247	9.650	31.660	-9.650	-31.660	8.719	0.103	179.270	1.181	5	3	3	3	1	114.551	1.811	1.540	0.270	8.665	0.823	4.176	3.439	3.104	1.668	4.487	1.491	6.909	0.611	0.771	1.027	0.299	2.029	3.144	68.697	0.000	0.000	0.000	0.000	0.000	0.461	0.666	0.997	0.688	6.878	4.487
248	9.700	31.824	-9.700	-31.824	8.567	0.073	208.520	0.852	5	3	3	3	1	114.551	1.820	1.545	0.276	8.829	0.822	4.204	3.524	3.251	1.571	4.370	1.082	6.748	0.661	0.839	0.703	0.252	1.705	3.095	63.116	0.000	0.000	0.000	0.000	0.000	0.450	0.708	0.974	0.675	6.748	4.370
249	9.750	31.988	-9.750	-31.988	9.632	0.071	208.520	0.737	6	3	3	3	1	114.551	1.830	1.549	0.281	8.993	0.821	3.691	3.031	3.137	1.713	5.040	0.910	7.803	0.647	0.799	1.015	0.299	2.017	3.008	59.042	0.000	0.000	0.000	0.000	0.000	0.458	0.701	0.970	0.668	6.682	4.379
250	9.800	32.152	-9.800	-32.152	10.707	0.073	209.370	0.682	6	4	3	3	1	114.551	1.839	1.553	0.286	9.158	0.820	4.103	3.364	3.346	1.864	5.712	0.823	8.869	0.584	0.705	1.685	0.400	2.687	2.941	54.609	0.000	0.000	0.000	0.000	0.000	0.441	0.674	0.963	0.657	6.573	4.382
251	9.850	32.316	-9.850	-32.316	10.901	0.085	205.180	0.780	6	4	3	3	1	114.551	1.848	1.557	0.291	9.322	0.819	4.177	3.420	3.439	1.915	5.815	0.939	9.053	0.561	0.676	1.887	0.431	2.888	2.957	55.610	0.000	0.000	0.000	0.000	0.000	0.455	0.684	0.952	0.640	6.403	4.379
252	9.900	32.480	-9.900	-32.480	10.690	0.096	200.290	0.898	6	4	3	3	1	114.551	1.858	1.562	0.296	9.486	0.818	4.097	3.350	3.450	1.906	5.658	1.087	8.833	0.557	0.675	1.842	0.425	2.843	2.994	58.054	0.000	0.000	0.000	0.000	0.000	0.457	0.691	0.967	0.653	6.529	4.379
253	9.950	32.644	-9.950	-32.644	10.171	0.080	197.190	0.787	6	3	3	3	1	114.551	1.867	1.566	0.301	9.650	0.817	3.898	3.183	3.291	1.792	5.305	0.963	8.305	0.576	0.705	1.564	0.385	2.566	2.998	58.324	0.000	0.000	0.000	0.000	0.000	0.457	0.708	0.968	0.657	6.568	4.379
254	10.000	32.808	-10.000	-32.808	10.144	0.085	207.280	0.838	6	3	3	3	1	114.551	1.877	1.570	0.306	9.814	0.815	3.887	3.170	3.312	1.795	5.268	1.028	8.268	0.608	0.746	1.339	0.352	2.341	3.012	59.289	0.000	0.000	0.000	0.000	0.000	0.457	0.689	0.962	0.649	6.488	4.382
255	10.050	32.972	-10.050	-32.972	10.120	0.091	208.450	0.899	6	4	3	3	1	114.551	1.886	1.575	0.311	9.979	0.814	3.878	3.158	3.337	1.801	5.232	1.105	8.235	0.572	0.703	1.553	0.385	2.554	3.028	60.358	0.000	0.000	0.000	0.000	0.000	0.457	0.700	0.962	0.649	6.488	4.379
256	10.100	33.136	-10.100	-33.136	10.854	0.095	212.010	0.875	6	3	3	3	1	114.551	1.895	1.579	0.317	10.142	0.813	4.159	3.383	3.490	1.906	5.677	1.060	8.960	0.581	0.704	1.681	0.406	2.683	3.186	57.668	0.000	0.000	0.000	0.000	0.000	0.457	0.698	0.961	0.646	6.457	4.379
257	10.150	33.300	-10.150	-33.300	11.422	0.085	234.160	0.744	6	4	3	3	1	114.551	1.905	1.583	0.322	10.307	0.812	4.377	3.555	3.555	1.954	6.015	0.893	9.518	0.612	0.734	1.597	0.394	2.599	2.935	54.180	0.000	0.000	0.000	0.000	0.000	0.457	0.698	0.961	0.646	6.457	4.379
258	10.200	33.464	-10.200	-33.464	11.731	0.079	227.690	0.673	6	4	3	3	1	114.551	1.914	1.587	0.327	10.471	0.811	4.495	3.646	3.589	1.976	6.188	0.805	9.818	0.578	0.691	1.913	0.443	2.914	2.905	52.334	0.000	0.000	0.000	0.000	0.000	0.457	0.698	0.961	0.646	6.457	4.379
259	10.250	33.628	-10.250	-33.628	11.124	0.090	218.550	0.809	6	4	3	3	1	114.551	1.924	1.592	0.332	10.635	0.810	4.263	3.453	3.530	1.915	5.783	0.978	9.202	0.584	0.706	1.703	0.412	2.704	2.966	56.224	0.000	0.000	0.000	0.000	0.000	0.457	0.699	0.961	0.646	6.457	4.379
260	10.300	33.792	-10.300	-33.792	10.909	0.097	228.910	0.889	6	3	3	3	1	114.551	1.933	1.596	0.337	10.799	0.809	4.180	3.381	3.523	1.897	5.627	1.081	8.977	0.624	0.759	1.358	0.361	2.596	2.995	58.131	0.000	0.000	0.000	0.000	0.000	0.457	0.698	0.961	0.646	6.457	4.379
261	10.350	33.956	-10.350	-33.956	11.664	0.089	234.440	0.763	6	4	3	3	1	114.551	1.942	1.600	0.342	10.963	0.808	4.469	3.611	3.631	1.975	6.078	0.915	9.722	0.598	0.718	1.715	0.416

	A	B	E	F	G	H
1		ConeTec CPT Interpretations				
2		Interpretation Output - SCREENzW Version 1.19 - Dec 18 2012				
3		DAS Version: W47				
4		Interpretation Format:	All but Liquefaction Parameters (NLI)			
5		Run ID:	1367593888			
6		Job No:	13-54031			
7		Client:	Schnabel			
8		Project:	James River Bank Stabilization			
9		Facility:	James River Bank Stabilization			
10		Sounding ID:	CPT-02			
11		Cone ID:	184:T1500F15U500			
12		Operator:	BK-AS			
13		CPT Date:	May-02-2013			
14		CPT Time:	09:54			
15		CPT File:	13-54031_CP02.COR			
16						
17		Tip Units:	tsf			
18		Sleeve Units:	tsf			
19		PP Units:	ft			
20		Tip Conversion to bar:	0.9580			
21		Sleeve Conversion to bar:	0.9580			
22		PP Conversion to meters:	0.3050			
23						
24		Col 5 (Extra Module) Parameter	N/A			
25		Col 5 (Extra Module) Units	N/A			
26						
27		Coord Source:	GPS			
28		Coord Type:	LATLONG			
29		UTM Zone:	N/A			
30		Easting / Long:	-76.458363			
31		Northing / Lat:	37.021022			
32		Elevation:	0.000			
33						
34		Tip Net Area Ratio:	0.80			
35		Unit Weight of Soil Base:	Based on Soil Zones			
36		Unit Weight of Soil (Def):	19.00	kN/m^3	120.91	pcf
37		Unit Weight of Water:	9.81	kN/m^3	62.43	pcf
38		Equilibrium U Profile Used:	No			
39		Soil Unit Weight Profile Used:	No			
40		Water Table	5.79	m	19.00	ft
41		Averaging Interval:	0.00	m	0.00	ft
42						
43		Su Factors Nkt and Ndu:	15.0	8.0		
44		Cn Exp. and Limits:	0.50	0.00	1.70	
45		Qc1 Exp. and Limits:	0.50	0.00	1.70	
46		State Parameter M:	1.20			
47		NC Su / p':	0.30			
48		Relative Density Method:	All Sands - Jamilokowski (1985)			
49		Phi Angle Method:	Kulhawy and Mayne (1990)			
50		Youngs Modulus Sand Type:	Recent			
51		N160Ic Method:	Based on qc1n			
52						

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
53	Depth	Depth	Elev	Elev	Avg qt	Avg fs	Avg u	Avg Rf	SBT	SBTn	SBT Bq	SBT Bqn	SBT JandD	Unit Wt.	TStress	EStress	Equil u	Equil u	Cn	N(60)	N1(60)	N60 (Ic)
54	m	ft	m	ft	tsf	tsf	ft	%						pcf	tsf	tsf	tsf	ft		bpf	bpf	bpf
55	0.050	0.164	-0.050	-0.164	9.043	0.218	0.410	2.411	5	8	5	7	8	114.551	0.009	0.009	0.000	0.000	1.700	4.331	7.363	2.612
56	0.100	0.328	-0.100	-0.328	19.186	0.311	1.010	1.621	6	0	7	0	0	114.551	0.019	0.019	0.000	0.000	1.700	7.352	12.499	4.602
57	0.150	0.492	-0.150	-0.492	31.345	0.346	0.730	1.104	7	0	7	0	0	117.733	0.028	0.028	0.000	0.000	1.700	10.009	17.016	6.682
58	0.200	0.656	-0.200	-0.656	32.983	0.347	0.520	1.052	7	6	7	7	8	117.733	0.038	0.038	0.000	0.000	1.700	10.533	17.906	6.946
59	0.250	0.820	-0.250	-0.820	34.684	0.367	0.680	1.058	7	6	7	7	8	117.733	0.048	0.048	0.000	0.000	1.700	11.076	18.829	7.256
60	0.300	0.984	-0.300	-0.984	31.182	0.456	1.930	1.462	6	6	7	7	8	114.551	0.057	0.057	0.000	0.000	1.700	11.949	20.313	6.860
61	0.350	1.148	-0.350	-1.148	32.840	0.363	1.670	1.105	7	6	7	7	8	117.733	0.067	0.067	0.000	0.000	1.700	10.487	17.828	6.956
62	0.400	1.312	-0.400	-1.312	33.148	0.334	1.350	1.008	7	6	7	7	8	117.733	0.076	0.076	0.000	0.000	1.700	10.585	17.995	6.946
63	0.450	1.476	-0.450	-1.476	27.585	0.302	0.850	1.095	7	6	7	7	8	117.733	0.086	0.086	0.000	0.000	1.700	8.809	14.975	5.989
64	0.500	1.640	-0.500	-1.640	20.005	0.247	0.880	1.235	6	6	7	7	5	114.551	0.096	0.096	0.000	0.000	1.700	7.666	13.032	4.624
65	0.550	1.804	-0.550	-1.804	13.155	0.218	0.840	1.657	5	6	6	6	5	114.551	0.105	0.105	0.000	0.000	1.700	6.301	10.712	3.377
66	0.600	1.968	-0.600	-1.968	12.055	0.238	0.820	1.974	5	5	6	6	5	114.551	0.114	0.114	0.000	0.000	1.700	5.774	9.816	3.213
67	0.650	2.133	-0.650	-2.133	13.969	0.287	1.410	2.055	5	5	6	6	5	114.551	0.124	0.124	0.000	0.000	1.700	6.691	11.375	3.644
68	0.700	2.297	-0.700	-2.297	17.941	0.318	1.770	1.772	6	6	6	6	5	114.551	0.133	0.133	0.000	0.000	1.700	6.875	11.688	4.401
69	0.750	2.461	-0.750	-2.461	16.929	0.351	1.510	2.073	5	5	6	6	5	114.551	0.143	0.143	0.000	0.000	1.700	8.109	13.786	4.277
70	0.800	2.625	-0.800	-2.625	12.975	0.320	0.770	2.466	5	5	6	6	5	114.551	0.152	0.152	0.000	0.000	1.700	6.215	10.565	3.515
71	0.850	2.789	-0.850	-2.789	11.142	0.294	0.390	2.639	5	5	6	6	4	114.551	0.161	0.161	0.000	0.000	1.700	5.337	9.073	3.135
72	0.900	2.953	-0.900	-2.953	10.812	0.330	0.290	3.052	4	5	6	6	4	114.551	0.171	0.171	0.000	0.000	1.700	6.905	11.739	3.125
73	0.950	3.117	-0.950	-3.117	11.695	0.415	2.470	3.548	4	4	6	6	4	114.551	0.180	0.180	0.000	0.000	1.700	7.469	12.698	3.407
74	1.000	3.281	-1.000	-3.281	14.586	0.487	2.500	3.339	4	5	6	6	4	114.551	0.190	0.190	0.000	0.000	1.700	9.315	15.836	4.041
75	1.050	3.445	-1.050	-3.445	21.514	0.443	2.180	2.059	6	5	7	6	5	114.551	0.199	0.199	0.000	0.000	1.700	8.244	14.015	5.222
76	1.100	3.609	-1.100	-3.609	33.704	0.396	0.680	1.175	7	6	7	6	5	117.733	0.208	0.208	0.000	0.000	1.700	10.763	18.297	7.162
77	1.150	3.773	-1.150	-3.773	47.181	0.369	0.190	0.782	7	6	8	7	6	117.733	0.218	0.218	0.000	0.000	1.700	15.067	25.613	9.187
78	1.200	3.937	-1.200	-3.937	54.271	0.357	0.200	0.658	8	6	8	7	6	120.915	0.228	0.228	0.000	0.000	1.700	12.998	22.097	10.212
79	1.250	4.101	-1.250	-4.101	57.381	0.370	0.160	0.645	8	6	8	7	6	120.915	0.238	0.238	0.000	0.000	1.700	13.743	23.363	10.700
80	1.300	4.265	-1.300	-4.265	58.021	0.406	0.200	0.700	8	6	8	7	6	120.915	0.248	0.248	0.000	0.000	1.700	13.896	23.623	10.884
81	1.350	4.429	-1.350	-4.429	60.421	0.443	0.120	0.733	8	6	8	7	6	120.915	0.258	0.258	0.000	0.000	1.700	14.471	24.600	11.325
82	1.400	4.593	-1.400	-4.593	61.360	0.474	0.060	0.772	8	6	8	7	6	120.915	0.268	0.268	0.000	0.000	1.700	14.696	24.983	11.535
83	1.450	4.757	-1.450	-4.757	61.330	0.493	-0.010	0.804	8	6	8	7	6	120.915	0.278	0.278	0.000	0.000	1.700	14.689	24.970	11.574
84	1.500	4.921	-1.500	-4.921	65.060	0.529	0.060	0.813	8	6	8	7	6	120.915	0.287	0.287	0.000	0.000	1.700	15.582	26.489	12.201
85	1.550	5.085	-1.550	-5.085	68.431	0.557	0.110	0.814	8	6	8	7	6	120.915	0.297	0.297	0.000	0.000	1.700	16.389	27.862	12.755
86	1.600	5.249	-1.600	-5.249	65.821	0.536	0.090	0.814	8	6	8	7	6	120.915	0.307	0.307	0.000	0.000	1.700	15.764	26.799	12.328
87	1.650	5.413	-1.650	-5.413	52.340	0.512	0.010	0.978	7	6	8	6	6	117.733	0.317	0.317	0.000	0.000	1.700	16.714	28.414	10.278
88	1.700	5.577	-1.700	-5.577	38.880	0.520	-0.030	1.337	7	6	8	6	5	117.733	0.327	0.327	0.000	0.000	1.700	12.416	21.107	8.215
89	1.750	5.741	-1.750	-5.741	29.890	0.543	-0.070	1.817	6	5	7	6	5	114.551	0.336	0.336	0.000	0.000	1.700	11.454	19.471	6.795
90	1.800	5.905	-1.800	-5.905	26.860	0.399	-0.010	1.485	6	5	7	6	5	114.551	0.346	0.346	0.000	0.000	1.700	10.293	17.498	6.059
91	1.850	6.069	-1.850	-6.069	28.042	0.327	0.250	1.166	7	6	7	6	5	117.733	0.355	0.355	0.000	0.000	1.700	8.955	15.223	6.119
92	1.900	6.234	-1.900	-6.234	24.231	0.333	0.140	1.374	6	5	7	6	5	114.551	0.365	0.365	0.000	0.000	1.692	9.285	15.712	5.509
93	1.950	6.398	-1.950	-6.398	19.071	0.316	0.090	1.657	6	5	7	6	5	114.551	0.374	0.374	0.000	0.000	1.671	7.308	12.209	4.614
94	2.000	6.562	-2.000	-6.562	16.541	0.321	0.230	1.941	5	5	6	6	5	114.551	0.384	0.384	0.000	0.000	1.650	7.923	13.075	4.189
95	2.050	6.726	-2.050	-6.726	21.558	0.321	1.270	1.489	6	5	7	6	5	114.551	0.393	0.393	0.000	0.000	1.630	8.261	13.468	5.069
96	2.100	6.890	-2.100	-6.890	26.342	0.342	3.460	1.298	6	5	7	6	5	114.551	0.402	0.402	0.000	0.000	1.611	10.094	16.263	5.920
97	2.150	7.054	-2.150	-7.054	26.777	0.444	2.720	1.658	6	5	7	6	5	114.551	0.412	0.412	0.000	0.000	1.593	10.261	16.342	6.184
98	2.200	7.218	-2.200	-7.218	22.552	0.480	1.930	2.128	6	5	7	6	5	114.551	0.421	0.421	0.000	0.000	1.575	8.642	13.609	5.530
99	2.250	7.382	-2.250	-7.382	23.562	0.429	1.880	1.821	6	5	7	6	5	114.551	0.431	0.431	0.000	0.000	1.557	9.029	14.062	5.636
100	2.300	7.546	-2.300	-7.546	26.401	0.370	1.840	1.401	6	5	7	6	5	114.551	0.440	0.440	0.000	0.000	1.541	10.117	15.588	6.024

	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR
53	N160 (Ic)	Norm: Qt	Norm: Fr	Net qt	Delta U/qt	Bq	Q(1-Bq)	qe	qeNorm	Ic	FC	Dr	Phi	State Parm	Es/qt	Es	Su (Nkt)	Su (Ndu)	OCR	qc1 (Cn)	qc1	qc1n
54	bpf		%	tsf				MPa			%	%	deg			tsf	tsf	tsf		MPa		
55	4.440	961.530	2.413	9.033	0.001	0.001	960.167	0.865	961.168	2.805	46.273	0.000	0.000	0.000	0.000	0.000	0.602	0.002	10.000	1.473	14.727	14.727
56	7.824	1020.138	1.623	19.168	0.002	0.002	1018.459	1.835	1019.460	2.439	28.014	76.299	34.043	-0.476	3.680	70.641	0.000	0.000	0.000	3.125	31.247	31.247
57	11.360	1106.026	1.105	31.316	0.001	0.001	1105.221	3.001	1106.221	2.168	17.942	84.491	36.388	-0.427	2.910	91.254	0.000	0.000	0.000	5.105	51.048	51.048
58	11.808	867.672	1.053	32.945	0.000	0.000	867.245	3.158	868.245	2.138	16.981	81.746	36.631	-0.398	2.835	93.541	0.000	0.000	0.000	5.372	53.717	53.717
59	12.335	727.274	1.060	34.637	0.001	0.001	726.828	3.321	727.828	2.122	16.476	79.941	36.871	-0.382	2.763	95.858	0.000	0.000	0.000	5.649	56.487	56.487
60	11.662	544.615	1.465	31.125	0.002	0.002	543.560	2.981	544.561	2.243	20.485	74.277	36.363	-0.396	2.918	91.024	0.000	0.000	0.000	5.078	50.783	50.783
61	11.825	491.542	1.108	32.774	0.002	0.002	490.760	3.141	491.760	2.152	17.434	73.553	36.610	-0.350	2.841	93.344	0.000	0.000	0.000	5.348	53.484	53.484
62	11.808	433.273	1.010	33.072	0.001	0.001	432.720	3.172	433.721	2.126	16.596	71.882	36.655	-0.327	2.828	93.768	0.000	0.000	0.000	5.399	53.986	53.986
63	10.181	319.810	1.098	27.499	0.001	0.001	319.501	2.640	320.501	2.212	19.397	64.909	35.777	-0.308	3.106	85.712	0.000	0.000	0.000	4.493	44.925	44.925
64	7.861	208.456	1.241	19.910	0.001	0.001	208.169	1.914	209.169	2.357	24.694	54.194	34.243	-0.280	3.615	72.346	0.000	0.000	0.000	3.258	32.581	32.581
65	5.740	124.400	1.670	13.050	0.002	0.002	124.150	1.258	125.150	2.580	34.399	0.000	0.000	0.000	0.000	0.000	0.870	0.003	10.000	2.142	21.425	21.425
66	5.462	104.469	1.993	11.941	0.002	0.002	104.245	1.152	105.245	2.655	38.101	0.000	0.000	0.000	0.000	0.000	0.796	0.003	10.000	1.963	19.633	19.633
67	6.195	111.929	2.073	13.845	0.003	0.003	111.573	1.334	112.573	2.613	35.979	0.000	0.000	0.000	0.000	0.000	0.923	0.006	10.000	2.275	22.750	22.750
68	7.482	133.804	1.786	17.808	0.003	0.003	133.389	1.713	134.389	2.487	30.091	46.318	33.722	-0.279	0.000	0.000	0.000	0.000	0.000	2.922	29.219	29.219
69	7.271	117.816	2.091	16.787	0.003	0.003	117.485	1.617	118.485	2.548	32.869	0.000	0.000	0.000	0.000	0.000	1.120	0.006	10.000	2.757	27.571	27.571
70	5.976	84.429	2.496	12.823	0.002	0.002	84.270	1.241	85.270	2.686	39.734	0.000	0.000	0.000	0.000	0.000	0.855	0.003	10.000	2.113	21.131	21.131
71	5.330	68.090	2.677	10.981	0.001	0.001	68.015	1.066	69.015	2.758	43.589	0.000	0.000	0.000	0.000	0.000	0.732	0.002	10.000	1.815	18.147	18.147
72	5.313	62.350	3.101	10.641	0.001	0.001	62.297	1.035	63.297	2.807	46.373	0.000	0.000	0.000	0.000	0.000	0.710	0.001	10.000	1.761	17.608	17.608
73	5.792	63.952	3.604	11.515	0.007	0.007	63.524	1.113	64.524	2.820	47.171	0.000	0.000	0.000	0.000	0.000	0.768	0.010	10.000	1.905	19.047	19.047
74	6.870	75.986	3.383	14.396	0.005	0.005	75.574	1.390	76.574	2.729	41.999	0.000	0.000	0.000	0.000	0.000	0.960	0.010	10.000	2.375	23.754	23.754
75	8.878	107.189	2.078	21.315	0.003	0.003	106.847	2.054	107.847	2.464	29.106	45.768	34.590	-0.277	3.500	75.328	0.000	0.000	0.000	3.504	35.037	35.037
76	12.175	160.747	1.182	33.496	0.001	0.001	160.645	3.227	161.645	2.160	17.681	57.966	36.734	-0.249	2.804	94.529	0.000	0.000	0.000	5.489	54.891	54.891
77	15.619	215.395	0.786	46.963	0.000	0.000	215.368	4.519	216.368	1.938	11.319	66.958	38.341	-0.236	2.380	112.347	0.000	0.000	0.000	7.684	76.839	76.839
78	17.360	237.222	0.661	54.043	0.000	0.000	237.194	5.199	238.194	1.845	9.102	70.342	39.010	-0.229	2.247	122.009	0.000	0.000	0.000	8.839	88.386	88.386
79	18.191	240.366	0.647	57.143	0.000	0.000	240.345	5.497	241.345	1.820	8.550	71.328	39.276	-0.228	2.201	126.373	0.000	0.000	0.000	9.345	93.451	93.451
80	18.503	233.286	0.703	57.774	0.000	0.000	233.261	5.558	234.261	1.836	8.913	71.060	39.329	-0.233	2.193	127.281	0.000	0.000	0.000	9.449	94.493	94.493
81	19.252	233.582	0.736	60.163	0.000	0.000	233.567	5.788	234.567	1.834	8.861	71.659	39.523	-0.238	2.162	130.702	0.000	0.000	0.000	9.840	98.401	98.401
82	19.609	228.398	0.776	61.093	0.000	0.000	228.391	5.878	229.391	1.842	9.044	71.560	39.597	-0.240	2.151	132.050	0.000	0.000	0.000	9.993	99.932	99.932
83	19.676	220.088	0.808	61.053	-0.000	-0.000	220.089	5.875	221.089	1.853	9.286	71.024	39.594	-0.241	2.152	132.007	0.000	0.000	0.000	9.988	99.882	99.882
84	20.742	225.441	0.817	64.773	0.000	0.000	225.434	6.233	226.434	1.836	8.897	72.213	39.876	-0.244	2.111	137.392	0.000	0.000	0.000	10.596	105.957	105.957
85	21.684	229.225	0.818	68.133	0.000	0.000	229.214	6.555	230.214	1.819	8.523	73.175	40.118	-0.246	2.078	142.282	0.000	0.000	0.000	11.145	111.446	111.446
86	20.958	213.294	0.818	65.513	0.000	0.000	213.285	6.305	214.285	1.832	8.819	71.590	39.932	-0.239	2.103	138.494	0.000	0.000	0.000	10.720	107.195	107.195
87	17.473	164.144	0.984	52.023	0.000	0.000	164.143	5.014	165.143	1.960	11.888	64.571	38.837	-0.233	2.279	119.337	0.000	0.000	0.000	8.524	85.241	85.241
88	13.965	118.047	1.349	38.553	-0.000	-0.000	118.050	3.725	119.050	2.146	17.239	55.620	37.417	-0.233	2.608	101.422	0.000	0.000	0.000	6.332	63.320	63.320
89	11.552	87.926	1.837	29.553	-0.000	-0.000	87.933	2.864	88.933	2.320	23.256	47.671	36.161	-0.239	2.982	89.166	0.000	0.000	0.000	4.868	48.678	48.678
90	10.301	76.740	1.505	26.514	-0.000	-0.000	76.741	2.573	77.741	2.302	22.590	44.212	35.650	-0.202	3.148	84.580	0.000	0.000	0.000	4.374	43.744	43.744
91	10.403	77.982	1.181	27.687	0.000	0.000	77.960	2.686	78.960	2.224	19.819	45.056	35.856	-0.179	3.080	86.412	0.000	0.000	0.000	4.567	45.668	45.668
92	9.322	65.466	1.395	23.866	0.000	0.000	65.454	2.321	66.454	2.320	23.259	40.490	35.136	-0.178	3.318	80.433	0.000	0.000	0.000	3.928	39.280	39.280
93	7.709	49.997	1.690	18.697	0.000	0.000	49.989	1.827	50.989	2.457	28.809	33.261	33.931	-0.171	3.717	70.910	0.000	0.000	0.000	3.052	30.524	30.524
94	6.913	42.150	1.987	16.158	0.000	0.000	42.131	1.584	43.131	2.553	33.107	0.000	0.000	0.000	0.000	0.000	1.078	0.001	10.000	2.615	26.149	26.149
95	8.264	53.890	1.517	21.165	0.002	0.002	53.789	2.061	54.789	2.395	26.214	36.073	34.400	-0.167	3.563	76.843	0.000	0.000	0.000	3.367	33.669	33.669
96	9.538	64.504	1.318	25.939	0.004	0.004	64.235	2.513	65.235	2.293	22.269	41.478	35.300	-0.171	3.263	85.995	0.000	0.000	0.000	4.066	40.657	40.657
97	9.849	64.066	1.684	26.365	0.003	0.003	63.860	2.557	64.860	2.355	24.622	41.617	35.324	-0.196	3.256	87.211	0.000	0.000	0.000	4.085	40.855	40.855
98	8.708	52.577	2.169	22.131	0.003	0.003	52.434	2.155	53.434	2.486	30.047	36.372	34.449	-0.204	3.547	80.015	0.000	0.000	0.000	3.402	34.022	34.022
99	8.777	53.754	1.855	23.131	0.002	0.003	53.617	2.252	54.617	2.432	27.753	37.311	34.606	-0.188	3.495	82.373	0.000	0.000	0.000	3.516	35.155	35.155
100	9.282	59.042	1.425	25.962	0.002	0.002	58.911	2.524	59.911	2.328	23.570	40.263	35.098	-0.170	3.331	87.971	0.000	0.000	0.000	3.897	38.969	38.969

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR
101	2.350	7.710	-2.350	-7.710	27.199	0.363	1.500	1.335	6	5	7	6	5	114.551	0.449	0.449	0.000	0.000	1.525	10.423	15.890	6.154	9.382	59.562	1.357	26.750	0.002	0.002	59.458	2.601	60.458	2.309	22.843	40.814	35.190	-0.166	3.300	89.798	0.000	0.000	0.000	3.972	39.725	39.725
102	2.400	7.874	-2.400	-7.874	25.516	0.402	1.020	1.575	6	5	7	6	5	114.551	0.459	0.459	0.000	0.000	1.509	9.778	14.753	5.953	8.982	54.651	1.604	25.058	0.001	0.001	54.581	2.441	55.582	2.378	25.511	38.686	34.835	-0.174	3.418	87.259	0.000	0.000	0.000	3.688	36.883	36.883
103	2.450	8.038	-2.450	-8.038	29.267	0.387	1.180	1.322	7	5	7	6	5	117.733	0.468	0.468	0.000	0.000	1.493	9.346	13.957	6.562	9.800	61.533	1.344	28.799	0.001	0.001	61.454	2.800	62.454	2.288	22.067	42.323	35.441	-0.168	3.217	94.180	0.000	0.000	0.000	4.187	41.872	41.872
104	2.500	8.202	-2.500	-8.202	34.036	0.386	1.010	1.134	7	5	7	6	5	117.733	0.478	0.478	0.000	0.000	1.478	10.869	16.067	7.348	10.862	70.252	1.150	33.559	0.001	0.001	70.186	3.258	71.186	2.199	18.945	46.357	36.114	-0.167	2.997	102.049	0.000	0.000	0.000	4.820	48.201	48.201
105	2.550	8.366	-2.550	-8.366	49.245	0.412	0.730	0.837	7	6	8	6	6	117.733	0.488	0.488	0.000	0.000	1.464	15.725	23.015	9.796	14.337	100.047	0.845	48.757	0.000	0.000	100.000	4.715	101.000	1.994	12.780	56.658	37.830	-0.172	2.500	123.156	0.000	0.000	0.000	6.904	69.044	69.044
106	2.600	8.530	-2.600	-8.530	58.165	0.462	0.750	0.794	8	6	8	6	6	120.915	0.497	0.497	0.000	0.000	1.449	13.950	20.186	11.273	16.335	116.001	0.801	57.668	0.000	0.000	115.954	5.570	116.954	1.925	11.002	61.144	38.578	-0.181	2.330	135.584	0.000	0.000	0.000	8.074	80.743	80.743
107	2.650	8.694	-2.650	-8.694	59.424	0.506	0.700	0.852	8	6	8	6	6	120.915	0.507	0.507	0.000	0.000	1.435	14.232	20.420	11.576	16.610	116.197	0.859	58.917	0.000	0.000	116.154	5.691	117.154	1.939	11.346	61.476	38.633	-0.187	2.319	137.854	0.000	0.000	0.000	8.168	81.681	81.681
108	2.700	8.858	-2.700	-8.858	54.813	0.515	0.560	0.940	8	6	8	6	6	120.915	0.517	0.517	0.000	0.000	1.421	13.128	18.654	10.913	15.507	105.030	0.948	54.297	0.000	0.000	104.996	5.249	105.996	1.996	12.840	58.883	38.201	-0.187	2.411	132.236	0.000	0.000	0.000	7.462	74.618	74.618
109	2.750	9.022	-2.750	-9.022	49.273	0.498	0.510	1.011	7	6	8	6	5	117.733	0.527	0.527	0.000	0.000	1.408	15.735	22.150	10.040	14.133	92.542	1.022	48.746	0.000	0.000	92.512	4.719	93.512	2.056	14.500	55.560	37.647	-0.182	2.546	125.519	0.000	0.000	0.000	6.645	66.450	66.450
110	2.800	9.186	-2.800	-9.186	43.061	0.455	0.240	1.057	7	6	8	6	5	117.733	0.537	0.537	0.000	0.000	1.395	13.751	19.182	8.994	12.546	79.278	1.070	42.525	0.000	0.000	79.264	4.125	80.264	2.118	16.351	51.437	36.960	-0.172	2.736	117.883	0.000	0.000	0.000	5.755	57.547	57.547
111	2.850	9.350	-2.850	-9.350	35.941	0.342	0.150	0.952	7	6	8	6	5	117.733	0.546	0.546	0.000	0.000	1.383	11.477	15.868	7.636	10.558	64.819	0.966	35.395	0.000	0.000	64.810	3.443	65.810	2.160	17.674	46.000	36.054	-0.143	3.016	108.445	0.000	0.000	0.000	4.760	47.605	47.605
112	2.900	9.514	-2.900	-9.514	31.410	0.305	0.080	0.971	7	5	7	6	5	117.733	0.556	0.556	0.000	0.000	1.371	10.030	13.747	6.834	9.367	55.523	0.989	30.855	0.000	0.000	55.518	3.009	56.518	2.217	19.576	41.887	35.369	-0.131	3.241	101.832	0.000	0.000	0.000	4.124	41.241	41.241
113	2.950	9.678	-2.950	-9.678	30.921	0.273	0.230	0.883	7	5	7	6	5	117.733	0.566	0.566	0.000	0.000	1.359	9.874	13.417	6.690	9.091	53.692	0.899	30.356	0.000	0.000	53.680	2.962	54.680	2.204	19.125	41.191	35.253	-0.119	3.279	101.440	0.000	0.000	0.000	4.025	40.251	40.251
114	3.000	9.842	-3.000	-9.842	29.341	0.214	0.150	0.729	7	5	7	6	5	117.733	0.575	0.575	0.000	0.000	1.347	9.370	12.624	6.296	8.483	50.025	0.744	28.766	0.000	0.000	50.017	2.810	51.017	2.184	18.463	39.444	34.961	-0.097	3.376	99.102	0.000	0.000	0.000	3.787	37.872	37.872
115	3.050	10.006	-3.050	-10.006	27.200	0.213	0.040	0.783	7	5	7	6	5	117.733	0.585	0.585	0.000	0.000	1.336	8.686	11.606	5.954	7.955	45.521	0.800	26.616	0.000	0.000	45.519	2.606	46.519	2.232	20.068	37.034	34.560	-0.095	3.510	95.511	0.000	0.000	0.000	3.482	34.817	34.817
116	3.100	10.170	-3.100	-10.170	26.400	0.217	1.620	0.822	7	5	7	6	5	117.733	0.595	0.595	0.000	0.000	1.325	8.430	11.173	5.841	7.741	43.419	0.841	25.806	0.002	0.002	43.334	2.524	44.334	2.257	20.948	35.943	34.378	-0.094	3.570	94.292	0.000	0.000	0.000	3.352	33.518	33.518
117	3.150	10.335	-3.150	-10.335	26.310	0.277	1.660	1.053	7	5	7	6	5	117.733	0.604	0.604	0.000	0.000	1.315	8.402	11.045	5.976	7.856	42.561	1.078	25.706	0.002	0.002	42.475	2.516	43.475	2.317	23.168	35.615	34.323	-0.113	3.588	94.447	0.000	0.000	0.000	3.314	33.136	33.136
118	3.200	10.499	-3.200	-10.499	28.271	0.323	1.710	1.143	7	5	7	6	5	117.733	0.614	0.614	0.000	0.000	1.304	9.028	11.774	6.410	8.360	45.070	1.168	27.657	0.002	0.002	44.983	2.703	45.983	2.313	23.016	37.447	34.629	-0.125	3.487	98.622	0.000	0.000	0.000	3.532	35.323	35.323
119	3.250	10.663	-3.250	-10.663	27.734	0.371	0.650	1.338	6	5	7	6	5	114.551	0.623	0.623	0.000	0.000	1.294	10.628	13.755	6.424	8.314	43.505	1.368	27.111	0.001	0.001	43.472	2.655	44.472	2.362	24.882	36.677	34.500	-0.136	3.530	97.932	0.000	0.000	0.000	3.439	34.387	34.387
120	2.950	9.678	-2.950	-9.678	30.921	0.273	0.230	0.883	7	5	7	6	5	117.733	0.566	0.566	0.000	0.000	1.359	9.874	13.417	6.690	9.091	53.692	0.899	30.356	0.000	0.000	53.680	2.962	54.680	2.204	19.125	41.191	35.253	-0.119	3.279	101.440	0.000	0.000	0.000	4.025	40.251	40.251
121	3.350	10.991	-3.350	-10.991	41.941	0.374	0.230	0.892	7	6	8	6	5	117.733	0.643	0.643	0.000	0.000	1.275	13.393	17.073	8.760	11.167	64.293	0.906	41.299	0.000	0.000	64.282	4.017	65.282	2.118	16.350	48.098	36.404	-0.137	2.905	121.894	0.000	0.000	0.000	5.122	51.220	51.220
122	3.400	11.155	-3.400	-11.155	52.738	0.372	-0.370	0.705	8	6	8	6	6	120.915	0.652	0.652	0.000	0.000	1.265	12.631	15.980	10.439	13.207	79.869	0.714	52.086	-0.000	-0.000	79.886	5.053	80.886	1.981	12.433	54.447	37.462	-0.137	2.595	136.930	0.000	0.000	0.000	6.392	63.920	63.920
123	3.450	11.319	-3.450	-11.319	59.293	0.405	-1.140	0.683	8	6	8	6	6	120.915	0.662	0.662	0.000	0.000	1.256	14.201	17.831	11.526	14.472	88.559	0.691	58.631	-0.001	-0.001	88.612	5.684	89.612	1.933	11.201	57.589	37.986	-0.143	2.462	146.033	0.000	0.000	0.000	7.132	71.324	71.324
124	3.500	11.483	-3.500	-11.483	65.633	0.444	-1.170	0.676	8	6	8	6	6	120.915	0.672	0.672	0.000	0.000	1.246	15.719	19.591	12.585	15.686	96.672	0.683	64.961	-0.001	-0.001	96.726	6.291	97.726	1.896	10.303	60.288	38.435	-0.150	2.360	154.950	0.000	0.000	0.000	7.837	78.366	78.366
125	3.550	11.647	-3.550	-11.647	75.917	0.500	-0.490	0.659	8	6	8	6	6	120.915	0.682	0.682	0.000	0.000	1.237	18.182	22.496	14.259	17.642	110.333	0.665	75.235	-0.000	-0.000	110.356	7.274	111.356	1.840	8.991	64.250	39.096	-0.160	2.232	169.522	0.000	0.000	0.000	8.998	89.984	89.984
126	3.600	11.811	-3.600	-11.811	84.680	0.598	0.010	0.706	8	6	9	6	6	120.915	0.692	0.692	0.000	0.000	1.228	20.281	24.912	15.797	19.405	121.404	0.712	83.988	0.000	0.000	121.404	8.112	122.404	1.821	8.573	67.175	39.583	-0.175	2.153	182.407	0.000	0.000	0.000	9.965	99.649	99.649
127	3.650	11.975	-3.650	-11.975	90.042	0.636	0.390	0.706	8	6	9	6	6	120.915	0.702	0.702	0.000	0.000	1.220	21.876	26.302	16.683	20.348	129.316	0.712	89.341	0.000	0.000	127.290	8.625	128.290	1.802	8.116	69.574	39.892	-0.129	3.389	193.154	0.000	0.000	0.000	10.521	105.208	105.208
128	3.700	12.139	-3.700	-12.139	96.679	0.655	1.460	0.677	8	6	9	6	6	120.915	0.712	0.712	0.000	0.000	1.211	23.155	28.043	17.702	21.440	134.854	0.683	95.967	0.000	0.000	134.790	9.257	135.790	1.969	7.464	70.568	40.149	-0.180	2.074	200.623	0.000	0.000	0.000	11.217	112.172	112.172
129	3.750	12.303	-3.750	-12.303	107.359	0.649	1.520	0.605	9	6	9	6	6	124.097	0.722	0.722	0.000	0.000	1.203	20.570	24.739	19.226	23.122	147.762	0.609	106.638	0.000	0.000	147.696	10.280	148.696	1.705	6.209	73.370	40.616	-0.179	2.016	216.482	0.000	0.000	0.000	12.369	123.694	123.694
130	3.800	12.467	-3.800	-12.467	118.360	0.685	1.550	0.579	9	6	9	6	6	124.097	0.732	0.732	0.000	0.000	1.194	22.678	27.083	20.885	24.942	160.724	0.582	117.628	0.000	0.000	160.658	11.334	161.658	1.662	5.419	75.966	41.048	-0.182	1.964	232.583	0.000	0.000	0.000	13.542	135.416	135.416
131	3.850	12.631	-3.850	-12.631	125.100	0.602	1.610	0.481	9	6	9	6	6	124.097	0.742	0.742	0.000	0.000	1.186	23.969	28.429	21.606	25.626	167.589	0.484	124.358	0.000	0.000	167.521	11.980	168.521	1.598	4.332	77.355	41.280	-0.170	1.938	242.567	0.000	0.000	0.000	14.214	142.143	142.143
132	3.900	12.795	-3.900	-12.795	115.009	0.599	1.520	0.521	9	6	9	6	6	124.097	0.753	0.753	0.000	0.000	1.178	22.036	25.958	20.214	23.813	151.894	0.524	114.257	0.000	0.000	151.831	11.013	152.831	1.650	5.215	74.750	40.846	-0.168	1.988	228.730	0.000	0.000	0.000	12.979	129.791	129.791
133	3.950	12.959	-3.950	-12.959	92.408	0.576	2.950	0.623	8	6	9	6	6	120.915	0.763	0.763	0.000	0.000	1.170	22.132	25.899	16.963	19.850	120.229	0.629	91.646	0.001	0.001	120.108	8.844	121.108	1.776	7.610	68.288	39.769	-0.163	2.126	196.545	0.000	0.000	0.000	10.360	103.596	103.596
134	4.000	13.123	-4.000	-13.123	72.858	0.645	2.820	0.637	8	6	8	6	6	120.915	0.773	0.773	0.000	0.000	1.163	17.452	20.316	13.850	16.103	93.482	0.644	72.185	0.001	0.001	93.388	6.981	94.388	1.642	9.224	61.611	39.650	-0.144	2.524	169.511	0.000	0.000	0.000	8.126	81.263	81.263
135	4.050	13.287	-4.050	-13.287	52.887	0.424	2.650	0.802	8	6	8	6	6	120.915	0.782	0.782	0.000	0.000	1.155	12.666	14.633	10.726	12.392	66.621	0.814	52.104	0.002	0.002	66.516	5.059	67.516	2.044	14.162	51.924	37.041	-0.131	2.713	143.532	0.000	0.000	0.000	5.853	58.533	58.533
136	4.100	13.451	-4.100	-13.451	35.186	0.431	2.590	1.225	7	5	7	6	5	117.733	0.792	0.792	0.000	0.000	1.148	11.236	12.900	7.924	9.098	43.433	1.253	34.394	0.002	0.002	43.331	3.363	44.331	2.298	22.441	40.065	35.065	-0.128	3.344	117.710	0.000	0.000	0.000	3.870	38.701	38.701
137	4.150	13.615	-4.150	-13.615	27.428	0.441	2.910	1.608	6	5	7	6	5	114.551	0.802	0.802	0.000	0.000	1.141	10.510	11.995	6.640	7.578	33.225	1.656	26.627	0.003	0.003	33.112	2.619	34.112	2.458	28.854	32.754	33.846	-0.126	0.000	0.000	0.000	0.000	0.000	2.999	29.988	29.988
138	4.200	13.779	-4.200	-13.779	22.650	0.419	6.400	1.850	6	4	7	5	4	114.551	0.811	0.811	0.000	0.000	1.135	8.679	9.848	5.771	6.548	26.935	1.919	21.839	0.009	0.009	26.689	2.151	27.689	2.565	33.681	0.000	32.904	-0.117	0.000	0.000	0.000	0.000	0.000	2.462	24.620	24.620
139	4.250	13.943	-4.250	-13.943	20.730	0.402	9.690	1.939	6	4	6	5	4	114.551	0.821	0.821	0.000	0.000	1.128	7.944	8.962	5.359	6.344	24.275	2.019	19.910	0.015	0.015	23.906	1.957	24.906	2.594	35.083	0.000	32.454	-0.110	0.000	0.000	0.000	0.000	0.000	2.240	22.404	23.511
140	4.300	14.107	-4.300	-14.107	21.907	0.324	10.670	1.479	6	5	6	5	5	114.551	0.830	0.830	0.000	0.000	1.122	8.395	9.416	5.476	6.143	25.406	1.537	21.077	0.015	0.016	25.005	2.067	26.005	2.526	31.864	0.000	32.690	-0.091	0.000	0.000	0.000	0.000	0.000	2.354	23.541	23.541
141	4.350	14.271	-4.350	-14.271	25.138	0.317	10.910	1.281	6	5	6	5	5	114.551	0.839	0.839	0.000	0.000	1.115	9.633	10.745	6.031	6.727	28.962	1.305	24.299	0.014	0.014	28.596	2.376	29.554	2.455	29.000	0.000	33.321	-0.090	0.000	0.000	0.000	0.000	0.000	2.686	26.862	26.862
142	4.400	14.436	-4.400	-14.436	23.756	0.356	10.540	1.499	6	5	7	5	5	114.551	0.849	0.849	0.000	0.000	1.109	9.103	10.098	5.875	6.517	27.001	1.554	22.907	0.014	0.014	26.613	2.244	27.314	2.504	30.846	0.000	33.024	-0.098	0.000	0.000	0.000	0.000	0.000	2.524	25.242	26.244
143	4.450	14.600	-4.450	-14.600	19.135	0.374	10.340	1.955	6	4	6	5	4	114.551	0.858	0.858	0.000	0.000	1.103	7.332	8.089	5.042	5.861	21.307	2.046	18.277	0.017	0.018	20.931	1.802	21.931	2.632	36.964	0.000	31.964	-0.097	0.000	0.000	0.000	0.000	0.000	2.022	20.222	21.307
144	4.500	14.764	-4.500	-14.764	16.574	0.319	10.310	1.925	6	4	6	5	4	114.551	0.868	0.868	0.000	0.000	1.097	6.351	6.968	4.495	5.128	18.113	2.031	15.707	0.019	0.020	17.742	1.557	18.742	2.688	39.834	0.000	31.252	-0.078	0.000	0.000	0.000	0.000	0.000	1.742	17.421	18.113
145	4.550	14.928	-4.550	-14.928	15.285	0.267	10.410	1.747	6	4	6	5	4	114.551	0.877	0.877	0.000	0.000	1.091	5.857	6.392	4.173	4.684	16.437	1.853	14.408	0.021	0.023	16.067	1.433	17.067	2.701	40.504	0.000	30.839	-0.060	0.000	0.000	0.000	0.000	0.000	1.598	15.979	16.437
146	4.600	15.092	-4.600	-15.092	14.156	0.228	10.600	1.611	6	4	6	5	4	114.551	0.886	0.886	0.000	0.000	1.085	5.425	5.888	3.898	4.305	14.978	1.718	13.270	0.023	0.025	14.605	1.324	15.605	2.717	41.364	0.000	30.447	-0.044	0.000	0.000	0.000	0.000	0.000	1.472	14.720	14.978
147	4.650	15.256	-4.650	-15.256	13.156	0.208	10.500	1.581	5	4	6	5	4	114.551	0.896	0.896	0.000	0.000	1.080	6.302	6.804	3.681	3.999	13.693	1.697	12.260	0.025	0.027	13.327	1.229	14.327	2.747	43.006	0.000	30.000	0.000	0.000	0.000	0.000	0.000	0.000	0.818	0.041	3.974	1.361	13.608	13.693
148	4.700	15.420	-4.700	-15.420	11.653	0.177	10.050	1.519	5	4	5	4	4	114.551	0.905	0.905	0.000	0.000	1.074	5.582	5.995	3.343	3.558	11.880	1.647	10.748	0.027	0.029	11.533	1.039	12.533	2.793	45.592	0.000	29.695	0.000	0.000	0.000	0.000	0.000	0.000	0.717	0.039	3.230	1.199	11.991	11.880
149	4.750	15.584	-4.750	-15.584	10.803	0.174	10.090	1.611	5	4	5	4	4	114.551	0.915	0.915	0.000	0.000	1.069	5.175	5.530	3.187	3.331	10.818	1.760	9.889	0.029	0.032	10.473	1.005	11.473	2.843	46.498	0.000	29.226	0.000	0.000	0.000	0.000	0.000	0.000	0.660	0.039	2.828	1.106	11.059	10.818
150	4.800	15.748	-4.800	-15.748	10.195	0.162	10.420	1.589	5	4	5	4	4	114.551	0.924	0.924	0.000	0.000	1.063	4.883	5.192	3.053	3.139	10.039	1.747	9.272	0.032	0.035	9.687	0.946	10.687	2.869	50.084	0.000	0.000	0.000	0.000	0.000	0.000	0.618	0.041	2.549	1.038	10.384	10.039
151	4.850	15.912	-4.850	-15.912	9.158	0.175	10.860	1.911	5	3	5	4	3	114.551	0.933	0.933	0.000	0.000	1.058	4.387	4.640	2.898	2.912	8.816	2.128	8.225	0.037	0.041	8.453	0.845	9.453	2.961	55.925	0.000	0.000	0.000	0.000	0.000	0.000	0.549	0.042	2.140	0.928	9.280	8.816
152	4.900	16.076	-4.900	-16.076	7.612	0.139	11.600	1.826	5	3	5	4	3	114.551	0.943	0.943	0.000	0.000	1.052	3.646	3.838	2.528	2.453	7.078	2.084	6.670	0.048	0.054	6.694	0.695	7.694	3.039	61.121	0.000	0.000	0.000	0.000	0.000	0.000	0.445	0.045	1.621	0.768	7.675	7.078
153	4.950	16.240	-4.950	-16.240	6.711	0.097	20.990	1.445	5	3	4	3	3	114.551	0.952	0.952	0.000	0.000	1.047	3.215	3.367	2.248	2.116	6.051	1.684	5.759	0.098	0.114	5.363	0.580	6.363	3.053	62.096	0.000	0.000	0.000	0.000	0.000	0.000	0.384	0.082	1.352	0.673	6.733	6.051
154	5.000	16.404	-5.000	-16.404	5.763	0.085	21.310	1.475	1	3	4	3	3	111.369	0.961	0.961	0.000	0.000	1.042	2.760	2.877	0.000	0.000	4.997	1.770	4.802	0.115	0.139	4.305	0.488	5.305	3.136	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.320	0.083	1.105	0.575	5.754	4.997
155	5.050	16.568	-5.050	-16.568	4.955	0.148	23.250	2.987	3	3	3	3	2	111.369	0.971	0.971	0.000	0.000	1.037	4.747	4.924	2.090	1.809	4.108	3.714	3.985	0.147	0.182	3.359	0.405	4.360	3.371	67.120	0.000	0.000	0.000	0.000	0.000	0.000	0.266	0.091	0.922	0.482	4.824	4.108
156	5.100	16.732	-5.100	-16.732	11.527	0.114	26.680	0.989	6	4	5	4	4	114.551	0.980	0.980	0.000	0.000	1.032	4.417	4.560	3.215	3.136	10.769	1.081	10.547	0.072	0.079	9.919	1.024	10.919	3.241	42.689	0.000	29.226	0.026	0.000	0.000	0.000	0.000	0.000	1.140	11.400	10.769
157	5.150	16.896	-5.150	-16.896	5.095	0.092	40.810	1.806	4	3	3	3	3	114.551	0.989	0.989	0.000	0.000	1.027	3.254	3.343	1.965	1.671	4.153	2.241	4.106	0.250	0.310	2.864	0.366	3.864	3.255	77.403	0.000	0.000	0.000	0.000	0.000	0.000	0.274	0.159	0.931	0.501	5.015	4.153
158	5.200	17.060	-5.200	-17.060	5.241	0.098	56.180	1.870	4	3	3	3	3	114.551	0.999	0.999	0.000	0.000	1.023	3.347	3.423	2.017	1.708	4.250	2.310	4.243	0.335	0.413	2.493	0.334	3.494	3.253	77.207	0.000	0.000	0.000	0.000	0.000	0.000	0.283	0.219	0.950	0.513	5.134	4.250
159	5.250	17.224	-5.250	-17.224	5.042	0.049	59.570	0.972	1	3	3	3	1	111.369	1.008	1.008	0.000	0.000	1.018	2.415	2.458	0.000	0.000	4.005	1.215	4.034	0.369	0.461	2.158	0.305	3.159	3.150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.269	0.233	0.903	0.492	4.917	4.005
160	5.300	17.388	-5.300	-17.388	4.959	0.052	62.310	1.049	1	3	3	3	1	111.369	1.017	1.017	0.000	0.000	1.013	2.375	2.407	0.000	0.000	3.878	1.319	3.942	0.392	0.494	1.964	0.289	2.965	3.178	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.263	0.243	0.879	0.481	4.814	3.878
161	5.350	17.552	-5.350	-17.552	4.969	0.051	65.540	1.026	1	3	3	3

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR
201	7.350	24.114	-7.350	-24.114	7.841	0.075	134.690	0.957	1	3	3	3	1	111.369	1.392	1.232	0.160	5.117	0.921	3.756	3.458	0.000	0.000	5.238	1.163	6.450	0.516	0.627	1.952	0.348	2.953	3.036	0.000	0.000	0.000	0.000	0.000	0.000	0.430	0.506	1.159	0.692	6.916	5.238
202	7.400	24.278	-7.400	-24.278	7.791	0.070	139.570	0.898	1	3	3	3	1	111.369	1.401	1.236	0.165	5.281	0.919	3.732	3.430	0.000	0.000	5.173	1.095	6.391	0.538	0.656	1.779	0.329	2.780	3.030	0.000	0.000	0.000	0.000	0.000	0.000	0.426	0.524	1.144	0.686	6.861	5.173
203	7.450	24.442	-7.450	-24.442	7.880	0.072	144.110	0.914	1	3	3	3	1	111.369	1.410	1.240	0.170	5.445	0.918	3.774	3.464	0.000	0.000	5.220	1.113	6.470	0.550	0.669	1.727	0.324	2.728	3.030	0.000	0.000	0.000	0.000	0.000	0.000	0.432	0.541	1.155	0.693	6.927	5.220
204	7.500	24.606	-7.500	-24.606	7.877	0.071	140.410	0.901	1	3	3	3	1	111.369	1.419	1.244	0.175	5.610	0.916	3.773	3.457	0.000	0.000	5.194	1.099	6.458	0.534	0.652	1.808	0.335	2.810	3.030	0.000	0.000	0.000	0.000	0.000	0.000	0.431	0.526	1.149	0.691	6.914	5.194
205	7.550	24.770	-7.550	-24.770	8.027	0.075	140.530	0.934	1	3	3	3	1	111.369	1.428	1.248	0.180	5.774	0.915	3.845	3.517	0.000	0.000	5.290	1.139	6.600	0.524	0.638	1.917	0.349	2.919	3.028	0.000	0.000	0.000	0.000	0.000	0.000	0.440	0.526	1.170	0.703	7.035	5.290
206	7.600	24.934	-7.600	-24.934	8.138	0.074	140.640	0.909	1	3	3	3	1	111.369	1.437	1.252	0.185	5.938	0.913	3.898	3.560	0.000	0.000	5.355	1.104	6.701	0.517	0.628	1.994	0.359	2.995	3.018	0.000	0.000	0.000	0.000	0.000	0.000	0.447	0.526	1.185	0.712	7.120	5.355
207	7.650	25.098	-7.650	-25.098	8.182	0.074	146.050	0.904	1	3	3	3	1	111.369	1.446	1.256	0.190	6.102	0.912	3.919	3.573	0.000	0.000	5.365	1.099	6.736	0.534	0.649	1.884	0.347	2.886	3.017	0.000	0.000	0.000	0.000	0.000	0.000	0.449	0.547	1.188	0.715	7.147	5.365
208	7.700	25.262	-7.700	-25.262	8.116	0.074	148.260	0.912	1	3	3	3	1	111.369	1.456	1.260	0.196	6.266	0.910	3.887	3.539	0.000	0.000	5.288	1.111	6.661	0.546	0.666	1.768	0.334	2.769	3.024	0.000	0.000	0.000	0.000	0.000	0.000	0.444	0.554	1.170	0.708	7.078	5.288
209	7.750	25.426	-7.750	-25.426	8.192	0.072	150.890	0.879	1	3	3	3	1	111.369	1.465	1.264	0.201	6.430	0.909	3.924	3.567	0.000	0.000	5.325	1.070	6.728	0.551	0.671	1.754	0.334	2.756	3.015	0.000	0.000	0.000	0.000	0.000	0.000	0.449	0.564	1.178	0.713	7.133	5.325
210	7.800	25.590	-7.800	-25.590	8.369	0.073	150.360	0.872	1	3	3	3	1	111.369	1.474	1.268	0.206	6.594	0.907	4.009	3.638	0.000	0.000	5.440	1.059	6.895	0.536	0.651	1.898	0.352	2.900	3.004	0.000	0.000	0.000	0.000	0.000	0.000	0.460	0.561	1.205	0.728	7.275	5.440
211	7.850	25.754	-7.850	-25.754	8.355	0.071	151.310	0.850	1	3	3	3	1	111.369	1.483	1.272	0.211	6.759	0.906	4.002	3.626	0.000	0.000	5.405	1.033	6.872	0.540	0.657	1.855	0.348	2.856	3.003	0.000	0.000	0.000	0.000	0.000	0.000	0.458	0.564	1.197	0.725	7.252	5.405
212	7.900	25.918	-7.900	-25.918	8.295	0.074	151.340	0.892	1	3	3	3	1	111.369	1.492	1.276	0.216	6.923	0.905	3.973	3.594	0.000	0.000	5.333	1.088	6.803	0.544	0.663	1.798	0.342	2.799	3.017	0.000	0.000	0.000	0.000	0.000	0.000	0.454	0.564	1.180	0.719	7.188	5.333
213	7.950	26.082	-7.950	-26.082	8.422	0.074	152.500	0.879	1	3	3	3	1	111.369	1.501	1.280	0.221	7.087	0.903	4.034	3.644	0.000	0.000	5.409	1.069	6.921	0.539	0.656	1.860	0.351	2.862	3.008	0.000	0.000	0.000	0.000	0.000	0.000	0.462	0.568	1.198	0.729	7.287	5.409
214	8.000	26.246	-8.000	-26.246	8.592	0.070	157.380	0.815	1	3	3	3	1	111.369	1.510	1.284	0.226	7.251	0.902	4.116	3.712	0.000	0.000	5.518	0.988	7.083	0.546	0.662	1.865	0.353	2.867	2.987	0.000	0.000	0.000	0.000	0.000	0.000	0.472	0.586	1.223	0.742	7.423	5.518
215	8.050	26.410	-8.050	-26.410	8.623	0.068	157.500	0.789	1	4	3	3	1	111.369	1.520	1.288	0.231	7.415	0.900	4.131	3.719	0.000	0.000	5.517	0.957	7.104	0.544	0.660	1.878	0.355	2.879	2.981	0.000	0.000	0.000	0.000	0.000	0.000	0.474	0.586	1.223	0.744	7.438	5.517
216	8.100	26.574	-8.100	-26.574	8.660	0.072	160.120	0.831	5	3	3	3	1	114.551	1.529	1.292	0.237	7.579	0.899	4.148	3.729	2.789	1.856	5.521	1.010	7.131	0.550	0.668	1.833	0.351	2.835	2.990	57.819	0.000	0.000	0.000	0.000	0.000	0.476	0.596	1.224	0.746	7.457	5.521
217	8.150	26.739	-8.150	-26.739	8.775	0.071	162.650	0.809	5	4	3	3	1	114.551	1.538	1.297	0.242	7.743	0.897	4.203	3.772	2.809	1.866	5.585	0.981	7.238	0.551	0.668	1.852	0.354	2.854	2.980	57.175	0.000	0.000	0.000	0.000	0.000	0.483	0.605	1.239	0.754	7.545	5.585
218	8.200	26.903	-8.200	-26.903	8.952	0.071	165.340	0.793	5	4	3	3	1	114.551	1.548	1.301	0.247	7.908	0.896	4.288	3.842	2.845	1.889	5.695	0.959	7.405	0.549	0.664	1.914	0.363	2.916	2.969	56.395	0.000	0.000	0.000	0.000	0.000	0.494	0.615	1.265	0.768	7.684	5.695
219	8.250	27.067	-8.250	-27.067	8.949	0.066	164.820	0.738	5	4	3	3	1	114.551	1.557	1.305	0.252	8.072	0.895	4.287	3.834	2.826	1.868	5.667	0.893	7.393	0.547	0.662	1.915	0.364	2.916	2.958	55.713	0.000	0.000	0.000	0.000	0.000	0.493	0.612	1.258	0.767	7.669	5.667
220	8.300	27.231	-8.300	-27.231	8.987	0.065	164.570	0.723	5	4	3	3	1	114.551	1.566	1.309	0.257	8.236	0.893	4.305	3.844	2.832	1.865	5.670	0.876	7.422	0.543	0.658	1.940	0.369	2.942	2.955	55.482	0.000	0.000	0.000	0.000	0.000	0.495	0.610	1.259	0.769	7.689	5.670
221	8.350	27.395	-8.350	-27.395	8.739	0.073	159.960	0.835	5	3	3	3	1	114.551	1.576	1.314	0.262	8.400	0.892	4.186	3.732	2.825	1.841	5.455	1.019	7.163	0.542	0.661	1.851	0.359	2.852	2.996	58.247	0.000	0.000	0.000	0.000	0.000	0.478	0.592	1.208	0.746	7.464	5.455
222	8.400	27.559	-8.400	-27.559	8.567	0.113	154.880	1.319	5	3	3	3	1	114.551	1.585	1.318	0.267	8.564	0.890	4.104	3.653	2.952	1.906	5.300	1.618	6.982	0.533	0.654	1.832	0.358	2.833	3.095	65.141	0.000	0.000	0.000	0.000	0.000	0.466	0.571	1.173	0.731	7.305	5.300
223	8.450	27.723	-8.450	-27.723	13.379	0.143	164.910	1.069	6	4	4	3	4	114.551	1.595	1.322	0.272	8.728	0.889	5.127	4.556	3.935	2.738	8.917	1.213	11.786	0.365	0.414	5.227	0.789	6.228	2.837	48.171	0.000	0.000	0.000	0.000	0.000	0.474	0.596	1.224	0.746	7.457	8.917
224	8.500	27.887	-8.500	-27.887	66.222	0.178	51.610	0.269	8	6	8	6	6	120.915	1.604	1.327	0.277	8.892	0.887	15.860	14.071	12.448	11.044	48.724	0.275	64.619	0.020	0.021	47.718	6.190	48.718	1.842	5.000	50.800	36.854	-0.014	2.889	191.372	0.000	0.000	0.000	5.628	56.283	56.283
225	8.550	28.051	-8.550	-28.051	92.087	0.288	78.730	0.313	9	6	9	6	6	124.097	1.614	1.332	0.283	9.057	0.886	17.644	15.624	16.664	14.756	67.967	0.318	90.473	0.003	0.003	67.739	8.766	68.740	1.735	5.000	60.198	38.420	-0.056	2.474	227.921	0.000	0.000	0.000	7.812	78.121	78.121
226	8.600	28.215	-8.600	-28.215	112.532	0.390	16.380	0.347	9	6	9	6	6	124.097	1.624	1.337	0.288	9.221	0.884	21.561	19.057	19.955	17.637	83.003	0.352	110.908	0.002	0.002	82.836	10.732	83.835	1.676	5.000	65.891	39.369	-0.082	2.292	257.994	0.000	0.000	0.000	9.528	95.285	95.285
227	8.650	28.379	-8.650	-28.379	140.345	0.503	15.180	0.415	9	6	9	6	6	124.097	1.634	1.342	0.293	9.385	0.882	26.800	23.722	24.507	21.920	103.418	0.420	138.111	0.001	0.001	103.284	13.400	104.288	1.617	5.000	72.167	40.000	-0.116	2.135	299.814	0.000	0.000	0.000	11.861	118.610	118.610
228	8.700	28.543	-8.700	-28.543	155.884	0.953	10.300	0.611	9	6	9	6	6	124.097	1.645	1.347	0.298	9.549	0.881	29.867	26.299	27.748	24.433	114.564	0.618	154.240	0.000	0.000	114.547	14.903	115.547	1.687	5.883	75.124	40.908	-0.157	2.068	322.557	0.000	0.000	0.000	13.150	131.496	131.496
229	8.750	28.707	-8.750	-28.707	170.324	1.241	10.270	0.729	9	6	9	6	6	124.097	1.655	1.352	0.303	9.713	0.879	32.634	28.681	30.499	26.805	124.813	0.736	168.670	0.000	0.000	124.800	16.286	125.800	1.705	6.206	77.609	41.322	-0.180	2.013	343.049	0.000	0.000	0.000	14.341	143.407	143.407
230	8.800	28.871	-8.800	-28.871	155.770	1.417	9.610	0.910	9	6	9	6	6	124.097	1.665	1.357	0.308	9.877	0.877	29.846	26.182	28.818	25.280	113.611	0.920	154.105	-0.000	-0.000	113.617	14.894	114.617	1.798	8.071	74.995	40.887	-0.192	2.073	323.023	0.000	0.000	0.000	13.091	130.908	130.908
231	8.850	29.035	-8.850	-29.035	118.657	1.296	9.070	1.092	8	6	9	6	5	120.915	1.675	1.362	0.313	10.041	0.876	28.418	24.884	23.132	20.255	85.930	1.108	116.982	-0.000	-0.000	85.952	11.340	86.952	1.941	11.394	67.143	39.578	-0.183	2.262	268.543	0.000	0.000	0.000	9.954	99.538	99.538
232	8.900	29.199	-8.900	-29.199	72.863	1.270	8.440	1.743	7	5	8	6	5	117.733	1.685	1.367	0.318	10.205	0.874	23.267	20.339	15.984	13.973	52.106	1.784	71.178	-0.001	-0.001	52.146	6.955	53.146	2.237	20.248	53.116	37.240	-0.181	2.783	202.855	0.000	0.000	0.000	6.102	61.018	61.018
233	8.950	29.363	-8.950	-29.363	37.661	1.224	9.730	3.250	5	4	8	5	4	114.551	1.695	1.371	0.324	10.370	0.873	18.039	15.744	10.262	7.465	26.245	3.403	35.967	-0.001	-0.001	26.259	3.579	27.259	2.697	40.311	0.000	0.000	0.000	0.000	0.000	2.399	0.000	10.000	3.149	31.488	26.245
234	9.000	29.527	-9.000	-29.527	21.679	1.089	9.450	5.023	3	3	7	5	3	114.551	1.704	1.376	0.329	10.534	0.871	20.768	18.098	7.138	4.995	14.532	2.452	19.976	-0.002	-0.002	14.557	2.049	15.557	3.025	60.215	0.000	0.000	0.000	0.000	0.000	4.342	1.810	18.098	4.152	41.518	14.532
235	9.050	29.691	-9.050	-29.691	14.030	0.786	11.240	5.602	3	3	6	4	2	111.369	1.713	1.379	0.334	10.698	0.870	13.441	11.696	5.317	3.534	8.935	6.381	12.318	0.001	0.001	8.923	1.310	9.923	3.232	75.507	0.000	0.000	0.000	0.000	0.000	1.822	0.002	2.178	1.170	11.696	8.935
236	9.100	29.855	-9.100	-29.855	11.629	0.416	19.040	3.577	4	3	6	4	3	114.551	1.722	1.383	0.339	10.862	0.869	7.427	6.453	4.304	2.768	7.165	4.199	9.907	0.022	0.026	6.980	1.057	7.980	3.199	72.926	0.000	0.000	0.000	0.000	0.000	0.661	0.032	1.845	0.968	9.679	7.165
237	9.150	30.019	-9.150	-30.019	11.685	0.146	40.890	1.249	6	3	5	4	4	114.551	1.732	1.388	0.344	11.026	0.868	4.478	3.885	3.692	2.367	7.177	1.467	9.954	0.080	0.094	6.504	0.997	7.505	2.959	55.760	0.000	0.000	0.000	0.000	0.000	0.971	0.711	7.177
238	9.200	30.183	-9.200	-30.183	11.775	0.105	74.500	0.892	6	4	4	3	4	114.551	1.741	1.392	0.349	11.190	0.866	4.512	3.908	3.572	2.284	7.213	1.046	10.035	0.168	0.197	5.791	0.905	6.792	2.891	51.448	0.000	0.000	0.000	0.000	0.000	0.977	9.771	7.213
239	9.250	30.347	-9.250	-30.347	11.958	0.095	98.930	0.794	6	4	4	3	4	114.551	1.750	1.396	0.354	11.354	0.865	4.582	3.963	3.571	2.280	7.315	0.931	10.208	0.229	0.268	5.355	0.850	6.356	2.864	49.792	0.000	0.000	0.000	0.000	0.000	0.991	9.907	7.315
240	9.300	30.511	-9.300	-30.511	11.932	0.097	112.500	0.813	6	4	4	3	4	114.551	1.760	1.400	0.359	11.519	0.864	4.572	3.948	3.578	2.275	7.267	0.953	10.173	0.264	0.310	5.015	0.807	6.016	2.871	50.214	0.000	0.000	0.000	0.000	0.000	0.987	9.871	7.267
241	9.350	30.675	-9.350	-30.675	11.369	0.102	130.190	0.897	6	4	4	3	4	114.551	1.769	1.405	0.365	11.683	0.862	4.357	3.756	3.498	2.196	6.837	1.062	9.601	0.305	0.363	4.357	0.721	5.358	2.877	52.937	0.000	0.000	0.000	0.000	0.000	0.939	9.391	6.837
242	9.400	30.840	-9.400	-30.840	10.996	0.113	138.770	1.028	6	4	4	3	3	114.551	1.779	1.409	0.370	11.847	0.861	4.214	3.628	3.474	2.159	6.545	1.226	9.218	0.360	0.430	3.731	0.638	4.732	2.959	53.769	0.000	0.000	0.000	0.000	0.000	0.907	9.069	6.545
243	9.450	31.004	-9.450	-31.004	11.187	0.110	151.760	0.983	6	4	4	3	3	114.551	1.788	1.413	0.375	12.011	0.860	4.287	3.685	3.502	2.174	6.654	1.170	9.400	0.390	0.464	3.565	0.618	4.566	2.944	54.775	0.000	0.000	0.000	0.000	0.000	0.921	9.213	6.654
244	9.500	31.168	-9.500	-31.168	11.471	0.102	163.560	0.889	6	4	4	3	3	114.551	1.797	1.418	0.380	12.175	0.858	4.396	3.773	3.528	2.192	6.828	1.054	9.674	0.412	0.489	3.491	0.610	4.493	2.914	52.883	0.000	0.000	0.000	0.000	0.000	0.943	9.432	6.828
245	9.550	31.332	-9.550	-31.332	11.890	0.120	161.790	1.009	6	4	3	3	3	114.551	1.807	1.422	0.385	12.339	0.857	4.556	3.905	3.674	2.288	7.095	1.190	10.084	0.393	0.463	3.811	0.655	4.813	2.922	53.378	0.000	0.000	0.000	0.000	0.000	0.976	9.762	7.095
246	9.600	31.496	-9.600	-31.496	12.209	0.130	152.040	1.065	6	4	3	3	3	114.551	1.816	1.426	0.390	12.503	0.856	4.679	4.004	3.770	2.350	7.291	1.251	10.394	0.357	0.419	4.234	0.715	5.236	2.921	53.320	0.000	0.000	0.000	0.000	0.000	1.001	10.009	7.291
247	9.650	31.660	-9.650	-31.660	12.528	0.129	174.340	1.030	6	4	4	3	3	114.551	1.826	1.430	0.395	12.668	0.854	4.801	4.102	3.829	2.388	7.486	1.205	10.703	0.403	0.472	3.955	0.679	4.957	2.904	52.219	0.000	0.000	0.000	0.000	0.000	1.026	10.255	7.486
248	9.700	31.824	-9.700	-31.824	12.921	0.114	192.330	0.892	6	4	4	3	3	114.551	1.835	1.435	0.401	12.832	0.853	4.951	4.224	3.851	2.405	7.731	1.028	11.086	0.434	0.506	3.822	0.653	4.822	2.891	51.120	0.000	0.000	0.000	0.000	0.000	1.056	10.561	7.731
249	9.750	31.988	-9.750	-31.988	13.172	0.103	206.940	0.782	6	4	4	3	3	114.551	1.844	1.439	0.406	12.996	0.852	5.047	4.300	3.860	2.469	7.876	0.909	11.328	0.460	0.535	3.665	0.643	4.667	2.831	47.790	0.000	0.000	0.000	0.000	0.000	1.075	10.750	7.876
250	9.800	32.152	-9.800	-32.152	13.830	0.090	221.010	0.651	6	4	4	3	3	114.551	1.854	1.443	0.411	13.160	0.851	5.300	4.508	3.931	2.464	8.302	0.751	11.977	0.469	0.542	3.803	0.664	4.805	2.776	44.637	0.000	0.000	0.000	0.000	0.000	1.127	11.270	8.302
251	9.850	32.316	-9.850	-32.316	13.731	0.094	232.500	0.685	6	4	4	3	3	114.551	1.863	1.447	0.416	13.324	0.849	5.262	4.469	3.933	2.453	8.203	0.792	11.869	0.498	0.577	3.473	0.620	4.475	2.790	45.426	0.000	0.000	0.000	0.000	0.000	1.117	11.173	8.203
252	9.900	32.480	-9.900	-32.480	13.691	0.082	235.660	0.599	6	4	4	3	3	114.551	1.873	1.452	0.421	13.488	0.848	5.246	4.450	3.880	2.409	8.145	0.694	11.819	0.507	0.587	3.364	0.607	4.366	2.770	44.308	0.000	0.000	0.000	0.000	0.000	1.112	11.124	8.145
253	9.950	32.644	-9.950	-32.644	13.767	0.089	230.250	0.646	6	4	4	3	3	114.551	1.882	1.456	0.426	13.652	0.847	5.276	4.468	3.927	2.431	8.167	0.749	11.886	0.491	0.569	3.519	0.630	4.521	2.782	44.975	0.000	0.000	0.000	0.000	0.000	1.117	11.170	8.167
254	10.000	32.808	-10.000	-32.808	12.828	0.099	211.150	0.772	6	4	4	3	3	114.551	1.891	1.460	0.431	13.817	0.846	4.916	4.157	3.800	2.317	7.493	0.905	10.937	0.480	0.563	3.271	0.598	4.273	2.850	48.914	0.000	0.000	0.000	0.000	0.000	1.039	10.392	7.493
255	10.050	32.972	-10.050	-32.972	13.053	0.100	214.520	0.766	6	4	4	3	3	114.551	1.901	1.465	0.436	13.981	0.844	5.002	4.224	3.848	2.344	7.618	0.897	11.153	0.477	0.559	3.362	0.612	4.462	2.841	48.421	0.000	0.000	0.000	0.000	0.000	1.056	10.559	7.618
256	10.100	33.136	-10.100	-33.136	12.545	0.102	212.750	0.813	6	4	4	3	3	114.551	1.910	1.469	0.441	14.145	0.843	4.807	4.053	3.767	2.270	7.244	0.959	10.635	0.493	0.582	3.031	0.567	4.033	2.853	50.358	0.000	0.000	0.000	0.000	0.000	1.013	10.133	7.244
257	10.150	33.300	-10.150	-33.300	11.760	0.119	213.090	1.012	6	4	4	3	3	114.551	1.920	1.473	0.447	14.309	0.842	4.507	3.794	3.691	2.190	6.683	1.209	9.841	0.528	0.631	2.468	0.489	3.470	2.948	55.069	0.000	0.000	0.000	0.000	0.000	0.949	9.486	6.683
258	10.200	33.464	-10.200	-33.464	11.758	0.146	222.340	1.242	6	3	3	3	1	114.551	1.929	1.477	0.452	14.473	0.841	4.506	3.788	3.787	2.238	6.656	1.485	9.830	0.552	0.660	2.261	0.462	3.263	2.990	57.840	0.000	0.000	0.000	0.000	0.000	0.947	9.470	6.656
259	10.250	33.628	-10.250	-33.628	17.018	0.209	219.160	1.228	6	4	4	4	4	114.551	1.938	1.482	0.457	14.637	0.840	6.521	5.475	4.939	3.085	10.182	1.386	15.081	0.375	0.424	5.870	0.975	6.872	2.814	46.784	0.000	0.000	0.000	0.000	0.000	1.369	13.687	10.182
260	10.300	33.792	-10.300	-33.792	13.259	0.211	129.610	1.591	5	3	4	3	3	114.551	1.948	1.486	0.462	14.801	0.838	6.351	5.324	4.261	2.555	7.616	1.865	11.312	0.270	0.317	5.202	0.883	6.203	2.987	57.605	0.000	0.000	0.000	0.000	0.000	0.754	0.448	1.773	1.065	10.648	7.616
261	10.350	33.956	-10.350	-33.956	12.032	0.184	134.810	1.529	5	3	4	3	3	114.551	1.957	1.490	0.467	14.965	0.837	5.763	4.824	3.966	2.327	6.764	1.826	10.075	0.311	0.371	4.251	0.750	5.252	3.027	60.333	0.000	0.000	0.000	0.000	0.000	0.672	0.468	1.536	0.965	9.649	6.764
262	10.400	34.120	-10.400	-34.120	12.085	0.184	137.340	0.695	6	4	4	3	3	114.551	1.967	1.494	0.472	15.130	0.836	4.631	3.871	3.631	2.124	6.774	1.830	10.119	0.393	0.470	3.592	0.657	4.593	2.875	50.427	0.000	0.000	0.000	0.000	0.000	0.968	9.677	6.774
263	10.450	34.284	-10.450	-34.284	11.512	0.077	192.560	0.669	6	4	4	3	3	114.551	1.976	1.499	0.

ConeTec CPT Interpretations				
Interpretation Output - SCREENzW Version 1.19 - Dec 18 2012				
DAS Version: W47				
Interpretation Format:	All but Liquefaction Parameters (NLI)			
Run ID:	1367593892			
Job No:	13-54031			
Client:	Schnabel			
Project:	James River Bank Stabilization			
Facility:	James River Bank Stabilization			
Sounding ID:	CPT-03			
Cone ID:	184:T1500F15U500			
Operator:	BK-AS			
CPT Date:	May-02-2013			
CPT Time:	12:35			
CPT File:	13-54031_CP03.COR			
Tip Units:	tsf			
Sleeve Units:	tsf			
PP Units:	ft			
Tip Conversion to bar:	0.9580			
Sleeve Conversion to bar:	0.9580			
PP Conversion to meters:	0.3050			
Col 5 (Extra Module) Parameter	N/A			
Col 5 (Extra Module) Units	N/A			
Coord Source:	GPS			
Coord Type:	LATLONG			
UTM Zone:	N/A			
Easting / Long:	-76.457930			
Northing / Lat:	37.020350			
Elevation:	0.000			
Tip Net Area Ratio:	0.80			
Unit Weight of Soil Base:	Based on Soil Zones			
Unit Weight of Soil (Def):	19.00	kN/m^3	120.91	pcf
Unit Weight of Water:	9.81	kN/m^3	62.43	pcf
Equilibrium U Profile Used:	No			
Soil Unit Weight Profile Used:	No			
Water Table	8.53	m	28.00	ft
Averaging Interval:	0.00	m	0.00	ft
Su Factors Nkt and Ndu:	15.0	8.0		
Cn Exp. and Limits:	0.50	0.00	1.70	
Qc1 Exp. and Limits:	0.50	0.00	1.70	
State Parameter M:	1.20			
NC Su / p':	0.30			
Relative Density Method:	All Sands - Jamilokowski (1985)			
Phi Angle Method:	Kulhawy and Mayne (1990)			
Youngs Modulus Sand Type:	Recent			
N160Ic Method:	Based on qc1n			

Depth m	Depth ft	Elev m	Elev ft	Avg qt tsf	Avg fs tsf	Avg u ft	Avg Rf %	SBT	SBTn	SBT Bq	SBT Bqn	SBT JandD	Unit Wt. pcf
0.050	0.164	-0.050	-0.164	6.223	0.104	-5.950	1.671	4	8	5	7	8	114.551
0.100	0.328	-0.100	-0.328	16.845	0.165	-5.610	0.980	6	6	6	7	8	114.551
0.150	0.492	-0.150	-0.492	29.544	0.228	-5.740	0.772	7	0	7	0	0	117.733
0.200	0.656	-0.200	-0.656	36.726	0.427	-5.370	1.163	7	6	8	7	8	117.733
0.250	0.820	-0.250	-0.820	45.917	0.389	-5.260	0.847	7	7	8	7	8	117.733
0.300	0.984	-0.300	-0.984	47.857	0.316	-5.280	0.660	8	7	8	7	8	120.915
0.350	1.148	-0.350	-1.148	41.135	0.535	-5.680	1.301	7	6	8	7	8	117.733
0.400	1.312	-0.400	-1.312	45.036	0.566	-5.470	1.257	7	6	8	7	8	117.733
0.450	1.476	-0.450	-1.476	25.058	0.639	-5.100	2.550	6	8	7	7	8	114.551
0.500	1.640	-0.500	-1.640	20.028	0.567	-5.050	2.831	5	8	7	7	8	114.551
0.550	1.804	-0.550	-1.804	20.477	0.446	-5.230	2.178	6	6	7	7	8	114.551
0.600	1.968	-0.600	-1.968	21.106	0.409	-5.500	1.938	6	6	7	7	8	114.551
0.650	2.133	-0.650	-2.133	22.565	0.415	-5.660	1.839	6	6	7	7	8	114.551
0.700	2.297	-0.700	-2.297	22.411	0.465	-6.180	2.075	6	6	7	6	8	114.551
0.750	2.461	-0.750	-2.461	20.790	0.532	-6.460	2.559	5	5	7	6	8	114.551
0.800	2.625	-0.800	-2.625	20.588	0.404	-6.710	1.962	6	5	7	6	5	114.551
0.850	2.789	-0.850	-2.789	24.286	0.301	-7.040	1.239	6	6	7	6	5	114.551
0.900	2.953	-0.900	-2.953	26.145	0.204	-7.230	0.780	7	6	7	6	6	117.733
0.950	3.117	-0.950	-3.117	24.955	0.122	-7.170	0.489	7	6	7	6	6	117.733
1.000	3.281	-1.000	-3.281	24.705	0.121	-7.170	0.490	7	6	7	6	6	117.733
1.050	3.445	-1.050	-3.445	25.286	0.119	-7.030	0.471	7	6	7	6	6	117.733
1.100	3.609	-1.100	-3.609	26.117	0.108	-6.870	0.414	7	6	7	6	6	117.733
1.150	3.773	-1.150	-3.773	28.667	0.114	-6.940	0.398	7	6	7	6	6	117.733
1.200	3.937	-1.200	-3.937	28.897	0.118	-6.860	0.408	7	6	7	6	6	117.733
1.250	4.101	-1.250	-4.101	30.027	0.135	-6.890	0.450	7	6	7	6	6	117.733
1.300	4.265	-1.300	-4.265	34.437	0.144	-6.950	0.418	7	6	7	6	6	117.733
1.350	4.429	-1.350	-4.429	41.857	0.179	-6.820	0.428	8	6	8	6	6	120.915
1.400	4.593	-1.400	-4.593	53.668	0.236	-6.650	0.440	8	6	8	7	6	120.915
1.450	4.757	-1.450	-4.757	66.048	0.288	-6.660	0.436	8	6	8	7	6	120.915
1.500	4.921	-1.500	-4.921	73.439	0.341	-6.600	0.464	8	6	8	7	6	120.915
1.550	5.085	-1.550	-5.085	77.479	0.395	-6.550	0.510	8	6	8	7	6	120.915
1.600	5.249	-1.600	-5.249	82.269	0.444	-6.550	0.540	8	6	9	7	6	120.915
1.650	5.413	-1.650	-5.413	84.439	0.450	-6.520	0.533	8	6	9	7	6	120.915
1.700	5.577	-1.700	-5.577	86.020	0.439	-6.430	0.510	8	6	9	7	6	120.915
1.750	5.741	-1.750	-5.741	82.029	0.452	-6.510	0.551	8	6	9	7	6	120.915
1.800	5.905	-1.800	-5.905	76.039	0.445	-6.500	0.585	8	6	8	7	6	120.915
1.850	6.069	-1.850	-6.069	68.479	0.409	-6.540	0.597	8	6	8	7	6	120.915
1.900	6.234	-1.900	-6.234	61.520	0.373	-6.450	0.606	8	6	8	6	6	120.915
1.950	6.398	-1.950	-6.398	53.250	0.378	-6.480	0.710	8	6	8	6	6	120.915
2.000	6.562	-2.000	-6.562	39.480	0.382	-6.440	0.968	7	6	8	6	5	117.733
2.050	6.726	-2.050	-6.726	30.760	0.314	-6.330	1.021	7	6	7	6	5	117.733
2.100	6.890	-2.100	-6.890	29.211	0.219	-6.270	0.750	7	6	7	6	6	117.733
2.150	7.054	-2.150	-7.054	33.964	0.181	-5.810	0.533	7	6	7	6	6	117.733
2.200	7.218	-2.200	-7.218	32.734	0.269	-5.780	0.822	7	6	7	6	6	117.733
2.250	7.382	-2.250	-7.382	28.884	0.359	-5.840	1.243	7	5	7	6	5	117.733
2.300	7.546	-2.300	-7.546	21.654	0.350	-5.820	1.616	6	5	7	6	5	114.551

Depth m	TStress tsf	EStress tsf	Equil u tsf	Equil u ft	Cn	N(60) bpf	N1(60) bpf	N60 (Ic) bpf	N160 (Ic) bpf	Norm: Qt	Norm: Fr %	Net qt tsf	Delta U/qt	Bq
0.050	0.009	0.009	0.000	0.000	1.700	3.974	6.756	1.850	3.145	661.388	1.674	6.213	-0.030	-0.030
0.100	0.019	0.019	0.000	0.000	1.700	6.455	10.973	3.908	6.644	895.527	0.981	16.826	-0.010	-0.010
0.150	0.028	0.028	0.000	0.000	1.700	9.434	16.039	6.135	10.429	1042.440	0.772	29.516	-0.006	-0.006
0.200	0.038	0.038	0.000	0.000	1.700	11.728	19.938	7.697	13.085	966.257	1.164	36.689	-0.005	-0.005
0.250	0.048	0.048	0.000	0.000	1.700	14.663	24.927	9.039	15.367	963.135	0.848	45.870	-0.004	-0.004
0.300	0.057	0.057	0.000	0.000	1.700	11.462	19.485	9.156	15.566	832.583	0.661	47.800	-0.003	-0.003
0.350	0.067	0.067	0.000	0.000	1.700	13.136	22.331	8.591	14.605	611.146	1.303	41.067	-0.004	-0.004
0.400	0.077	0.077	0.000	0.000	1.700	14.381	24.448	9.257	15.737	585.001	1.259	44.959	-0.004	-0.004
0.450	0.086	0.086	0.000	0.000	1.700	9.602	16.324	6.103	10.375	289.099	2.559	24.972	-0.006	-0.006
0.500	0.096	0.096	0.000	0.000	1.700	9.594	16.309	5.128	8.717	208.126	2.845	19.933	-0.008	-0.008
0.550	0.105	0.105	0.000	0.000	1.700	7.847	13.340	5.043	8.574	193.713	2.189	20.372	-0.008	-0.008
0.600	0.115	0.115	0.000	0.000	1.700	8.088	13.749	5.097	8.665	183.230	1.948	20.991	-0.008	-0.008
0.650	0.124	0.124	0.000	0.000	1.700	8.647	14.700	5.358	9.108	181.037	1.849	22.441	-0.008	-0.008
0.700	0.133	0.133	0.000	0.000	1.700	8.588	14.600	5.408	9.193	167.064	2.087	22.278	-0.009	-0.009
0.750	0.143	0.143	0.000	0.000	1.700	9.958	16.929	5.219	8.872	144.642	2.577	20.647	-0.010	-0.010
0.800	0.152	0.152	0.000	0.000	1.700	7.889	13.412	5.001	8.502	134.324	1.977	20.436	-0.010	-0.010
0.850	0.162	0.162	0.000	0.000	1.700	9.306	15.821	5.448	9.262	149.346	1.248	24.125	-0.009	-0.009
0.900	0.171	0.171	0.000	0.000	1.700	8.349	14.193	5.538	9.414	151.841	0.785	25.974	-0.009	-0.009
0.950	0.181	0.181	0.000	0.000	1.700	7.969	13.547	5.119	8.703	137.092	0.492	24.775	-0.009	-0.009
1.000	0.190	0.190	0.000	0.000	1.700	7.889	13.412	5.077	8.630	128.774	0.494	24.515	-0.009	-0.009
1.050	0.200	0.200	0.000	0.000	1.700	8.075	13.727	5.162	8.775	125.414	0.474	25.086	-0.009	-0.009
1.100	0.210	0.210	0.000	0.000	1.700	8.340	14.178	5.256	8.935	123.556	0.417	25.907	-0.008	-0.008
1.150	0.219	0.219	0.000	0.000	1.700	9.154	15.562	5.672	9.643	129.697	0.401	28.447	-0.008	-0.008
1.200	0.229	0.229	0.000	0.000	1.700	9.228	15.687	5.722	9.727	125.193	0.412	28.668	-0.007	-0.007
1.250	0.239	0.239	0.000	0.000	1.700	9.589	16.301	5.952	10.119	124.821	0.453	29.788	-0.007	-0.007
1.300	0.248	0.248	0.000	0.000	1.700	10.997	18.694	6.655	11.313	137.687	0.421	34.188	-0.006	-0.006
1.350	0.258	0.258	0.000	0.000	1.700	10.025	17.042	7.879	13.394	161.182	0.430	41.599	-0.005	-0.005
1.400	0.268	0.268	0.000	0.000	1.700	12.854	21.851	9.785	16.634	199.251	0.442	53.400	-0.004	-0.004
1.450	0.278	0.278	0.000	0.000	1.700	15.819	26.892	11.713	19.912	236.650	0.438	65.771	-0.003	-0.003
1.500	0.288	0.288	0.000	0.000	1.700	17.589	29.901	12.914	21.953	254.138	0.466	73.151	-0.003	-0.003
1.550	0.298	0.298	0.000	0.000	1.700	18.556	31.546	13.637	23.183	259.210	0.512	77.181	-0.003	-0.003
1.600	0.308	0.308	0.000	0.000	1.700	19.703	33.496	14.445	24.556	266.392	0.542	81.961	-0.002	-0.002
1.650	0.318	0.318	0.000	0.000	1.700	20.223	34.379	14.764	25.098	264.876	0.535	84.122	-0.002	-0.002
1.700	0.328	0.328	0.000	0.000	1.700	20.602	35.023	14.952	25.419	261.652	0.512	85.692	-0.002	-0.002
1.750	0.338	0.338	0.000	0.000	1.700	19.646	33.398	14.434	24.537	242.106	0.553	81.692	-0.002	-0.002
1.800	0.347	0.347	0.000	0.000	1.700	18.211	30.959	13.574	23.075	217.920	0.588	75.692	-0.003	-0.003
1.850	0.357	0.357	0.000	0.000	1.700	16.401	27.881	12.405	21.089	190.682	0.600	68.122	-0.003	-0.003
1.900	0.367	0.367	0.000	0.000	1.686	14.734	24.843	11.323	19.091	166.551	0.610	61.153	-0.003	-0.003
1.950	0.377	0.377	0.000	0.000	1.664	12.753	21.219	10.145	16.879	140.213	0.715	52.872	-0.004	-0.004
2.000	0.387	0.387	0.000	0.000	1.643	12.607	20.709	8.083	13.277	101.048	0.977	39.093	-0.005	-0.005
2.050	0.397	0.397	0.000	0.000	1.622	9.823	15.937	6.576	10.669	76.574	1.034	30.364	-0.006	-0.007
2.100	0.406	0.406	0.000	0.000	1.603	9.328	14.954	6.120	9.811	70.915	0.760	28.805	-0.007	-0.007
2.150	0.416	0.416	0.000	0.000	1.584	10.846	17.184	6.770	10.726	80.675	0.540	33.548	-0.005	-0.005
2.200	0.426	0.426	0.000	0.000	1.566	10.453	16.372	6.824	10.688	75.931	0.833	32.308	-0.006	-0.006
2.250	0.435	0.435	0.000	0.000	1.549	9.223	14.285	6.409	9.926	65.376	1.262	28.448	-0.006	-0.006
2.300	0.445	0.445	0.000	0.000	1.532	8.298	12.713	5.190	7.952	47.695	1.650	21.209	-0.008	-0.009

Depth m	Q(1-Bq)	qe MPa	qeNorm	Ic	FC %	Dr %	Phi deg	State Parm	Es/qt	Es tsf	Su (Nkt) tsf	Su (Ndu) tsf	OCR	qc1 (Cn) MPa	qc1	qc1n
0.050	681.165	0.614	682.157	2.856	49.295	0.000	0.000	0.000	0.000	0.000	0.414	0.000	10.000	1.013	10.135	10.135
0.100	904.851	1.631	905.847	2.366	25.027	72.569	33.421	-0.393	0.000	0.000	0.000	0.000	0.000	2.743	27.434	27.434
0.150	1048.770	2.847	1049.768	2.103	15.906	82.795	36.105	-0.380	3.000	88.660	0.000	0.000	0.000	4.812	48.116	48.116
0.200	970.673	3.534	971.671	2.126	16.610	84.828	37.145	-0.421	2.683	98.585	0.000	0.000	0.000	5.981	59.813	59.813
0.250	966.583	4.415	967.582	1.966	12.057	87.982	38.212	-0.383	2.409	110.665	0.000	0.000	0.000	7.478	74.781	74.781
0.300	835.454	4.600	836.453	1.890	10.158	86.490	38.409	-0.343	2.365	113.251	0.000	0.000	0.000	7.794	77.940	77.940
0.350	613.785	3.958	614.784	2.118	16.348	79.895	37.686	-0.392	2.536	104.374	0.000	0.000	0.000	6.699	66.992	66.992
0.400	587.224	4.331	588.223	2.078	15.147	80.569	38.119	-0.383	2.430	109.498	0.000	0.000	0.000	7.335	73.345	73.345
0.450	290.943	2.416	291.942	2.471	29.416	62.090	35.318	-0.429	3.257	81.656	0.000	0.000	0.000	4.081	40.810	40.810
0.500	209.772	1.934	210.772	2.575	34.147	0.000	0.000	0.000	0.000	0.000	1.329	0.000	10.000	3.262	32.618	32.618
0.550	195.266	1.977	196.265	2.495	30.460	53.482	34.354	-0.352	3.578	73.300	0.000	0.000	0.000	3.335	33.349	33.349
0.600	184.729	2.038	185.728	2.453	28.639	53.122	34.498	-0.327	3.530	74.540	0.000	0.000	0.000	3.437	34.373	34.373
0.650	182.463	2.179	183.463	2.416	27.088	53.909	34.818	-0.317	3.424	77.296	0.000	0.000	0.000	3.675	36.749	36.749
0.700	168.511	2.165	169.510	2.451	28.560	52.667	34.785	-0.328	3.435	77.014	0.000	0.000	0.000	3.650	36.499	36.499
0.750	146.055	2.011	147.054	2.535	32.263	0.000	0.000	0.000	0.000	0.000	1.377	0.000	10.000	3.386	33.858	33.858
0.800	135.701	1.992	136.700	2.466	29.172	48.345	34.380	-0.296	3.570	73.521	0.000	0.000	0.000	3.353	33.530	33.530
0.850	150.707	2.348	151.706	2.289	22.117	52.221	35.169	-0.249	3.307	80.349	0.000	0.000	0.000	3.955	39.552	39.552
0.900	153.161	2.526	154.160	2.152	17.430	53.514	35.521	-0.205	3.190	83.440	0.000	0.000	0.000	4.258	42.580	42.580
0.950	138.331	2.412	139.330	2.073	5.000	51.392	35.299	-0.155	3.264	81.484	0.000	0.000	0.000	4.064	40.642	40.642
1.000	129.951	2.388	130.950	2.077	5.000	50.358	35.251	-0.149	3.280	81.063	0.000	0.000	0.000	4.023	40.235	40.235
1.050	126.512	2.443	127.511	2.060	5.000	50.315	35.362	-0.144	3.243	82.036	0.000	0.000	0.000	4.118	41.181	41.181
1.100	124.579	2.523	125.579	2.024	5.000	50.566	35.516	-0.131	3.192	83.395	0.000	0.000	0.000	4.253	42.534	42.534
1.150	130.685	2.767	131.684	1.980	5.000	52.591	35.961	-0.132	3.046	87.357	0.000	0.000	0.000	4.669	46.687	46.687
1.200	126.128	2.789	127.128	1.982	5.000	52.203	35.999	-0.131	3.034	87.702	0.000	0.000	0.000	4.706	47.062	47.062
1.250	125.723	2.897	126.722	1.985	5.000	52.710	36.183	-0.139	2.975	89.366	0.000	0.000	0.000	4.890	48.902	48.902
1.300	138.561	3.320	139.561	1.917	5.000	56.069	36.837	-0.142	2.773	95.523	0.000	0.000	0.000	5.608	56.083	56.083
1.350	162.007	4.030	163.006	1.846	5.000	61.109	37.769	-0.157	2.515	105.321	0.000	0.000	0.000	6.817	68.169	68.169
1.400	200.026	5.161	201.025	1.756	5.000	67.693	38.957	-0.178	2.257	121.172	0.000	0.000	0.000	8.740	87.404	87.404
1.450	237.399	6.347	238.398	1.677	5.000	73.122	39.948	-0.192	2.101	138.825	0.000	0.000	0.000	10.757	107.566	107.566
1.500	254.854	7.055	255.854	1.652	5.000	75.660	40.455	-0.204	2.035	149.534	0.000	0.000	0.000	11.960	119.602	119.602
1.550	259.897	7.442	260.897	1.654	5.289	76.709	40.711	-0.214	2.004	155.338	0.000	0.000	0.000	12.618	126.182	126.182
1.600	267.057	7.901	268.057	1.647	5.160	77.959	40.998	-0.222	1.970	162.148	0.000	0.000	0.000	13.398	133.983	133.983
1.650	265.517	8.109	266.517	1.635	4.946	78.251	41.122	-0.220	1.956	165.216	0.000	0.000	0.000	13.752	137.518	137.518
1.700	262.265	8.260	263.265	1.617	4.650	78.342	41.211	-0.215	1.946	167.450	0.000	0.000	0.000	14.009	140.092	140.092
1.750	242.709	7.878	243.709	1.654	5.272	76.553	40.984	-0.215	1.972	161.808	0.000	0.000	0.000	13.359	133.593	133.593
1.800	218.505	7.304	219.505	1.696	6.036	73.964	40.621	-0.211	2.015	153.276	0.000	0.000	0.000	12.384	123.838	123.838
1.850	191.253	6.580	192.253	1.738	6.849	70.559	40.121	-0.201	2.078	142.352	0.000	0.000	0.000	11.153	111.525	111.525
1.900	167.099	5.913	168.099	1.783	7.765	67.095	39.570	-0.190	2.155	132.641	0.000	0.000	0.000	9.937	99.372	99.372
1.950	140.749	5.121	141.749	1.879	9.885	62.575	38.817	-0.189	2.283	121.619	0.000	0.000	0.000	8.487	84.875	84.875
2.000	101.568	3.801	102.568	2.068	14.852	53.631	37.326	-0.187	2.632	103.970	0.000	0.000	0.000	6.213	62.126	62.126
2.050	77.073	2.966	78.073	2.175	18.161	46.125	36.075	-0.166	3.009	92.609	0.000	0.000	0.000	4.781	47.812	47.812
2.100	71.397	2.817	72.397	2.126	16.590	44.298	35.771	-0.132	3.108	90.828	0.000	0.000	0.000	4.486	44.861	44.861
2.150	81.111	3.271	82.111	1.999	12.922	48.283	36.435	-0.115	2.896	98.383	0.000	0.000	0.000	5.155	51.551	51.551
2.200	76.355	3.153	77.355	2.113	16.204	46.897	36.204	-0.146	2.968	97.203	0.000	0.000	0.000	4.912	49.117	49.117
2.250	65.795	2.785	66.795	2.263	21.192	42.988	35.552	-0.169	3.180	91.885	0.000	0.000	0.000	4.286	42.856	42.856
2.300	48.104	2.092	49.104	2.437	27.945	34.420	34.124	-0.164	3.654	79.149	0.000	0.000	0.000	3.178	31.783	31.783

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR
101	2.350	7.710	-2.350	-7.710	22.435	0.315	-5.630	1.404	6	5	7	6	5	114.551	0.454	0.454	0.000	0.000	1.516	8.597	13.035	5.269	7.989	48.408	1.433	21.981	-0.008	-0.008	48.795	2.166	49.795	2.392	26.104	35.136	34.243	-0.152	3.615	81.125	0.000	0.000	0.000	3.259	32.587	32.587
102	2.400	7.874	-2.400	-7.874	26.317	0.270	-5.280	1.026	7	5	7	6	5	117.733	0.464	0.464	0.000	0.000	1.501	8.404	12.610	5.835	8.755	55.767	1.044	25.853	-0.006	-0.006	56.123	2.537	57.123	2.262	21.126	39.413	34.956	-0.137	3.378	88.933	0.000	0.000	0.000	3.783	37.831	37.831
103	2.450	8.038	-2.450	-8.038	27.766	0.297	-5.490	1.070	7	5	7	6	5	117.733	0.473	0.473	0.000	0.000	1.485	8.867	13.168	6.141	9.120	57.670	1.088	27.292	-0.006	-0.006	58.032	2.676	59.032	2.256	20.920	40.654	35.163	-0.143	3.309	91.914	0.000	0.000	0.000	3.950	39.504	39.504
104	2.500	8.202	-2.500	-8.202	27.835	0.339	-5.570	1.218	7	5	7	6	5	117.733	0.483	0.483	0.000	0.000	1.470	8.889	13.068	6.249	9.187	56.641	1.239	27.352	-0.006	-0.006	57.001	2.683	58.001	2.290	22.170	40.436	35.127	-0.153	3.321	92.481	0.000	0.000	0.000	3.921	39.205	39.205
105	2.550	8.366	-2.550	-8.366	20.914	0.282	-5.720	1.348	6	5	7	6	5	114.551	0.493	0.493	0.000	0.000	1.456	8.014	11.668	4.980	7.251	41.471	1.381	20.422	-0.009	-0.009	41.834	2.021	42.834	2.423	27.353	31.962	33.714	-0.133	0.000	0.000	0.000	0.000	0.000	2.917	29.171	29.171
106	2.600	8.530	-2.600	-8.530	17.715	0.215	-5.580	1.214	6	5	6	6	5	114.551	0.502	0.502	0.000	0.000	1.442	6.788	9.791	4.297	6.198	34.301	1.249	17.213	-0.010	-0.010	34.649	1.714	35.648	2.463	29.064	0.000	0.000	32.876	-0.105	0.000	0.000	0.000	0.000	2.448	24.477	24.477
107	2.650	8.694	-2.650	-8.694	16.476	0.143	-2.230	0.868	6	5	6	6	5	114.551	0.511	0.511	0.000	0.000	1.429	6.314	9.022	3.918	5.598	31.229	0.896	15.965	-0.004	-0.004	31.365	1.585	32.365	2.420	27.219	0.000	0.000	32.486	-0.069	0.000	0.000	0.000	0.000	2.255	22.554	22.554
108	2.700	8.858	-2.700	-8.858	16.999	0.136	-1.830	0.800	6	5	6	6	5	114.551	0.521	0.521	0.000	0.000	1.416	6.514	9.224	3.995	5.657	31.651	0.825	16.478	-0.003	-0.003	31.761	1.634	32.761	2.394	26.174	0.000	32.591	-0.064	0.000	0.000	0.000	0.000	0.000	2.306	23.059	23.059
109	2.750	9.022	-2.750	-9.022	17.760	0.159	-1.590	0.895	6	5	6	6	5	114.551	0.530	0.530	0.000	0.000	1.403	6.806	9.551	4.194	5.885	32.509	0.923	17.230	-0.003	-0.003	32.603	1.706	33.603	2.404	26.590	0.000	32.758	-0.075	0.000	0.000	0.000	0.000	0.000	2.388	23.877	23.877
110	2.800	9.186	-2.800	-9.186	14.849	0.172	-1.820	1.158	6	5	6	6	5	114.551	0.540	0.540	0.000	0.000	1.391	5.690	7.915	3.724	5.180	26.528	1.202	14.309	-0.004	-0.004	26.633	1.428	27.633	2.533	32.163	0.000	31.861	-0.077	0.000	0.000	0.000	0.000	0.000	1.979	19.788	19.788
111	2.850	9.350	-2.850	-9.350	12.789	0.145	-1.810	1.134	6	5	6	6	5	114.551	0.549	0.549	0.000	0.000	1.379	4.901	6.759	3.296	4.546	22.303	1.185	12.240	-0.004	-0.005	22.406	1.231	23.406	2.589	34.803	0.000	31.106	-0.059	0.000	0.000	0.000	0.000	0.000	1.690	16.897	16.897
112	2.900	9.514	-2.900	-9.514	9.905	0.135	-0.820	1.363	5	4	6	5	5	114.551	0.558	0.558	0.000	0.000	1.367	4.744	6.488	2.615	4.614	16.745	1.444	9.347	-0.003	-0.003	16.790	0.951	17.790	2.636	37.143	0.000	0.000	0.000	0.000	0.000	0.000	0.623	0.000	5.381	1.298	12.976	16.745
113	2.950	9.678	-2.950	-9.678	9.009	0.177	1.450	1.965	5	4	6	5	4	114.551	0.568	0.568	0.000	0.000	1.356	4.315	5.852	2.548	4.391	14.872	2.097	8.441	0.005	0.005	14.793	0.859	15.793	2.767	44.107	0.000	0.000	0.000	0.000	0.000	0.000	0.563	0.006	4.496	1.170	11.704	14.872
114	3.000	9.842	-3.000	-9.842	10.735	0.257	2.340	2.394	5	4	6	5	4	114.551	0.577	0.577	0.000	0.000	1.345	5.142	6.916	3.014	5.160	17.605	2.530	10.158	0.007	0.007	17.478	1.021	18.478	2.754	43.368	0.000	0.000	0.000	0.000	0.000	0.000	0.677	0.009	5.812	1.383	13.832	17.605
115	3.050	10.006	-3.050	-10.006	15.290	0.343	3.280	2.243	5	4	6	5	4	114.551	0.587	0.587	0.000	0.000	1.334	7.324	9.772	3.982	6.818	25.076	2.333	14.704	0.007	0.007	24.901	1.455	25.902	2.609	35.821	0.000	0.000	0.000	0.000	0.000	0.000	0.981	0.013	10.000	1.954	19.544	25.076
116	3.100	10.170	-3.100	-10.170	22.157	0.342	2.650	1.544	6	5	7	6	5	114.551	0.596	0.596	0.000	0.000	1.324	8.490	11.238	5.394	7.140	36.190	1.586	21.561	0.004	0.004	36.051	2.115	37.051	2.470	29.381	30.886	33.535	-0.131	0.000	0.000	0.000	0.000	0.000	2.810	28.096	28.096
117	3.150	10.335	-3.150	-10.335	30.260	0.325	1.610	1.074	7	5	7	6	5	117.733	0.606	0.606	0.000	0.000	1.313	9.663	12.690	6.736	8.845	48.992	1.096	29.655	0.002	0.002	48.909	2.894	49.909	2.271	21.459	39.593	34.986	-0.128	3.368	101.956	0.000	0.000	0.000	3.807	38.069	38.069
118	3.200	10.499	-3.200	-10.499	32.693	0.400	-1.180	1.224	7	5	7	6	5	117.733	0.615	0.615	0.000	0.000	1.303	10.440	13.602	7.299	9.509	52.163	1.247	32.078	-0.001	-0.001	52.223	3.135	53.223	2.278	21.708	41.582	35.318	-0.145	3.258	106.541	0.000	0.000	0.000	4.080	40.805	40.805
119	3.250	10.663	-3.250	-10.663	31.306	0.350	-3.790	1.118	7	5	7	6	5	117.733	0.625	0.625	0.000	0.000	1.293	9.997	12.924	6.978	9.021	49.122	1.141	30.682	-0.004	-0.004	49.311	3.010	50.311	2.274	21.571	40.117	35.074	-0.132	3.339	104.569	0.000	0.000	0.000	3.877	38.771	38.771
120	3.300	10.827	-3.300	-10.827	31.200	0.406	-4.870	1.301	7	5	7	6	5	117.733	0.635	0.635	0.000	0.000	1.283	9.963	12.781	7.081	9.084	48.190	1.328	30.565	-0.005	-0.005	48.430	3.003	49.430	2.316	23.108	39.799	35.021	-0.144	3.356	104.162	0.000	0.000	0.000	3.834	38.344	38.344
121	3.350	10.991	-3.350	-10.991	32.439	0.361	-6.560	1.113	7	5	7	6	5	117.733	0.644	0.644	0.000	0.000	1.273	10.359	13.189	7.204	9.173	49.377	1.135	31.795	-0.006	-0.006	49.696	3.127	50.695	2.266	21.267	40.699	35.171	-0.132	3.306	107.303	0.000	0.000	0.000	3.957	39.567	39.567
122	3.400	11.155	-3.400	-11.155	27.331	0.455	-7.900	1.665	6	5	7	6	5	114.551	0.654	0.654	0.000	0.000	1.264	10.473	13.237	6.534	8.258	40.826	1.706	26.677	-0.009	-0.009	41.203	2.642	42.203	2.431	27.708	35.577	34.317	-0.151	3.590	98.166	0.000	0.000	0.000	3.309	33.092	33.092
123	3.450	11.319	-3.450	-11.319	23.267	0.438	-8.500	1.882	6	5	7	6	5	114.551	0.663	0.663	0.000	0.000	1.255	8.916	11.189	5.808	7.288	34.102	1.938	22.604	-0.011	-0.012	34.502	2.254	35.502	2.523	31.722	30.759	33.514	-0.146	0.000	0.000	0.000	0.000	0.000	2.797	27.972	27.972
124	3.500	11.483	-3.500	-11.483	28.674	0.481	-8.920	1.677	6	5	7	6	5	114.551	0.673	0.673	0.000	0.000	1.246	10.988	13.692	6.824	8.503	41.655	1.718	28.002	-0.010	-0.010	42.070	2.774	43.069	2.421	27.294	36.547	34.479	-0.154	3.537	101.459	0.000	0.000	0.000	3.423	34.231	34.231
125	3.550	11.647	-3.550	-11.647	43.068	0.524	-9.950	1.217	7	5	8	6	5	117.733	0.682	0.682	0.000	0.000	1.237	13.753	17.018	9.291	11.497	62.172	1.236	42.386	-0.007	-0.007	62.627	4.156	63.627	2.197	18.889	48.005	36.388	-0.162	2.910	125.378	0.000	0.000	0.000	5.105	51.053	51.053
126	3.600	11.811	-3.600	-11.811	51.404	0.410	-10.560	0.798	8	6	8	6	6	120.915	0.692	0.692	0.000	0.000	1.229	12.311	15.126	10.371	12.741	73.332	0.808	50.713	-0.006	-0.007	73.805	4.956	74.809	2.030	13.780	52.872	37.199	-0.140	2.668	137.187	0.000	0.000	0.000	6.050	60.502	60.502
127	3.650	11.975	-3.650	-11.975	57.701	0.376	-11.060	0.412	8	6	8	6	6	120.915	0.702	0.702	0.000	0.000	1.220	13.676	16.683	10.756	13.120	80.403	0.417	56.399	-0.006	-0.005	80.895	5.503	81.895	2.041	15.162	56.581	37.958	-0.137	2.541	151.162	0.000	0.000	0.000	6.673	66.730	66.730
128	3.700	12.139	-3.700	-12.139	57.997	0.210	-11.640	0.362	8	6	8	6	6	120.915	0.712	0.712	0.000	0.000	1.211	13.890	16.826	10.814	13.100	80.528	0.367	57.286	-0.006	-0.006	81.039	5.591	82.039	1.820	5.000	55.926	37.708	-0.083	2.531	146.831	0.000	0.000	0.000	6.730	67.304	67.304
129	3.750	12.303	-3.750	-12.303	59.864	0.275	-12.190	0.459	8	6	8	6	6	120.915	0.722	0.722	0.000	0.000	1.203	14.337	17.248	11.315	13.611	81.995	0.465	59.143	-0.006	-0.006	82.523	5.771	83.523	1.857	5.000	56.636	37.827	-0.104	2.501	149.768	0.000	0.000	0.000	6.899	68.991	68.991
130	3.800	12.467	-3.800	-12.467	64.812	0.230	-12.430	0.355	8	6	8	6	6	120.915	0.732	0.732	0.000	0.000	1.195	15.523	18.546	11.905	14.224	87.637	0.359	64.081	-0.006	-0.006	88.168	6.246	89.168	1.778	5.000	58.716	38.174	-0.089	2.418	156.769	0.000	0.000	0.000	7.419	74.186	74.186
131	3.850	12.631	-3.850	-12.631	65.301	0.164	-12.670	0.251	8	6	8	6	6	120.915	0.741	0.741	0.000	0.000	1.187	15.640	18.561	11.743	13.937	87.110	0.254	64.560	-0.006	-0.006	87.644	6.294	88.644	1.717	5.000	58.739	38.177	-0.060	2.417	157.895	0.000	0.000	0.000	7.424	74.243	74.243
132	3.900	12.795	-3.900	-12.795	58.919	0.202	-12.910	0.343	8	6	8	6	6	120.915	0.751	0.751	0.000	0.000	1.179	14.111	16.636	10.965	12.926	77.450	0.347	58.168	-0.007	-0.007	77.987	5.683	78.987	1.814	5.000	55.601	37.654	-0.075	2.545	149.989	0.000	0.000	0.000	6.654	66.544	66.544
133	3.950	12.959	-3.950	-12.959	48.318	0.305	-13.190	0.631	8	6	8	6	6	120.915	0.761	0.761	0.000	0.000	1.171	11.572	13.553	9.698	11.358	62.496	0.641	47.557	-0.009	-0.009	63.037	4.668	64.037	2.017	13.413	49.726	36.675	-0.106	2.821	136.382	0.000	0.000	0.000	5.421	54.214	54.214
134	4.000	13.123	-4.000	-13.123	44.756	0.329	-13.520	0.476	8	6	8	6	6	120.915	0.771	0.771	0.000	0.000	1.164	10.719	12.473	8.889	10.344	57.058	0.646	43.985	-0.009	-0.010	57.538	4.284	58.538	1.966	9.945	47.346	37.207	-0.075	2.945	131.839	0.000	0.000	0.000	4.988	49.883	49.883
135	4.050	13.287	-4.050	-13.287	40.747	0.217	-11.720	0.533	7	6	7	6	6	117.733	0.781	0.781	0.000	0.000	1.156	13.012	15.046	8.288	9.584	51.195	0.543	39.966	-0.009	-0.009	51.664	3.939	52.664	2.051	14.375	44.475	35.800	-0.075	3.098	126.306	0.000	0.000	0.000	4.514	45.138	45.138
136	4.100	13.451	-4.100	-13.451	33.624	0.239	-12.100	0.711	7	5	7	6	5	117.733	0.791	0.791	0.000	0.000	1.149	10.737	12.340	7.227	8.306	41.545	0.728	32.834	-0.011	-0.012	42.024	3.257	43.023	2.188	18.590	38.792	34.853	-0.080	3.414	114.852	0.000	0.000	0.000	3.702	37.020	37.020
137	4.150	13.615	-4.150	-13.615	27.645	0.258	-12.050	0.933	7	5	7	6	5	117.733	0.800	0.800	0.000	0.000	1.142	8.828	10.084	6.299	7.195	33.557	0.961	26.845	-0.014	-0.014	34.027	2.684	35.027	2.325	23.443	33.005	33.888	-0.082	3.735	103.304	0.000	0.000	0.000	3.025	30.252	30.252
138	4.200	13.779	-4.200	-13.779	23.775	0.227	-12.080	0.955	7	5	7	6	5	117.733	0.810	0.810	0.000	0.000	1.135	7.592	8.620	5.576	6.331	28.365	0.988	22.965	-0.016	-0.016	28.831	2.314	29.830	2.389	25.977	0.000	33.139	-0.069	0.000	0.000	0.000	0.000	0.000	2.586	25.861	25.861
139	4.250	13.943	-4.250	-13.943	22.515	0.189	-11.960	0.839	7	5	7	6	5	117.733	0.820	0.820	0.000	0.000	1.129	7.190	8.116	5.269	5.948	26.482	0.871	21.696	-0.017	-0.017	26.938	2.193	27.937	2.385	25.793	0.000	32.851	-0.053	0.000	0.000	0.000	0.000	0.000	2.435	24.347	24.347
140	4.300	14.107	-4.300	-14.107	21.916	0.159	-11.780	0.725	7	5	7	6	5	117.733	0.829	0.829	0.000	0.000	1.122	6.999	7.854	5.090	5.711	25.439	0.754	21.088	-0.017	-0.017	25.883	2.135	26.883	2.367	25.106	0.000	32.694	-0.038	0.000	0.000	0.000	0.000	0.000	2.356	23.561	23.561
141	4.350	14.271	-4.350	-14.271	19.987	0.158	-11.660	0.991	6	5	7	5	5	114.551	0.839	0.839	0.000	0.000	1.116	7.659	8.546	4.867	5.430	22.838	1.034	19.149	-0.019	-0.019	23.272	1.950	24.272	2.401	29.394	0.000	32.227	-0.052	0.000	0.000	0.000	0.000	0.000	2.136	21.364	21.364
142	4.400	14.436	-4.400	-14.436	19.348	0.225	-11.510	1.163	6	5	6	5	5	114.551	0.848	0.848	0.000	0.000	1.110	7.414	8.227	4.825	5.353	21.820	1.216	18.500	-0.019	-0.019	22.244	1.888	23.244	2.521	31.526	0.000	32.045	-0.060	0.000	0.000	0.000	0.000	0.000	2.057	20.566	20.566
143	4.450	14.600	-4.450	-14.600	18.619	0.272	-11.310	1.461	6	4	6	5	5	114.551	0.858	0.858	0.000	0.000	1.103	7.135	7.873	4.803	5.300	20.720	1.531	17.762	-0.019	-0.020	21.132	1.818	22.132	2.590	34.878	0.000	31.835	-0.073	0.000	0.000	0.000	0.000	0.000	1.968	19.683	19.683
144	4.500	14.764	-4.500	-14.764	17.021	0.298	-11.050	1.751	6	4	6	5	4	114.551	0.867	0.867	0.000	0.000	1.097	6.522	7.158	4.536	5.185	18.640	1.845	16.154	-0.020	-0.021	19.038	1.664	20.038	2.654	38.078	0.000	31.380	-0.078	0.000	0.000	0.000	0.000	0.000	1.790	17.896	18.640
145	4.550	14.928	-4.550	-14.928	18.132	0.280	-10.870	1.544	6	4	6	5	5	114.551	0.876	0.876	0.000	0.000	1.092	6.948	7.585	4.709	5.340	19.698	1.623	17.256	-0.019	-0.020	20.085	1.770	21.085	2.604	35.533	0.000	31.657	-0.073	0.000	0.000	0.000	0.000	0.000	1.896	18.961	19.698
146	4.600	15.092	-4.600	-15.092	19.153	0.266	-10.750	1.389	6	4	6	5	4	114.551	0.886	0.886	0.000	0.000	1.086	7.339	7.969	4.901	5.321	20.631	1.456	18.267	-0.018	-0.018	21.010	1.867	22.010	2.574	34.098	0.000	31.893	-0.069	0.000	0.000	0.000	0.000	0.000	1.992	19.922	19.922
147	4.650	15.256	-4.650	-15.256	17.184	0.308	-10.560	1.792	6	4	6	5	4	114.551	0.895	0.895	0.000	0.000	1.080	6.585	7.112	4.614	5.102	18.204	1.891	16.289	-0.019	-0.020	18.572	1.678	19.572	2.669	38.826	0.000	31.349	-0.077	0.000	0.000	0.000	0.000	0.000	1.778	17.780	18.204
148	4.700	15.420	-4.700	-15.420	13.735	0.283	-10.380	2.060	5	4	6	5	4	114.551	0.905	0.905	0.000	0.000	1.074	6.579	7.069	3.947	4.257	14.190	2.206	12.831	-0.024	-0.025	14.549	1.367	15.549	2.796	45.866	0.000	32.227	-0.052	0.000	0.000	0.000	0.000	0.000	4.191	1.414	14.138	14.190
149	4.750	15.584	-4.750	-15.584	11.876	0.238	-10.210	2.004	5	4	6	4	4	114.551	0.914	0.914	0.000	0.000	1.069	5.689	6.081	3.524	3.717	11.999	2.171	10.963	-0.027	-0.029	12.348	1.168	13.348	2.853	48.114	0.000	0.000	0.000	0.000	0.000	0.000	3.277	1.216	12.161	11.999
150	4.800	15.748	-4.800	-15.748	10.950	0.178	-9.690	1.626	5	4	6	4	4	114.551	0.923	0.923	0.000	0.000	1.063	5.245	5.578	3.231	3.346	10.863	1.775	10.026	-0.028	-0.030	11.191	1.078	12.190	2.843	48.525	0.000	0.000	0.000	0.000	0.000	0.000	0.669	0.000	2.844	1.116	11.155	10.863
151	4.850	15.912	-4.850	-15.912	9.692	0.138	-9.340	1.424	5	4	5	4	4	114.551	0.933	0.933	0.000	0.000	1.058	4.642	4.912	2.907	2.941	9.394	1.575	8.759	-0.030	-0.033	9.707	0.956	10.707	2.871	50.230	0.000	0.000	0.000	0.000	0.000	0.000	0.584	0.000	2.329	0.982	9.824	9.394
152	4.900	16.076	-4.900	-16.076	8.754	0.117	-8.990	1.337	5	4	5	4	4	114.551	0.942	0.942	0.000	0.000	1.053	4.193	4.414	2.682	2.653	8.295	1.498	7.812	-0.032	-0.036	8.593	0.866	9.593	2.908	52.491	0.000	0.000	0.000	0.000	0.000	0.000	0.521	0.000	1.976	0.883	8.829	8.295
153	4.950	16.240	-4.950	-16.240	6.926	0.122	-8.600	1.761	5	3	5	3	3	114.551	0.952	0.952	0.000	0.000	1.048	3.318	3.476	2.361	2.235	6.282	2.042	5.975	-0.039	-0.045	6.564	0.689	7.564	3.079	63.965	0.000	0.000	0.000	0.000	0.000	0.000	0.399	0.000	1.410	0.695	6.951	6.282
154	5.000	16.404	-5.000	-16.404	5.670	0.092	-7.990	1.623	4	3	4	3	3	114.551	0.961	0.961	0.000	0.000	1.042	3.621	3.775	2.047	1.847	4.903	1.953	4.710	-0.044	-0.053	5.162	0.567	6.162	3.164	70.199	0.000	0.000	0.000	0.000	0.000	0.000	0.314	0.000	1.085	0.566	5.662	4.903
155	5.050	16.568	-5.050	-16.568	4.913	0.077	-1.190	1.567	3	3	3	3	3	111.369	0.970	0.970	0.000	0.000	1.037	2.353	2.441	0.000	0.000	4.065	1.953	3.943	-0.008	-0.009	4.104	0.474	5.104	3.235	0.000	0.000	0.000	0.000	0.000	0.000	0.263	0.000	0.914	0.488	4.882	4.065
156	5.100	16.732	-5.100	-16.732	4.091	0.070	0.130	1.711	3	3	3	3	3	111.369	0.979	0.979	0.000	0.000	1.033	1.959	2.023	0.000	0.000	3.179	2.249	3.112	0.001	0.001	3.174	0.392	4.174	3.568	0.000	0.000	0.000	0.000	0.000	0.000	0.208	0.001	0.758	0.405	4.047	3.179
157	5.150	16.896	-5.150	-16.896	3.826	0.049	0.960	1.281	1	3	4	3	3	111.369	0.989	0.989	0.000	0.000	1.028	1.833	1.884	0.000	0.000	2.872	1.727	2.838	0.008	0.011	2.842	0.364	3.842	3.346	0.000	0.000	0.000	0.000	0.000	0.000	0.189	0.004	0.710	0.377	3.767	2.872
158	5.200	17.060	-5.200	-17.060	3.992	0.056	1.860	1.403	1	3	4	3	3	111.369	0.998	0.998	0.000	0.000	1.023	1.912	1.956	0.000	0.000	3.003	1.870	2.994	0.015	0.019	2.944	0.377	3.944	3.344	0.000	0.000	0.000	0.000	0.000	0.000	0.200	0.007	0.730	0.391	3.912	3.003
159	5.250	17.224	-5.250	-17.224	4.067	0.058	2.740	1.426	1	3	4	3	3	111.369	1.007	1.007	0.000	0.000	1.018	1.948	1.984	0.000	0.000	3.041	1.895	3.061	0.021	0.028	2.956	0.381	3.956	3.341	0.000	0.000	0.000	0.000	0.000	0.000	0.204	0.011	0.736	0.397	3.968	3.041
160	5.300	17.388	-5.300	-17.388	4.094	0.059	3.820	1.441	1	3	4	3	3	111.369	1.016	1.016	0.000	0.000	1.014	1.961	1.988	0.000	0.000	3.031	1.917	3.078	0.029	0.039	2.914	0.381	3.914	3.345	0.000	0.000	0.000	0.000	0.000	0.000	0.205	0.015	0.735	0.398	3.976	3.031
161	5.350	17.552	-5.350	-17.552	3.979	0.049	4.570	1.232	1	3	4	3	3	111.369	1.025	1.025	0.000	0.000	1.009	1.906	1.923	0.000

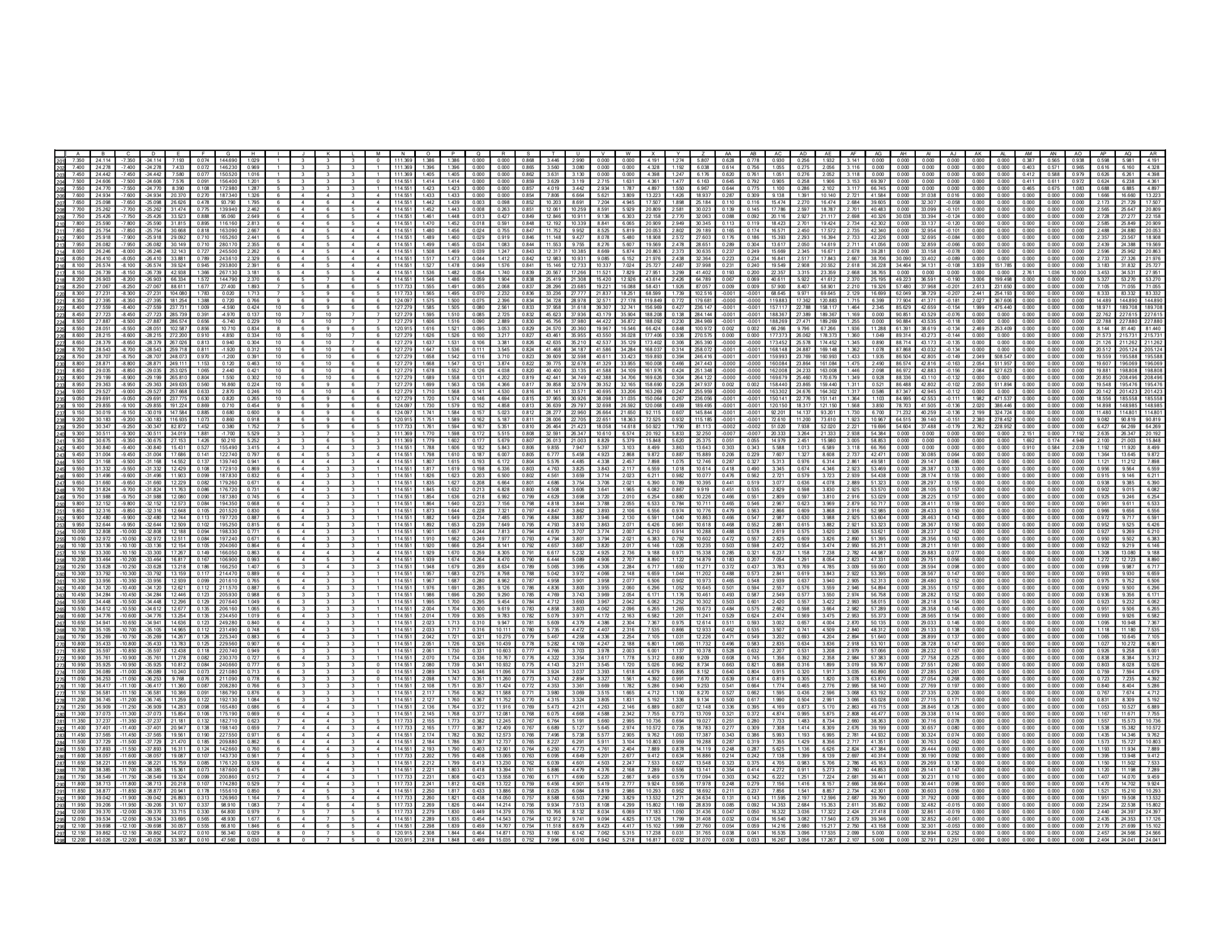
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR
201	7.350	24.114	-7.350	-24.114	6.611	0.064	115.480	0.968	1	3	3	1	111.369	1.391	1.391	0.000	0.000	0.867	3.167	2.744	0.000	0.000	3.756	1.226	5.221	0.545	0.691	1.162	0.288	2.163	3.177	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.348	0.451	0.857	0.549	5.488	3.756
202	7.400	24.278	-7.400	-24.278	6.696	0.066	119.440	0.986	1	3	3	1	111.369	1.400	1.400	0.000	0.000	0.864	3.207	2.770	0.000	0.000	3.786	1.246	5.296	0.557	0.704	1.120	0.284	2.121	3.177	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.353	0.466	0.862	0.554	5.540	3.786
203	7.450	24.442	-7.450	-24.442	6.798	0.062	122.970	0.912	1	3	3	1	111.369	1.409	1.409	0.000	0.000	0.861	3.256	2.803	0.000	0.000	3.827	1.150	5.389	0.565	0.712	1.100	0.284	2.101	3.159	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.359	0.480	0.870	0.561	5.607	3.827
204	7.500	24.606	-7.500	-24.606	6.915	0.056	125.790	0.810	1	3	3	1	111.369	1.418	1.418	0.000	0.000	0.858	3.312	2.843	0.000	0.000	3.879	1.019	5.498	0.568	0.714	1.108	0.286	2.109	3.132	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.367	0.491	0.879	0.569	5.685	3.879
205	7.550	24.770	-7.550	-24.770	6.726	0.059	129.190	0.877	1	3	3	0	111.369	1.427	1.427	0.000	0.000	0.855	3.222	2.756	0.000	0.000	3.715	1.113	5.300	0.600	0.761	0.887	0.258	1.888	3.165	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.353	0.504	0.850	0.551	5.512	3.715
206	7.600	24.934	-7.600	-24.934	7.095	0.063	130.560	0.888	1	3	3	1	111.369	1.436	1.436	0.000	0.000	0.853	3.399	2.898	0.000	0.000	3.942	1.113	5.659	0.575	0.720	1.102	0.289	2.103	3.141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.377	0.510	0.891	0.580	5.796	3.942
207	7.650	25.098	-7.650	-25.098	7.071	0.064	129.990	0.905	1	3	3	1	111.369	1.445	1.445	0.000	0.000	0.850	3.387	2.879	0.000	0.000	3.894	1.137	5.627	0.574	0.721	1.085	0.289	2.086	3.150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.508	0.882	0.576	5.758	3.894
208	7.700	25.262	-7.700	-25.262	7.198	0.058	132.710	0.806	1	3	3	1	111.369	1.455	1.455	0.000	0.000	0.847	3.448	2.922	0.000	0.000	3.951	1.010	5.745	0.576	0.721	1.101	0.293	2.102	3.123	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.383	0.518	0.893	0.584	5.843	3.951
209	7.750	25.426	-7.750	-25.426	7.293	0.061	136.700	0.836	1	3	3	1	111.369	1.464	1.464	0.000	0.000	0.845	3.494	2.951	0.000	0.000	3.985	1.046	5.830	0.585	0.732	1.067	0.290	2.069	3.126	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.389	0.534	0.899	0.590	5.902	3.985
210	7.800	25.590	-7.800	-25.590	7.552	0.065	139.720	0.861	1	3	3	1	111.369	1.473	1.473	0.000	0.000	0.842	3.618	3.046	0.000	0.000	4.130	1.069	6.080	0.578	0.718	1.166	0.306	2.168	3.115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.406	0.546	0.927	0.609	6.092	4.130
211	7.850	25.754	-7.850	-25.754	7.537	0.073	142.120	0.969	1	3	3	1	111.369	1.482	1.482	0.000	0.000	0.839	3.610	3.031	0.000	0.000	4.088	1.205	6.056	0.589	0.733	1.092	0.297	2.093	3.141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.404	0.555	0.919	0.606	6.061	4.088
212	7.900	25.918	-7.900	-25.918	7.832	0.051	144.450	0.651	1	3	3	1	111.369	1.491	1.491	0.000	0.000	0.837	3.751	3.139	0.000	0.000	4.255	0.804	6.341	0.576	0.711	1.228	0.318	2.229	3.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.423	0.564	0.951	0.628	6.279	4.255
213	7.950	26.082	-7.950	-26.082	12.014	0.145	149.650	1.207	6	4	3	3	114.551	1.500	1.500	0.000	0.000	0.834	4.604	3.841	3.788	2.307	7.011	1.379	10.514	0.389	0.444	3.895	0.703	4.896	2.956	55.537	0.000	0.000	28.406	0.103	0.000	0.000	0.000	0.000	0.000	0.960	9.602	7.011
214	8.000	26.246	-8.000	-26.246	19.937	0.154	62.050	0.772	6	4	5	4	114.551	1.510	1.510	0.000	0.000	0.832	7.640	6.354	5.281	3.376	12.211	0.836	18.428	0.097	0.105	10.927	1.724	11.928	2.643	37.483	0.000	0.000	30.811	0.034	0.000	0.000	0.000	0.000	0.000	1.588	15.885	12.211
215	8.050	26.410	-8.050	-26.410	15.335	0.219	80.830	1.428	6	4	5	3	4	114.551	1.519	1.519	0.000	0.000	0.829	5.876	4.872	4.635	2.871	9.098	1.585	13.816	0.165	0.183	7.436	1.227	8.437	2.885	51.052	0.000	0.000	29.542	0.031	0.000	0.000	0.000	0.000	0.000	1.218	12.180	9.098
216	8.100	26.574	-8.100	-26.574	14.970	0.249	91.250	1.663	6	3	4	3	3	114.551	1.529	1.529	0.000	0.000	0.827	5.736	4.741	4.651	2.853	8.797	1.852	13.442	0.190	0.212	6.933	1.161	7.933	2.931	53.972	0.000	0.000	29.412	0.029	0.000	0.000	0.000	0.000	0.000	1.185	11.853	8.797
217	8.150	26.739	-8.150	-26.739	14.779	0.301	95.930	2.037	5	3	4	3	3	114.551	1.538	1.538	0.000	0.000	0.824	7.079	5.833	4.745	2.887	8.613	2.273	13.242	0.203	0.226	6.665	1.129	7.666	2.985	57.489	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.883	0.375	2.075	1.167	11.667	8.613
218	8.200	26.903	-8.200	-26.903	16.384	0.334	104.700	2.039	5	3	4	3	3	114.551	1.547	1.547	0.000	0.000	0.822	7.848	6.447	5.127	3.133	9.593	2.251	14.837	0.200	0.220	7.479	1.255	8.480	2.943	54.744	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.990	0.409	2.395	1.289	12.894	9.593
219	8.250	27.067	-8.250	-27.067	18.475	0.350	103.270	1.894	6	4	5	4	4	114.551	1.557	1.557	0.000	0.000	0.819	7.079	5.798	5.561	3.416	10.872	2.069	16.919	0.175	0.191	8.800	1.461	9.801	2.878	50.617	0.000	0.000	30.374	-0.003	0.000	0.000	0.000	0.000	0.000	1.450	14.496	10.872
220	8.300	27.231	-8.300	-27.231	18.680	0.363	100.980	1.943	6	4	5	4	4	114.551	1.566	1.566	0.000	0.000	0.817	7.158	5.845	5.636	3.443	10.933	2.121	17.115	0.169	0.184	8.918	1.488	9.919	2.881	50.849	0.000	0.000	30.412	-0.006	0.000	0.000	0.000	0.000	0.000	1.461	14.613	10.933
221	8.350	27.395	-8.350	-27.395	18.661	0.287	94.600	1.538	6	4	5	4	4	114.551	1.576	1.576	0.000	0.000	0.814	7.151	5.822	5.470	3.319	10.849	1.680	17.086	0.158	0.173	8.973	1.505	9.974	2.831	47.820	0.000	0.000	30.393	0.008	0.000	0.000	0.000	0.000	0.000	1.455	14.554	10.849
222	8.400	27.559	-8.400	-27.559	17.141	0.287	96.290	1.674	6	4	5	3	4	114.551	1.585	1.585	0.000	0.000	0.812	6.568	5.332	5.195	3.106	9.819	1.845	15.557	0.175	0.193	7.922	1.354	8.922	2.889	51.333	0.000	0.000	29.973	0.015	0.000	0.000	0.000	0.000	0.000	1.333	13.329	9.819
223	8.450	27.723	-8.450	-27.723	20.514	0.305	109.600	1.487	6	4	5	4	4	114.551	1.594	1.594	0.000	0.000	0.809	7.861	6.362	5.871	3.547	11.872	1.612	18.921	0.167	0.181	9.725	1.638	10.726	2.788	45.333	0.000	0.000	30.817	0.002	0.000	0.000	0.000	0.000	0.000	1.591	15.905	11.872
224	8.500	27.887	-8.500	-27.887	44.260	0.259	107.400	0.585	8	5	7	5	5	120.915	1.604	1.604	0.000	0.000	0.807	10.600	8.553	9.484	7.652	26.605	0.607	42.657	0.076	0.079	24.513	3.919	25.514	2.180	18.342	36.532	34.476	-0.017	3.754	166.218	0.000	0.000	0.000	0.000	3.421	34.213	34.213
225	8.550	28.051	-8.550	-28.051	86.144	0.297	-7.320	0.345	9	6	9	6	6	124.097	1.614	1.612	0.002	0.051	0.805	16.505	13.283	16.048	12.915	52.445	0.351	84.531	-0.003	-0.003	52.588	8.275	53.588	1.817	5.000	55.544	37.645	-0.042	2.723	234.635	0.000	0.000	0.000	0.000	6.641	66.413	66.413
226	8.600	28.215	-8.600	-28.215	111.660	0.359	-8.040	0.322	9	6	9	6	6	124.097	1.624	1.618	0.007	0.215	0.803	21.394	17.190	19.975	16.050	68.056	0.326	110.036	-0.002	-0.002	68.215	10.721	69.215	1.702	5.000	62.936	38.877	-0.059	2.436	272.097	0.000	0.000	0.000	0.000	8.595	85.950	85.950
227	8.650	28.379	-8.650	-28.379	131.680	0.363	-3.370	0.348	9	6	9	6	6	124.097	1.633	1.623	0.010	0.802	0.802	25.113	20.147	23.776	19.312	79.805	0.352	129.146	-0.001	-0.001	79.876	12.580	80.876	1.552	5.000	67.480	39.078	-0.076	2.202	301.814	0.000	0.000	0.000	0.000	10.073	100.733	100.733
228	8.700	28.543	-8.700	-28.543	174.203	0.880	-4.330	0.505	9	6	9	6	6	124.097	1.645	1.628	0.017	0.544	0.801	33.377	26.735	30.439	24.382	106.062	0.510	172.559	-0.001	-0.001	106.156	16.702	107.156	1.503	4.914	75.595	40.987	-0.134	2.101	366.077	0.000	0.000	0.000	0.000	13.367	133.675	133.675
229	8.750	28.707	-8.750	-28.707	211.232	0.904	-4.520	0.428	9	6	9	6	6	124.097	1.655	1.633	0.022	0.708	0.800	40.472	32.368	35.595	28.467	128.416	0.431	209.578	-0.001	-0.001	128.516	20.250	129.516	1.523	3.173	81.075	41.900	-0.137	1.981	418.553	0.000	0.000	0.000	0.000	16.184	161.838	161.838
230	8.800	28.871	-8.800	-28.871	237.662	1.278	-4.550	0.538	9	6	9	6	6	124.097	1.665	1.638	0.027	0.872	0.799	45.536	36.361	40.278	32.163	144.158	0.542	235.997	-0.001	-0.001	144.261	22.782	145.261	1.541	3.434	84.409	42.456	-0.166	1.974	469.433	0.000	0.000	0.000	0.000	18.181	181.806	181.806
231	8.850	29.035	-8.850	-29.035	251.241	1.049	-4.650	0.418	10	6	10	6	6	127.279	1.675	1.643	0.032	1.036	0.797	40.115	31.982	41.432	33.032	151.965	0.420	249.566	-0.001	-0.001	152.073	24.083	153.073	1.456	2.236	85.957	42.714	-0.150	2.025	509.067	0.000	0.000	0.000	0.000	19.189	191.890	191.890
232	8.900	29.199	-8.900	-29.199	242.962	1.107	-4.550	0.456	10	6	9	6	6	127.279	1.686	1.648	0.037	1.200	0.796	38.793	30.878	40.513	32.247	146.443	0.459	241.277	-0.001	-0.001	146.552	23.289	147.552	1.491	2.707	84.950	42.546	-0.154	1.987	483.052	0.000	0.000	0.000	0.000	18.527	185.266	185.266
233	8.950	29.363	-8.950	-29.363	231.103	1.001	-4.380	0.433	9	6	9	6	6	124.097	1.696	1.653	0.043	1.364	0.795	44.279	35.189	38.604	30.679	138.802	0.436	229.407	-0.001	-0.001	138.910	22.153	139.910	1.496	2.784	83.471	42.299	-0.145	1.966	454.526	0.000	0.000	0.000	0.000	17.595	175.947	175.947
234	9.000	29.527	-9.000	-29.527	215.883	1.661	-4.260	0.306	9	6	9	6	6	124.097	1.706	1.663	0.043	1.529	0.794	42.425	32.791	35.409	28.097	129.071	0.309	213.978	-0.001	-0.001	129.180	20.675	130.180	1.442	2.655	81.448	41.982	-0.131	1.978	426.836	0.000	0.000	0.000	0.000	16.396	163.957	163.957
235	9.050	29.691	-9.050	-29.691	174.351	0.844	-1.430	0.484	9	6	9	6	6	124.097	1.716	1.664	0.053	1.693	0.792	33.406	26.467	30.396	24.083	103.817	0.489	172.635	-0.001	-0.001	103.875	16.707	104.875	1.506	4.799	75.306	40.938	-0.129	2.113	368.586	0.000	0.000	0.000	0.000	13.234	132.335	132.335
236	9.100	29.855	-9.100	-29.855	159.381	1.046	-1.520	0.656	9	6	9	6	6	124.097	1.727	1.669	0.058	1.857	0.791	30.537	24.158	28.846	22.820	94.520	0.663	157.655	-0.001	-0.001	94.584	15.273	95.584	1.735	6.799	72.689	40.502	-0.146	2.178	347.310	0.000	0.000	0.000	0.000	12.079	120.789	120.789
237	9.150	30.019	-9.150	-30.019	101.687	0.209	-2.090	0.206	9	6	9	6	6	124.097	1.737	1.674	0.063	2.021	0.790	19.483	15.390	18.014	14.229	59.743	0.209	99.951	-0.001	-0.001	59.820	9.748	60.820	1.673	5.000	59.765	38.348	-0.011	2.560	260.387	0.000	0.000	0.000	0.000	7.695	76.948	76.948
238	9.200	30.183	-9.200	-30.183	56.821	1.090	-3.040	1.918	7	5	8	6	5	117.733	1.747	1.678	0.068	2.185	0.789	18.145	14.312	13.283	10.477	32.826	1.979	55.075	-0.003	-0.003	32.923	5.453	33.923	2.382	25.691	43.042	35.561	-0.143	3.395	192.986	0.000	0.000	0.000	0.000	4.294	42.936	42.936
239	9.250	30.347	-9.250	-30.347	61.231	1.510	-3.040	2.466	6	4	8	4	4	114.551	1.756	1.683	0.073	2.349	0.788	23.464	18.483	14.620	11.517	35.356	2.539	59.476	-0.003	-0.003	35.456	5.875	36.456	2.429	27.596	45.147	35.912	-0.180	3.276	200.657	0.000	0.000	0.000	0.000	4.621	46.208	46.208
240	9.300	30.511	-9.300	-30.511	45.492	1.577	-2.930	3.467	5	4	8	5	3	114.551	1.766	1.687	0.078	2.513	0.787	21.791	17.143	12.530	7.455	25.928	3.606	43.727	-0.004	-0.004	26.029	4.367	27.029	2.718	41.404	0.000	0.000	0.000	0.000	0.000	0.000	2.916	0.000	10.000	3.429	34.287	25.928
241	9.350	30.675	-9.350	-30.675	40.332	1.826	-2.800	4.527	4	3	8	5	3	114.551	1.775	1.691	0.084	2.677	0.786	25.759	20.240	11.866	7.003	22.805	4.738	38.558	-0.004	-0.004	22.907	3.872	23.907	2.838	48.205	0.000	0.000	0.000	0.000	0.000	0.000	2.572	0.000	8.711	3.036	30.359	22.805
242	9.400	30.840	-9.400	-30.840	32.580	0.892	-1.580	2.738	6	4	7	5	4	114.551	1.784	1.696	0.089	2.842	0.785	12.485	9.797	9.269	5.396	18.169	2.896	30.796	-0.004	-0.004	18.250	3.126	19.250	2.778	44.220	0.000	0.000	0.000	0.000	0.000	0.000	2.449	0.000	7.348	2.449	24.493	18.169
243	9.450	31.004	-9.450	-31.004	26.688	1.320	-0.390	4.946	3	3	7	5	3	111.369	1.794	1.700	0.094	3.006	0.784	25.567	20.039	8.729	5.002	14.651	5.302	24.895	-0.004	-0.004	14.713	2.558	15.713	3.015	59.498	0.000	0.000	0.000	0.000	0.000	0.000	1.660	0.000	4.396	2.004	20.039	14.651
244	9.500	31.168	-9.500	-31.168	28.131	0.997	-1.410	3.544	5	3	7	5	3	114.551	1.803	1.704	0.099	3.170	0.783	13.475	10.549	8.602	4.934	15.458	3.787	26.329	-0.005	-0.005	15.541	2.699	16.541	2.904	52.278	0.000	0.000	0.000	0.000	0.000	0.000	1.756	0.000	4.765	2.110	21.097	15.458
245	9.550	31.332	-9.550	-31.332	13.868	0.769	-0.340	5.545	3	3	6	4	2	111.369	1.812	1.708	0.104	3.334	0.782	13.285	10.388	5.582	2.967	7.061	6.378	12.056	-0.008	-0.010	7.128	1.330	8.128	3.312	82.075	0.000	0.000	0.000	0.000	0.000	0.000	0.804	0.000	1.616	1.039	10.388	7.061
246	9.600	31.496	-9.600	-31.496	9.929	0.379	6.250	3.817	3	3	5	3	2	111.369	1.821	1.712	0.109	3.498	0.781	9.512	7.429	4.197	2.090	4.738	4.674	8.108	0.009	0.011	4.687	0.933	5.687	3.373	87.346	0.000	0.000	0.000	0.000	0.000	0.000	0.541	0.011	1.049	0.743	7.429	4.738
247	9.650	31.660	-9.650	-31.660	8.887	0.221	10.750	2.487	4	3	5	3	3	114.551	1.831	1.716	0.114	3.662	0.780	5.676	4.427	3.632	1.755	4.114	3.132	7.057	0.025	0.031	3.984	0.819	4.985	3.332	83.727	0.000	0.000	0.000	0.000	0.000	0.000	0.471	0.028	0.923	0.664	6.641	4.114
248	9.700	31.824	-9.700	-31.824	9.455	0.254	15.170	2.675	4	3	5	3	3	114.551	1.840	1.721	0.119	3.826	0.779	6.064	4.724	3.832	1.875	4.451	3.318	7.655	0.037	0.046	4.245	0.864	5.245	3.315	82.353	0.000	0.000	0.000	0.000	0.000	0.000	0.511	0.044	0.990	0.709	7.085	4.451
249	9.750	31.988	-9.750	-31.988	9.555	0.182	18.440	1.905	5	3	5	3	3	114.551	1.849	1.725	0.125	3.991	0.778	4.577	3.561	3.639	1.777	4.470	2.362	7.706	0.047	0.059	4.208	0.860	5.208	3.329	76.052	0.000	0.000	0.000	0.000	0.000	0.000	0.514	0.056	0.994	0.712	7.122	4.470
250	9.800	32.152	-9.800	-32.152	7.453	0.140	22.840	1.879	5	3	4	3	3	114.551	1.859	1.729	0.130	4.155	0.777	3.570	2.774	3.150	1.428	3.237	2.502	5.595	0.078	0.104	2.899	0.646	3.899	3.373	87.348	0.000	0.000	0.000	0.000	0.000	0.000	0.373	0.073	0.767	0.555	5.548	3.237
251	9.850	32.316	-9.850	-32.316	8.597	0.138	28.360	1.605	5	3	4	3	3	114.551	1.868	1.733	0.135	4.319	0.776	4.118	3.196	3.333	1.572	3.884	2.051	6.730	0.087	0.112	3.451	0.739	4.451	3.263	77.990	0.000	0.000	0.000	0.000	0.000	0.000	0.449	0.094	0.880	0.639	6.392	3.884
252	9.900	32.480	-9.900	-32.480	9.403	0.177	35.780	1.882	5	3	4	3	3	114.551	1.878	1.738	0.140	4.483	0.775	4.504	3.492	3.610	1.736	4.333	2.352	7.527	0.104	0.130	3.770	0.794	4.771	3.250	76.923	0.000	0.000	0.000	0.000	0.000	0.000	0.502	0.122	0.966	0.698	6.983	4.333
253	9.950	32.644	-9.950	-32.644	9.969	0.151	41.450	1.515	5	3	4	3	3	114.551	1.887	1.742	0.145	4.647	0.774	4.775	3.697	3.628	1.763	4.642	1.868	8.083	0.115	0.142	3.982	0.831	4.982	3.175	71.094	0.000	0.000	0.000	0.000	0.000	0.000	0.539	0.144	1.029	0.739	7.394	4.642
254	10.000	32.808	-10.000	-32.808	9.285	0.112	47.230	1.206	5	3	4	3	3	114.551	1.896	1.746	0.150	4.811	0.773	4.447	3.439	3.365	1.602	4.233	1.516	7.389	0.143	0.179	3.474	0.748	4.475	3.170	70.652	0.000	0.000	0.000	0.000	0.000	0.000	0.493	0.166	0.947	0.688	6.878	4.233
255	10.050	32.972	-10.050	-32.972	9.652	0.142	74.080	1.471	5	3	4	3	3	114.551	1.906	1.751	0.155	4.976	0.772	4.624	3.571	3.548	1.699	4.428	1.833	7.747	0.224	0.279	3.194	0.768	4.194	3.193	72.351	0.000	0.000	0.000	0.000	0.000	0.000	0.517	0.270	0.985	0.714	7.142	4.428
256	10.100	33.136	-10.100	-33.136	12.575	0.188	82.570	1.495	5	3	4	3	3	114.551	1.915	1.755	0.160	5.140	0.771	6.024	4.647	4.235	2.136	6.078	1.763	10.661	0.192	0.227	4.699	0.954	5.700	3.060	62.548	0.000	0.000	0.000	0.000	0.000	0.000	0.711	0.302	1.358	0.929	9.294	6.078
257	10.150	33.300	-10.150	-33.300	10.549	0.195	94.430	1.848	5	3	4	3	3	114.551	1.925	1.759	0.166	5.304	0.770	5.053	3.893	3.891	1.888	4.906	2.261	8.626	0.264	0.323	3.323	0.728	4.323	3.194	72.544	0.000	0.000	0.000	0.000	0.000	0.000	0.575	0.348	1.085	0.779	7.787	4.906
258	10.200	33.464	-10.200	-33.464	9.669	0.182	113.500	1.882	5	3	3	3	3	114.551	1.934	1.763	0.171	5.468	0.770	4.631	3.564	3.699	1.753	4.389	2.353	7.735	0.349	0.436	2.475	0.587	3.475	3.245	76.544	0.000	0.000	0.000	0.000	0.000	0.000	0.516	0.422	0.977	0.713	7.128	4.389
259	10.250	33.628	-10.250	-33.628	9.767	0.137	121.270	1.403	5	3	3	3	3	114.551	1.943	1.768	0.176	5.632	0.769	4.678	3.596	3.567	1.688	4.428	1.751	7.824	0.370	0.462	2.385	0.573	3.385	3.180	71.478	0.000	0.000	0.000	0.000	0.000	0.000	0.522	0.452	0.985	0.719	7.192	4.428
260	10.300	33.792	-10.300	-33.792	10.076	0.148	129.150	1.469	5	3	3	3	3	114.551	1.953	1.772	0.181	5.796	0.768	4.827	3.705	3.665	1.742

ConeTec CPT Interpretations				
Interpretation Output - SCREENzW Version 1.19 - Dec 18 2012				
DAS Version: W47				
Interpretation Format:	All but Liquefaction Parameters (NLI)			
Run ID:	1367593895			
Job No:	13-54031			
Client:	Schnabel			
Project:	James River Bank Stabilization			
Facility:	James River Bank Stabilization			
Sounding ID:	CPT-04			
Cone ID:	184:T1500F15U500			
Operator:	BK-AS			
CPT Date:	May-02-2013			
CPT Time:	11:53			
CPT File:	13-54031_CP04.COR			
Tip Units:	tsf			
Sleeve Units:	tsf			
PP Units:	ft			
Tip Conversion to bar:	0.9580			
Sleeve Conversion to bar:	0.9580			
PP Conversion to meters:	0.3050			
Col 5 (Extra Module) Parameter	N/A			
Col 5 (Extra Module) Units	N/A			
Coord Source:	GPS			
Coord Type:	LATLONG			
UTM Zone:	N/A			
Easting / Long:	-76.457745			
Northing / Lat:	37.020066			
Elevation:	0.000			
Tip Net Area Ratio:	0.80			
Unit Weight of Soil Base:	Based on Soil Zones			
Unit Weight of Soil (Def):	19.00	kN/m^3	120.91	pcf
Unit Weight of Water:	9.81	kN/m^3	62.43	pcf
Equilibrium U Profile Used:	No			
Soil Unit Weight Profile Used:	No			
Water Table	7.62	m	25.00	ft
Averaging Interval:	0.00	m	0.00	ft
Su Factors Nkt and Ndu:	15.0	8.0		
Cn Exp. and Limits:	0.50	0.00	1.70	
Qc1 Exp. and Limits:	0.50	0.00	1.70	
State Parameter M:	1.20			
NC Su / p':	0.30			
Relative Density Method:	All Sands - Jamilokowski (1985)			
Phi Angle Method:	Kulhawy and Mayne (1990)			
Youngs Modulus Sand Type:	Recent			
N160Ic Method:	Based on qc1n			

Depth	Depth	Elev	Elev	Avg qt	Avg fs	Avg u	Avg Rf	SBT	SBTn	SBT Bq	SBT Bqn	SBT JandD	Unit Wt.	TStress	EStress	Equil u	Equil u	Cn	N(60)	N1(60)
m	ft	m	ft	tsf	tsf	ft	%						pcf	tsf	tsf	tsf	ft		bpf	bpf
0.050	0.164	-0.050	-0.164	10.780	0.126	3.210	1.169	5	0	6	0	0	114.551	0.009	0.009	0.000	0.000	1.700	5.164	8.778
0.100	0.328	-0.100	-0.328	24.167	0.270	2.800	1.117	6	0	7	0	0	114.551	0.019	0.019	0.000	0.000	1.700	9.261	15.744
0.150	0.492	-0.150	-0.492	48.040	0.253	3.280	0.527	8	0	8	0	0	120.915	0.028	0.028	0.000	0.000	1.700	11.506	19.560
0.200	0.656	-0.200	-0.656	67.199	0.350	4.620	0.521	8	0	8	0	0	120.915	0.038	0.038	0.000	0.000	1.700	16.094	27.360
0.250	0.820	-0.250	-0.820	73.034	0.527	8.610	0.722	8	0	8	0	0	120.915	0.048	0.048	0.000	0.000	1.700	17.492	29.736
0.300	0.984	-0.300	-0.984	65.888	0.358	4.530	0.543	8	0	8	0	0	120.915	0.058	0.058	0.000	0.000	1.700	15.780	26.826
0.350	1.148	-0.350	-1.148	54.113	0.407	5.280	0.752	8	7	8	7	8	120.915	0.068	0.068	0.000	0.000	1.700	12.960	22.032
0.400	1.312	-0.400	-1.312	45.252	0.455	1.910	1.005	7	6	8	7	8	117.733	0.078	0.078	0.000	0.000	1.700	14.450	24.566
0.450	1.476	-0.450	-1.476	35.920	0.487	1.530	1.356	7	6	8	7	8	117.733	0.088	0.088	0.000	0.000	1.700	11.470	19.500
0.500	1.640	-0.500	-1.640	30.337	0.417	2.690	1.375	7	6	7	7	8	117.733	0.097	0.097	0.000	0.000	1.700	9.688	16.469
0.550	1.804	-0.550	-1.804	32.582	0.388	1.970	1.191	7	6	7	7	8	117.733	0.107	0.107	0.000	0.000	1.700	10.405	17.688
0.600	1.968	-0.600	-1.968	28.877	0.372	-2.080	1.288	7	6	7	7	8	117.733	0.117	0.117	0.000	0.000	1.700	9.221	15.676
0.650	2.133	-0.650	-2.133	21.479	0.301	-3.320	1.401	6	6	7	6	5	114.551	0.126	0.126	0.000	0.000	1.700	8.231	13.992
0.700	2.297	-0.700	-2.297	15.340	0.219	-1.660	1.428	6	6	6	6	5	114.551	0.135	0.135	0.000	0.000	1.700	5.878	9.993
0.750	2.461	-0.750	-2.461	12.867	0.230	5.890	1.788	5	5	6	6	5	114.551	0.145	0.145	0.000	0.000	1.700	6.163	10.477
0.800	2.625	-0.800	-2.625	13.264	0.341	10.310	2.571	5	5	6	6	4	114.551	0.154	0.154	0.000	0.000	1.700	6.354	10.801
0.850	2.789	-0.850	-2.789	14.291	0.403	3.420	2.820	5	5	6	6	4	114.551	0.164	0.164	0.000	0.000	1.700	6.846	11.637
0.900	2.953	-0.900	-2.953	16.421	0.542	-1.430	3.301	5	5	6	6	4	114.551	0.173	0.173	0.000	0.000	1.700	7.866	13.372
0.950	3.117	-0.950	-3.117	17.240	0.572	-3.130	3.318	5	5	6	6	4	114.551	0.182	0.182	0.000	0.000	1.700	8.258	14.039
1.000	3.281	-1.000	-3.281	19.957	0.503	-6.880	2.520	5	5	7	6	5	114.551	0.192	0.192	0.000	0.000	1.700	9.559	16.251
1.050	3.445	-1.050	-3.445	28.208	0.398	-6.730	1.411	6	6	7	6	5	114.551	0.201	0.201	0.000	0.000	1.700	10.809	18.376
1.100	3.609	-1.100	-3.609	32.989	0.395	-0.220	1.197	7	6	7	6	5	117.733	0.211	0.211	0.000	0.000	1.700	10.534	17.908
1.150	3.773	-1.150	-3.773	33.608	0.494	-0.350	1.470	7	6	7	6	5	117.733	0.220	0.220	0.000	0.000	1.700	10.732	18.245
1.200	3.937	-1.200	-3.937	34.658	0.555	-0.250	1.601	6	6	7	6	5	114.551	0.230	0.230	0.000	0.000	1.700	13.281	22.578
1.250	4.101	-1.250	-4.101	39.489	0.529	-0.090	1.340	7	6	8	6	5	117.733	0.240	0.240	0.000	0.000	1.700	12.610	21.437
1.300	4.265	-1.300	-4.265	44.116	0.503	-0.590	1.140	7	6	8	7	5	117.733	0.249	0.249	0.000	0.000	1.700	14.088	23.949
1.350	4.429	-1.350	-4.429	48.938	0.547	-0.400	1.118	7	6	8	7	6	117.733	0.259	0.259	0.000	0.000	1.700	15.627	26.567
1.400	4.593	-1.400	-4.593	61.869	0.562	-0.110	0.908	8	6	8	7	6	120.915	0.269	0.269	0.000	0.000	1.700	14.818	25.190
1.450	4.757	-1.450	-4.757	75.920	0.536	-0.050	0.706	8	6	8	7	6	120.915	0.279	0.279	0.000	0.000	1.700	18.183	30.911
1.500	4.921	-1.500	-4.921	86.582	0.563	0.390	0.650	8	6	9	7	8	120.915	0.288	0.288	0.000	0.000	1.700	20.736	35.252
1.550	5.085	-1.550	-5.085	93.962	0.602	0.290	0.641	8	6	9	7	8	120.915	0.298	0.298	0.000	0.000	1.700	22.504	38.257
1.600	5.249	-1.600	-5.249	95.381	0.620	0.110	0.650	8	6	9	7	8	120.915	0.308	0.308	0.000	0.000	1.700	22.844	38.834
1.650	5.413	-1.650	-5.413	88.090	0.596	-0.070	0.677	8	6	9	7	6	120.915	0.318	0.318	0.000	0.000	1.700	21.097	35.866
1.700	5.577	-1.700	-5.577	77.828	0.543	-0.280	0.698	8	6	8	7	6	120.915	0.328	0.328	0.000	0.000	1.700	18.640	31.688
1.750	5.741	-1.750	-5.741	71.967	0.520	-0.520	0.723	8	6	8	7	6	120.915	0.338	0.338	0.000	0.000	1.700	17.236	29.301
1.800	5.905	-1.800	-5.905	65.707	0.512	-0.410	0.779	8	6	8	7	6	120.915	0.348	0.348	0.000	0.000	1.700	15.737	26.753
1.850	6.069	-1.850	-6.069	57.248	0.500	-0.290	0.873	8	6	8	6	6	120.915	0.358	0.358	0.000	0.000	1.700	13.711	23.309
1.900	6.234	-1.900	-6.234	51.440	0.597	-0.080	1.161	7	6	8	6	5	117.733	0.368	0.368	0.000	0.000	1.685	16.426	27.682
1.950	6.398	-1.950	-6.398	44.803	0.690	0.420	1.540	7	6	8	6	5	117.733	0.377	0.377	0.000	0.000	1.663	14.307	23.800
2.000	6.562	-2.000	-6.562	41.530	0.677	-0.060	1.630	7	5	8	6	5	117.733	0.387	0.387	0.000	0.000	1.643	13.262	21.784
2.050	6.726	-2.050	-6.726	39.715	0.725	-0.790	1.826	6	5	8	6	5	114.551	0.397	0.397	0.000	0.000	1.623	15.219	24.696
2.100	6.890	-2.100	-6.890	34.365	0.779	-0.780	2.267	6	5	7	6	5	114.551	0.406	0.406	0.000	0.000	1.604	13.169	21.121
2.150	7.054	-2.150	-7.054	30.280	0.828	0.030	2.734	6	5	7	6	4	114.551	0.415	0.415	0.000	0.000	1.586	11.603	18.398
2.200	7.218	-2.200	-7.218	29.045	0.795	0.860	2.737	6	5	7	6	4	114.551	0.425	0.425	0.000	0.000	1.568	11.130	17.452
2.250	7.382	-2.250	-7.382	29.747	0.628	2.770	2.111	6	5	7	6	5	114.551	0.434	0.434	0.000	0.000	1.551	11.399	17.679
2.300	7.546	-2.300	-7.546	34.130	0.632	0.060	1.852	6	5	7	6	5	114.551	0.444	0.444	0.000	0.000	1.534	13.079	20.068

Depth	N60 (Ic)	N160 (Ic)	Norm: Qt	Norm: Fr	Net qt	Delta U/qt	Bq	Q(1-Bq)	qe	qeNorm	Ic	FC	Dr	Phi	State Parm	Es/qt	Es	Su (Nkt)	Su (Ndu)	OCR	qc1 (Cn)	qc1	qc1n
m	bpf	bpf		%	tsf				MPa			%	%	deg			tsf	tsf	tsf		MPa		
0.050	2.755	4.684	1146.475	1.170	10.771	0.009	0.009	1135.806	1.023	1136.810	2.571	33.981	0.000	0.000	0.000	0.000	0.000	0.718	0.013	10.000	1.756	17.556	17.556
0.100	5.363	9.117	1285.247	1.118	24.149	0.004	0.004	1280.594	2.307	1281.595	2.264	21.201	82.915	35.146	-0.443	3.315	80.145	0.000	0.000	0.000	3.936	39.359	39.359
0.150	9.012	15.321	1687.909	0.527	48.012	0.002	0.002	1684.309	4.592	1685.310	1.836	8.917	0.000	38.428	-0.384	2.362	113.497	0.000	0.000	0.000	7.824	78.239	78.239
0.200	12.056	20.496	1750.741	0.521	67.160	0.002	0.002	1746.981	6.424	1747.982	1.710	6.312	0.000	40.031	-0.386	2.090	140.494	0.000	0.000	0.000	10.944	109.440	109.440
0.250	13.347	22.690	1511.786	0.722	72.985	0.004	0.004	1506.217	6.971	1507.219	1.763	7.351	0.000	40.429	-0.406	2.039	148.950	0.000	0.000	0.000	11.894	118.943	118.943
0.300	11.892	20.217	1131.215	0.544	65.830	0.002	0.002	1128.784	6.299	1129.785	1.728	6.646	0.000	39.937	-0.351	2.103	138.592	0.000	0.000	0.000	10.731	107.306	107.306
0.350	10.308	17.524	793.486	0.753	54.045	0.003	0.003	791.065	5.168	792.066	1.878	9.878	87.562	38.996	-0.352	2.250	121.789	0.000	0.000	0.000	8.813	88.128	88.128
0.400	9.079	15.435	579.923	1.007	45.174	0.001	0.001	579.157	4.329	580.157	2.016	13.385	80.512	38.142	-0.354	2.425	109.784	0.000	0.000	0.000	7.370	73.697	73.697
0.450	7.680	13.055	409.264	1.359	35.832	0.001	0.001	408.719	3.437	409.719	2.175	18.170	72.217	37.039	-0.357	2.714	97.513	0.000	0.000	0.000	5.850	58.499	58.499
0.500	6.655	11.314	311.082	1.379	30.240	0.003	0.003	310.218	2.898	311.218	2.237	20.252	65.876	36.232	-0.332	2.959	89.814	0.000	0.000	0.000	4.941	49.407	49.407
0.550	6.965	11.840	303.897	1.195	32.475	0.002	0.002	303.321	3.115	304.322	2.175	18.152	66.566	36.573	-0.312	2.853	92.987	0.000	0.000	0.000	5.306	53.064	53.064
0.600	6.336	10.772	246.831	1.293	28.760	-0.002	-0.002	247.389	2.773	248.389	2.237	20.265	61.866	35.996	-0.302	3.035	87.672	0.000	0.000	0.000	4.703	47.029	47.029
0.650	4.978	8.463	169.411	1.410	21.353	-0.005	-0.005	170.234	2.068	171.233	2.363	24.935	52.257	34.582	-0.275	3.502	75.262	0.000	0.000	0.000	3.498	34.981	34.981
0.700	3.767	6.404	112.259	1.440	15.204	-0.003	-0.003	112.642	1.475	113.642	2.489	30.192	41.577	32.974	-0.236	0.000	0.000	0.000	0.000	0.000	2.498	24.982	24.982
0.750	3.348	5.691	87.839	1.808	12.722	0.014	0.014	86.569	1.215	87.569	2.607	35.724	0.000	0.000	0.000	0.000	0.000	0.848	0.023	10.000	2.095	20.955	20.955
0.800	3.600	6.120	85.005	2.601	13.110	0.024	0.025	82.918	1.240	83.919	2.690	39.905	0.000	0.000	0.000	0.000	0.000	0.874	0.040	10.000	2.160	21.602	21.602
0.850	3.877	6.590	86.344	2.853	14.128	0.007	0.008	85.691	1.359	86.691	2.689	39.860	0.000	0.000	0.000	0.000	0.000	0.942	0.013	10.000	2.327	23.275	23.275
0.900	4.447	7.559	93.910	3.336	16.248	-0.003	-0.003	94.168	1.577	95.168	2.685	39.686	0.000	0.000	0.000	0.000	0.000	1.084	0.000	10.000	2.674	26.743	26.743
0.950	4.633	7.877	93.514	3.353	17.058	-0.006	-0.006	94.050	1.661	95.050	2.671	38.926	0.000	0.000	0.000	0.000	0.000	1.138	0.000	10.000	2.808	28.078	28.078
1.000	5.035	8.559	103.048	2.545	19.765	-0.011	-0.011	104.168	1.932	105.168	2.545	32.734	0.000	0.000	0.000	0.000	0.000	1.318	0.000	10.000	3.250	32.502	32.502
1.050	6.276	10.669	139.198	1.421	28.007	-0.007	-0.008	140.243	2.722	141.243	2.270	21.421	53.365	35.884	-0.256	3.071	86.665	0.000	0.000	0.000	4.594	45.940	45.940
1.100	7.045	11.977	155.548	1.205	32.778	-0.000	-0.000	155.580	3.161	156.580	2.172	18.084	57.190	36.632	-0.248	2.835	93.548	0.000	0.000	0.000	5.373	53.725	53.725
1.150	7.323	12.449	151.499	1.480	33.387	-0.000	-0.000	151.548	3.221	152.548	2.221	19.695	57.081	36.721	-0.269	2.808	94.398	0.000	0.000	0.000	5.473	54.734	54.734
1.200	7.594	12.910	149.750	1.612	34.429	-0.000	-0.000	149.784	3.321	150.784	2.234	20.150	57.357	36.868	-0.278	2.764	95.823	0.000	0.000	0.000	5.644	56.445	56.445
1.250	8.325	14.152	163.930	1.348	39.250	-0.000	-0.000	163.942	3.783	164.942	2.141	17.067	60.515	37.491	-0.266	2.588	102.221	0.000	0.000	0.000	6.431	64.312	64.312
1.300	9.002	15.304	176.112	1.147	43.867	-0.000	-0.000	176.186	4.228	177.186	2.059	14.607	63.124	38.021	-0.255	2.454	108.286	0.000	0.000	0.000	7.185	71.848	71.848
1.350	9.829	16.709	188.136	1.124	48.679	-0.000	-0.000	188.184	4.689	189.184	2.019	13.458	65.552	38.516	-0.259	2.343	114.703	0.000	0.000	0.000	7.970	79.700	79.700
1.400	11.804	20.066	229.402	0.912	61.601	-0.000	-0.000	229.414	5.927	230.414	1.883	9.976	71.741	39.636	-0.257	2.145	132.782	0.000	0.000	0.000	10.076	100.760	100.760
1.450	13.785	23.435	271.656	0.709	75.641	-0.000	-0.000	271.662	7.273	272.662	1.745	6.983	77.087	40.614	-0.248	2.016	153.104	0.000	0.000	0.000	12.364	123.643	123.643
1.500	15.361	26.113	299.257	0.652	86.294	0.000	0.000	299.215	8.293	300.215	1.678	5.705	80.353	41.242	-0.249	1.942	168.246	0.000	0.000	0.000	14.101	141.008	141.008
1.550	16.490	28.033	314.015	0.643	93.664	0.000	0.000	313.984	9.001	314.984	1.646	5.136	82.213	41.632	-0.252	1.903	178.884	0.000	0.000	0.000	15.303	153.026	153.026
1.600	16.733	28.445	308.482	0.652	95.072	0.000	0.000	308.471	9.137	309.471	1.645	5.117	82.174	41.704	-0.251	1.897	181.015	0.000	0.000	0.000	15.534	155.337	155.337
1.650	15.654	26.612	275.915	0.679	87.771	-0.000	-0.000	275.922	8.439	276.922	1.683	5.795	79.440	41.324	-0.245	1.933	170.384	0.000	0.000	0.000	14.346	143.463	143.463
1.700	14.075	23.928	236.262	0.701	77.500	-0.000	-0.000	236.288	7.457	237.288	1.733	6.755	75.450	40.732	-0.234	2.001	155.836	0.000	0.000	0.000	12.675	126.751	126.751
1.750	13.182	22.409	211.955	0.726	71.629	-0.000	-0.000	212.003	6.896	213.003	1.770	7.484	72.779	40.358	-0.227	2.047	147.408	0.000	0.000	0.000	11.721	117.205	117.205
1.800	12.258	20.839	187.890	0.783	65.360	-0.000	-0.000	187.927	6.296	188.927	1.821	8.576	69.757	39.924	-0.223	2.104	138.330	0.000	0.000	0.000	10.701	107.011	107.011
1.850	10.988	18.680	159.011	0.879	56.890	-0.000	-0.000	159.036	5.485	160.036	1.899	10.367	65.404	39.265	-0.219	2.203	126.186	0.000	0.000	0.000	9.323	93.234	93.234
1.900	10.319	17.390	138.948	1.169	51.072	-0.000	-0.000	138.954	4.928	139.954	2.016	13.377	61.950	38.712	-0.234	2.303	118.521	0.000	0.000	0.000	8.305	83.045	83.045
1.950	9.464	15.743	117.771	1.553	44.425	0.000	0.000	117.736	4.291	118.736	2.146	17.223	57.619	37.991	-0.249	2.461	110.291	0.000	0.000	0.000	7.140	71.399	71.399
2.000	8.938	14.682	106.347	1.645	41.143	-0.000	-0.000	106.352	3.979	107.352	2.191	18.699	55.082	37.568	-0.246	2.567	106.658	0.000	0.000	0.000	6.535	65.352	65.352
2.050	8.733	14.172	99.190	1.844	39.319	-0.001	-0.001	99.252	3.807	100.252	2.242	20.443	53.453	37.296	-0.253	2.641	104.916	0.000	0.000	0.000	6.174	61.741	61.741
2.100	7.940	12.735	83.686	2.294	33.959	-0.001	-0.001	83.746	3.295	84.746	2.356	24.660	48.970	36.549	-0.265	2.860	98.325	0.000	0.000	0.000	5.280	52.802	52.802
2.150	7.322	11.609	71.931	2.772	29.865	0.000	0.000	71.929	2.901	72.929	2.456	28.750	45.015	35.890	-0.279	3.069	92.974	0.000	0.000	0.000	4.600	45.996	45.996
2.200	7.081	11.103	67.409	2.778	28.621	0.001	0.001	67.346	2.780	68.346	2.473	29.507	43.501	35.638	-0.271	3.152	91.581	0.000	0.000	0.000	4.363	43.629	43.629
2.250	6.993	10.846	67.546	2.142	29.313	0.003	0.003	67.346	2.842	68.347	2.395	26.194	43.872	35.699	-0.231	3.131	93.190	0.000	0.000	0.000	4.420	44.197	44.197
2.300	7.745	11.884	75.979	1.876	33.687	0.000	0.000	75.975	3.270	76.975	2.315	23.097	47.504	36.305	-0.226	2.936	100.254	0.000	0.000	0.000	5.017	50.170	50.170

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR
101	2.350	7.710	-2.350	-7.710	27.695	0.600	-0.790	2.166	6	5	7	6	5	114.551	0.453	0.453	0.000	0.000	1.518	10.613	16.114	6.626	10.062	60.169	2.202	27.242	-0.001	-0.001	60.223	2.656	61.223	2.433	27.785	41.215	35.257	-0.222	3.278	90.818	0.000	0.000	0.000	4.029	40.285	40.285
102	2.400	7.874	-2.400	-7.874	24.852	0.523	0.390	2.104	6	5	7	6	5	114.551	0.462	0.462	0.000	0.000	1.503	9.523	14.312	6.036	9.072	52.774	2.144	24.390	0.000	0.000	52.748	2.380	53.748	2.466	29.166	37.817	34.690	-0.204	3.467	86.188	0.000	0.000	0.000	3.578	35.781	35.781
103	2.450	8.038	-2.450	-8.038	22.912	0.453	3.480	1.977	6	5	7	6	5	114.551	0.472	0.472	0.000	0.000	1.488	8.780	13.063	5.604	8.338	47.588	2.019	22.440	0.005	0.005	47.357	2.185	48.357	2.480	29.810	35.198	34.254	-0.184	3.611	82.772	0.000	0.000	0.000	3.266	32.657	32.657
104	2.500	8.202	-2.500	-8.202	20.115	0.416	3.950	2.068	6	5	7	6	5	114.551	0.481	0.481	0.000	0.000	1.473	7.708	11.355	5.065	7.463	40.823	2.119	19.634	0.006	0.006	40.596	1.915	41.566	2.541	32.563	31.183	33.585	-0.173	0.000	0.000	0.000	0.000	0.000	2.839	28.389	28.389
105	2.550	8.366	-2.550	-8.366	21.861	0.312	8.090	1.427	6	5	7	6	5	114.551	0.491	0.491	0.000	0.000	1.459	8.377	12.222	5.199	7.585	43.582	1.460	21.370	0.012	0.012	43.067	2.070	44.067	2.420	27.233	33.291	33.936	-0.141	3.715	81.248	0.000	0.000	0.000	3.056	30.556	30.556
106	2.600	8.530	-2.600	-8.530	24.253	0.396	5.270	1.633	6	5	7	6	5	114.551	0.500	0.500	0.000	0.000	1.445	9.294	13.432	5.769	8.337	47.531	1.667	23.753	0.007	0.007	47.202	2.308	48.202	2.420	27.249	35.996	34.387	-0.163	3.567	86.552	0.000	0.000	0.000	3.358	33.580	33.580
107	2.650	8.694	-2.650	-8.694	21.380	0.473	1.590	2.212	6	5	7	6	4	114.551	0.509	0.509	0.000	0.000	1.432	8.193	11.731	5.402	7.735	40.993	2.266	20.871	0.002	0.002	40.895	2.043	41.895	2.548	32.877	32.115	33.740	-0.182	0.000	0.000	0.000	0.000	0.000	2.933	29.327	29.327
108	2.700	8.858	-2.700	-8.858	18.521	0.389	1.800	2.100	6	5	7	6	4	114.551	0.519	0.519	0.000	0.000	1.419	7.097	10.070	4.772	6.771	34.719	2.161	18.003	0.003	0.003	34.610	1.769	35.611	2.588	34.774	0.000	33.011	-0.158	0.000	0.000	0.000	0.000	0.000	2.517	25.175	25.175
109	2.750	9.022	-2.750	-9.022	14.115	0.438	3.990	3.103	5	4	6	5	4	114.551	0.528	0.528	0.000	0.000	1.406	6.761	9.507	3.829	7.287	25.737	3.224	13.587	0.009	0.009	25.501	1.340	26.501	2.689	39.851	0.000	0.000	0.000	0.000	0.000	0.000	1.901	19.014	25.737
110	2.800	9.186	-2.800	-9.186	14.574	0.438	10.310	3.005	5	4	6	5	4	114.551	0.538	0.538	0.000	0.000	1.394	6.981	9.730	3.924	7.343	26.124	3.120	14.037	0.022	0.023	25.525	1.365	26.525	2.675	39.115	0.000	0.000	0.000	0.000	0.000	0.936	0.040	10.000	1.946	19.461	26.124
111	2.850	9.350	-2.850	-9.350	21.615	0.275	8.820	1.272	6	5	7	6	5	114.551	0.547	0.547	0.000	0.000	1.382	8.283	11.445	5.132	7.091	38.536	1.305	21.068	0.013	0.013	38.033	2.044	39.033	2.416	27.077	31.408	33.622	-0.118	0.000	0.000	0.000	0.000	0.000	2.861	28.613	28.613
112	2.900	9.514	-2.900	-9.514	26.314	0.213	-4.220	0.809	7	5	7	6	5	117.733	0.556	0.556	0.000	0.000	1.370	8.403	11.511	5.785	7.925	46.307	0.827	25.757	-0.005	-0.005	46.543	2.533	47.543	2.242	20.425	36.799	34.521	-0.099	3.523	92.740	0.000	0.000	0.000	3.453	34.533	34.533
113	2.950	9.678	-2.950	-9.678	24.126	0.212	0.930	0.879	7	5	7	6	5	117.733	0.566	0.566	0.000	0.000	1.358	7.704	10.463	5.429	7.374	41.633	0.900	23.560	0.001	0.001	41.582	2.308	42.582	2.296	22.378	34.064	34.065	-0.098	3.673	88.654	0.000	0.000	0.000	3.139	31.390	31.390
114	3.000	9.842	-3.000	-9.842	21.495	0.249	-0.850	1.158	6	5	7	6	4	114.551	0.576	0.576	0.000	0.000	1.347	8.237	11.094	5.079	6.840	36.355	1.190	20.919	-0.001	-0.001	36.401	2.062	37.401	2.406	26.644	30.515	33.473	-0.106	0.000	0.000	0.000	0.000	0.000	2.773	27.735	27.735
115	3.050	10.006	-3.050	-10.006	23.076	0.280	-0.650	1.213	6	5	7	6	5	114.551	0.585	0.585	0.000	0.000	1.336	8.843	11.814	5.422	7.243	38.459	1.245	22.491	-0.001	-0.001	38.493	2.213	39.493	2.393	26.142	32.317	33.774	-0.115	0.000	0.000	0.000	0.000	0.000	2.953	29.535	29.535
116	3.100	10.170	-3.100	-10.170	27.715	0.277	-2.350	0.999	7	5	7	6	5	117.733	0.595	0.595	0.000	0.000	1.325	8.850	11.729	6.201	8.218	45.632	1.021	27.121	-0.003	-0.003	45.756	2.662	46.756	2.283	21.889	37.337	34.610	-0.115	3.493	96.854	0.000	0.000	0.000	3.519	35.187	35.187
117	3.150	10.335	-3.150	-10.335	34.723	0.240	-5.990	0.691	7	6	7	6	5	117.733	0.604	0.604	0.000	0.000	1.315	11.088	14.577	7.252	9.534	56.488	0.703	34.119	-0.005	-0.005	56.798	3.344	57.798	2.118	16.352	43.567	35.649	-0.104	3.148	109.356	0.000	0.000	0.000	4.373	43.730	43.730
118	3.200	10.499	-3.200	-10.499	39.506	0.231	-11.780	0.585	7	6	8	6	6	120.915	0.614	0.614	0.000	0.000	1.304	12.616	16.454	7.987	10.417	63.380	0.594	38.893	-0.009	-0.009	63.976	3.820	64.979	2.036	13.933	47.039	36.227	-0.101	2.961	117.016	0.000	0.000	0.000	4.936	49.362	49.362
119	3.250	10.663	-3.250	-10.663	43.470	0.255	-11.230	0.587	8	6	8	6	6	120.915	0.624	0.624	0.000	0.000	1.294	10.411	13.472	8.678	11.229	68.727	0.595	42.846	-0.008	-0.008	69.289	4.198	70.289	2.003	13.028	49.553	36.646	-0.109	2.830	123.082	0.000	0.000	0.000	5.389	53.886	53.886
120	3.300	10.827	-3.300	-10.827	47.475	0.337	-10.490	0.710	8	6	8	6	6	120.915	0.634	0.634	0.000	0.000	1.284	11.370	14.597	9.524	12.226	73.958	0.719	46.841	-0.007	-0.007	74.475	4.579	75.475	2.016	13.373	51.853	37.030	-0.131	2.716	129.007	0.000	0.000	0.000	5.839	58.388	58.388
121	3.350	10.991	-3.350	-10.991	49.413	0.427	-9.160	0.864	7	6	8	6	5	117.733	0.643	0.643	0.000	0.000	1.274	15.779	20.102	10.049	12.803	75.831	0.876	48.770	-0.006	-0.006	76.276	4.761	77.276	2.051	14.363	52.780	37.184	-0.150	2.672	132.088	0.000	0.000	0.000	6.031	60.307	60.307
122	3.400	11.155	-3.400	-11.155	51.011	0.437	-7.820	0.857	7	6	8	6	5	117.733	0.653	0.653	0.000	0.000	1.265	16.290	20.599	10.330	13.063	77.143	0.868	50.358	-0.005	-0.005	77.517	4.910	78.517	2.040	14.052	53.479	37.301	-0.151	2.639	134.696	0.000	0.000	0.000	6.180	61.796	61.796
123	3.450	11.319	-3.450	-11.319	53.729	0.514	-6.610	0.957	7	6	8	6	5	117.733	0.663	0.663	0.000	0.000	1.255	17.157	21.537	10.931	13.721	80.106	0.969	53.066	-0.004	-0.004	80.418	5.167	81.418	2.052	14.388	54.756	37.513	-0.164	2.582	138.762	0.000	0.000	0.000	6.461	64.612	64.612
124	3.500	11.483	-3.500	-11.483	56.079	0.566	-4.910	1.009	7	6	8	6	5	117.733	0.672	0.672	0.000	0.000	1.246	17.908	22.318	11.415	14.225	82.439	1.022	55.407	-0.003	-0.003	82.667	5.387	83.667	2.053	14.424	55.776	37.683	-0.171	2.537	142.336	0.000	0.000	0.000	6.695	66.953	66.953
125	3.550	11.647	-3.550	-11.647	61.959	0.460	-5.040	0.742	8	6	8	6	6	120.915	0.682	0.682	0.000	0.000	1.237	14.839	18.360	12.087	14.955	89.863	0.751	61.277	-0.003	-0.003	90.094	5.951	91.094	1.942	11.442	58.427	38.125	-0.152	2.429	150.556	0.000	0.000	0.000	7.344	73.439	73.439
126	3.600	11.811	-3.600	-11.811	66.032	0.343	-7.730	0.519	8	6	8	6	6	120.915	0.692	0.692	0.000	0.000	1.228	15.815	19.426	12.395	15.226	94.448	0.525	65.340	-0.004	-0.004	94.797	6.349	95.797	1.838	8.996	60.045	38.395	-0.126	2.369	156.466	0.000	0.000	0.000	7.770	77.704	77.704
127	3.650	11.975	-3.650	-11.975	65.395	0.370	-10.560	0.566	8	6	8	6	6	120.915	0.702	0.702	0.000	0.000	1.220	16.662	19.102	12.390	15.112	92.193	0.572	64.694	-0.005	-0.005	92.653	6.296	93.653	1.841	9.086	59.864	38.313	-0.131	2.716	159.007	0.000	0.000	0.000	7.641	76.409	76.409
128	3.700	12.139	-3.700	-12.139	58.879	0.535	-11.320	0.909	8	6	8	6	5	120.915	0.712	0.712	0.000	0.000	1.211	14.102	17.079	11.827	14.323	81.738	0.920	58.168	-0.006	-0.006	82.234	5.674	83.234	2.019	13.465	56.353	37.780	-0.161	2.513	147.999	0.000	0.000	0.000	6.831	68.315	68.315
129	3.750	12.303	-3.750	-12.303	50.400	0.598	-11.290	1.187	7	5	8	6	5	117.733	0.722	0.722	0.000	0.000	1.203	16.094	19.359	10.644	12.804	68.861	1.204	49.678	-0.007	-0.007	69.350	4.862	70.350	2.145	17.207	51.700	37.004	-0.170	2.724	137.326	0.000	0.000	0.000	5.808	58.078	58.078
130	3.800	12.467	-3.800	-12.467	44.924	0.610	-10.500	1.358	7	5	8	6	5	117.733	0.731	0.731	0.000	0.000	1.195	14.346	17.142	9.800	11.710	60.449	1.380	44.193	-0.007	-0.007	60.898	4.335	61.898	2.223	19.784	48.213	36.423	-0.170	2.899	130.295	0.000	0.000	0.000	5.143	51.426	51.426
131	3.850	12.631	-3.850	-12.631	44.391	0.330	-9.500	0.743	7	6	8	6	5	117.733	0.741	0.741	0.000	0.000	1.187	14.175	16.828	9.135	10.844	58.928	0.756	43.650	-0.007	-0.007	59.328	4.281	60.328	2.081	15.228	47.683	36.335	-0.114	2.927	129.977	0.000	0.000	0.000	5.048	50.483	50.483
132	3.900	12.795	-3.900	-12.795	38.497	0.291	-8.470	0.756	7	5	8	6	5	117.733	0.751	0.751	0.000	0.000	1.179	12.293	14.499	8.114	9.569	50.303	0.771	37.747	-0.007	-0.007	50.655	3.713	51.655	2.140	17.046	43.414	35.623	-0.101	3.156	121.566	0.000	0.000	0.000	4.350	43.498	43.498
133	3.950	12.959	-3.950	-12.959	29.878	0.431	-0.400	1.443	6	5	7	6	5	114.551	0.760	0.760	0.000	0.000	1.172	11.449	13.419	7.010	8.216	38.317	1.480	29.118	-0.000	-0.000	38.333	2.863	39.333	2.390	26.017	35.968	34.382	-0.130	3.569	106.671	0.000	0.000	0.000	3.355	33.546	33.546
134	4.000	13.123	-4.000	-13.123	21.653	0.394	-2.040	1.821	6	4	6	5	4	114.551	0.770	0.770	0.000	0.000	1.165	8.291	9.858	5.520	6.430	27.126	1.881	20.868	-0.003	-0.003	27.208	2.079	28.208	2.563	43.659	0.000	32.811	-0.118	0.000	0.000	0.000	0.000	0.000	2.415	24.145	24.145
135	4.050	13.287	-4.050	-13.287	16.053	0.326	-1.170	2.031	5	4	6	4	4	114.551	0.779	0.779	0.000	0.000	1.158	7.689	8.903	4.317	5.507	19.615	2.134	15.274	-0.002	-0.002	19.662	1.541	20.661	2.727	39.001	0.000	0.000	0.000	0.000	0.000	1.019	0.000	6.873	1.781	17.805	19.615
136	4.100	13.451	-4.100	-13.451	14.761	0.174	1.720	1.179	6	4	6	5	5	114.551	0.788	0.788	0.000	0.000	1.151	5.656	6.510	3.812	4.641	17.730	1.245	13.973	0.004	0.004	17.661	1.409	18.661	2.593	34.993	0.000	30.927	-0.039	0.000	0.000	0.000	0.000	0.000	1.627	16.274	17.215
137	4.150	13.615	-4.150	-13.615	15.729	0.138	4.600	0.877	6	5	6	5	5	114.551	0.798	0.798	0.000	0.000	1.144	6.027	6.896	3.937	4.504	18.723	0.924	14.931	0.009	0.010	18.543	1.493	19.543	2.529	31.984	0.000	31.202	-0.022	0.000	0.000	0.000	0.000	0.000	1.724	17.239	17.239
138	4.200	13.779	-4.200	-13.779	14.286	0.148	5.770	1.036	6	4	6	5	5	114.551	0.807	0.807	0.000	0.000	1.137	5.474	6.227	3.674	4.399	16.705	1.098	13.479	0.013	0.013	16.482	1.351	17.482	2.584	34.573	0.000	30.714	-0.024	0.000	0.000	0.000	0.000	0.000	1.557	15.566	16.389
139	4.250	13.943	-4.250	-13.943	14.140	0.197	6.380	1.393	6	4	6	5	4	114.551	0.817	0.817	0.000	0.000	1.131	5.418	6.127	3.761	4.532	16.322	1.479	13.324	0.014	0.015	16.078	1.336	17.078	2.651	37.892	0.000	30.637	-0.043	0.000	0.000	0.000	0.000	0.000	1.532	15.318	16.322
140	4.300	14.107	-4.300	-14.107	13.662	0.241	6.800	1.764	5	4	6	5	4	114.551	0.826	0.826	0.000	0.000	1.124	6.544	7.358	3.776	4.486	15.547	1.877	12.837	0.016	0.017	15.290	1.289	16.290	2.724	41.757	0.000	0.000	0.000	0.000	0.000	0.856	0.027	4.807	1.472	14.717	15.547
141	4.350	14.271	-4.350	-14.271	13.177	0.248	7.590	1.882	5	4	6	5	4	114.551	0.835	0.835	0.000	0.000	1.118	6.312	7.057	3.711	4.344	14.780	2.009	12.342	0.018	0.019	14.496	1.240	15.496	2.759	43.659	0.000	0.000	0.000	0.000	0.000	0.823	0.030	4.454	1.411	14.114	14.780
142	4.400	14.436	-4.400	-14.436	13.550	0.238	8.030	1.756	5	4	6	5	4	114.551	0.845	0.845	0.000	0.000	1.112	6.491	7.216	3.768	4.367	15.046	1.873	12.706	0.019	0.020	14.749	1.274	15.749	2.738	43.377	0.000	0.000	0.000	0.000	0.000	0.847	0.031	4.575	1.443	14.432	15.046
143	4.450	14.600	-4.450	-14.600	11.170	0.260	8.070	2.328	5	3	5	4	4	114.551	0.854	0.854	0.000	0.000	1.106	5.351	5.916	3.379	3.816	12.082	2.520	10.317	0.023	0.024	11.787	1.046	12.787	2.886	51.148	0.000	0.000	0.000	0.000	0.000	0.688	0.032	3.310	1.183	11.832	12.082
144	4.500	14.764	-4.500	-14.764	9.255	0.241	8.850	2.604	4	3	5	4	3	114.551	0.864	0.864	0.000	0.000	1.100	5.911	6.500	2.992	3.281	9.721	2.872	8.392	0.030	0.033	9.401	0.860	10.401	2.996	58.236	0.000	0.000	0.000	0.000	0.000	0.560	0.035	2.439	0.975	9.750	9.721
145	4.550	14.928	-4.550	-14.928	12.029	0.205	11.120	1.704	5	4	6	4	4	114.551	0.873	0.873	0.000	0.000	1.094	5.762	6.302	3.447	3.824	12.785	1.837	11.157	0.029	0.031	12.387	1.119	13.387	2.791	45.460	0.000	0.000	0.000	0.000	0.000	0.744	0.043	3.593	1.260	12.604	12.785
146	4.600	15.092	-4.600	-15.092	11.248	0.213	10.830	1.894	5	4	5	4	4	114.551	0.882	0.882	0.000	0.000	1.088	5.388	5.861	3.328	3.629	11.752	2.055	10.366	0.030	0.033	11.368	1.045	12.368	2.848	48.793	0.000	0.000	0.000	0.000	0.000	0.691	0.042	3.180	1.172	11.722	11.752
147	4.650	15.256	-4.650	-15.256	9.257	0.183	10.660	1.977	5	3	5	4	3	114.551	0.892	0.892	0.000	0.000	1.082	4.434	4.798	2.899	3.068	9.384	2.188	8.365	0.036	0.040	9.010	0.855	10.011	2.945	54.840	0.000	0.000	0.000	0.000	0.000	0.558	0.042	2.325	0.960	9.596	9.384
148	4.700	15.420	-4.700	-15.420	7.568	0.129	12.430	1.705	5	3	5	4	3	114.551	0.901	0.901	0.000	0.000	1.076	3.625	3.902	2.461	2.512	7.401	1.935	6.667	0.051	0.058	6.970	0.688	7.970	3.006	58.863	0.000	0.000	0.000	0.000	0.000	0.445	0.049	1.712	0.780	7.804	7.401
149	4.750	15.584	-4.750	-15.584	6.424	0.091	15.040	1.417	1	3	3	4	3	111.369	0.910	0.910	0.000	0.000	1.071	3.077	3.295	0.000	0.000	6.058	1.650	5.514	0.073	0.085	5.542	0.570	6.543	3.048	59.985	0.000	0.000	0.000	0.000	0.000	0.368	0.059	1.353	0.659	6.591	6.058
150	4.800	15.748	-4.800	-15.748	4.956	0.083	18.520	1.675	1	3	3	3	3	111.369	0.920	0.920	0.000	0.000	1.066	2.374	2.530	0.000	0.000	4.391	2.056	4.036	0.117	0.143	3.762	0.419	4.762	3.216	0.000	0.000	0.000	0.000	0.000	0.269	0.072	0.978	0.506	5.059	4.391
151	4.850	15.912	-4.850	-15.912	4.737	0.085	25.160	1.794	1	3	3	3	3	111.369	0.929	0.929	0.000	0.000	1.060	2.269	2.406	0.000	0.000	4.103	2.232	3.809	0.166	0.206	3.256	0.379	4.257	3.259	0.000	0.000	0.000	0.000	0.000	0.254	0.098	0.921	0.481	4.812	4.103
152	4.900	16.076	-4.900	-16.076	4.320	0.076	35.270	1.759	1	3	3	3	3	111.369	0.938	0.938	0.000	0.000	1.055	2.069	2.184	0.000	0.000	3.608	2.247	3.383	0.255	0.326	2.433	0.308	3.434	3.310	0.000	0.000	0.000	0.000	0.000	0.226	0.138	0.831	0.437	4.367	3.608
153	4.950	16.240	-4.950	-16.240	4.401	0.073	65.860	1.659	1	3	3	3	1	111.369	0.947	0.947	0.000	0.000	1.050	2.108	2.214	0.000	0.000	3.649	2.113	3.455	0.467	0.595	1.477	0.225	2.478	3.293	0.000	0.000	0.000	0.000	0.000	0.230	0.257	0.838	0.443	4.427	3.649
154	5.000	16.404	-5.000	-16.404	4.307	0.074	76.380	1.718	1	3	3	3	1	111.369	0.956	0.956	0.000	0.000	1.045	2.063	2.156	0.000	0.000	3.506	2.208	3.351	0.554	0.712	1.011	0.184	2.012	3.317	0.000	0.000	0.000	0.000	0.000	0.223	0.298	0.813	0.431	4.312	3.506
155	5.050	16.568	-5.050	-16.568	4.240	0.069	80.030	1.456	1	3	3	3	1	111.369	0.965	0.965	0.000	0.000	1.040	2.270	2.361	0.000	0.000	3.912	1.828	3.775	0.527	0.662	1.322	0.215	2.323	3.237	0.000	0.000	0.000	0.000	0.000	0.262	0.313	0.885	0.472	4.723	3.912
156	5.100	16.732	-5.100	-16.732	5.206	0.090	94.330	1.729	4	3	3	2	1	114.551	0.975	0.975	0.000	0.000	1.035	3.325	3.442	1.996	1.713	9.345	2.127	4.232	0.506	0.622	1.641	0.247	2.642	3.277	70.148	0.000	0.000	0.000	0.000	0.282	0.329	0.969	0.516	5.163	4.345
157	5.150	16.896	-5.150	-16.896	5.069	0.090	63.940	1.775	4	3	3	3	2	114.551	0.984	0.984	0.000	0.000	1.030	3.238	3.335	1.949	1.667	4.154	2.203	4.086	0.394	0.489	2.124	0.294	3.125	3.252	77.106	0.000	0.000	0.000	0.000	0.272	0.250	0.931	0.500	5.003	4.154
158	5.200	17.060	-5.200	-17.060	4.610	0.089	75.220	1.931	4	3	3	3	2	114.551	0.993	0.993	0.000	0.000	1.025	2.944	3.018	1.874	1.546	3.642	2.461	3.617	0.510	0.649	1.277	0.217	2.278	3.325	83.169	0.000	0.000	0.000	0.000	0.241	0.294	0.837	0.453	4.528	3.642
159	5.250	17.224	-5.250	-17.224	4.625	0.068	79.230	1.470	1	3	3	3	1	111.369	1.003	1.003	0.000	0.000	1.021	2.215	2.261	0.000	0.000	3.614	1.877	3.622	0.535	0.683	1.146	0.206	2.147	3.273	0.000	0.000	0.000	0.000	0.000	0.242	0.309	0.832	0.452	4.521	3.614
160	5.300	17.388	-5.300	-17.388	4.804	0.069	80.700	1.436	1	3	3	3	1	111.369	1.012	1.012	0.000	0.000	1.016	2.301	2.338	0.000	0.000	3.750	1.819	3.792	0.525	0.664	1.258	0.219	2.259	3.252	0.000	0.000	0.000	0.000	0.000	0.253	0.315	0.856	0.468	4.675	3.750
161	5.350	17.552	-5.350	-17.552	4.783	0.071	86.950	1.484	1	3	3	3	1	111.369	1.021	1.021	0.000	0.000	1.011	2.291	2.317	0.000	0.000	3.687	1.887	3.762	0.568	0.722	1.026	0.198	2.027	3.266	0.000	0.000	0.000	0.000	0.000	0.251	0.340	0.844	0.463	4.634	3.687
162



NON-FEDERAL SPONSOR SUPPORT LETTER AND SELF-CERTIFICATION

James River Shoreline, Newport News, VA
Continuing Authority Program, Section 14
Emergency Streambank & Shoreline Protection

APPENDIX D

OCTOBER 2021

U.S. Army Corps
of Engineers
Norfolk District

City of Newport News

Department of Engineering
2400 Washington Avenue
Newport News, Virginia 23607

(757) 933-2311 Fax 926-8300

May 3, 2021

Colonel Patrick Kinsman, PE
Commander, Norfolk District
U.S. Army Corps of Engineers
803 Front Street
Norfolk, VA 23510

Re: Draft Integrated Feasibility Report
James River Shoreline Stabilization
Newport News, VA

Dear Colonel Kinsman:

This letter is to offer our support for the submittal of the Draft Integrated Feasibility Report and Environmental Assessment for stabilization of approximately 600 linear feet of the James River shoreline in Newport News from 9304 River Rd to North Ave. The City concurs with the recommended Alternative #1 which involves installing a stone sill and providing a more stable vegetated slope.

VMRC commented that a living shoreline option should be evaluated. The USACE did evaluate a living shoreline alternative and determined that it was not feasible due to site constraints at the top of slope and the need to minimize impacts to State-owned submerged land to the extent practicable. The USACE will continue to engage with VMRC as the design advances.

The City of Newport News intends to continue to serve as the Non-Federal sponsor, should federal funds be appropriated to preform work described in the recommended plan. These non-federal cost sharing funds would only be an obligation should we elect to execute an agreement with the USACE. As such, we understand that this letter is not a contractually binding agreement and is not a funding obligation of the City of Newport News.

For additional comments or questions, please contact me at (757)926-8655 or anglekk@nnva.gov.

Sincerely,

Kathie Angle

Kathie Angle, PE, CFM
Engineering Supervisor-Stormwater
City of Newport News

Copy: Project Manager, J.C. Morgado Jofre
Supervising Engineer, K. Angle

NON-FEDERAL SPONSOR'S
SELF-CERTIFICATION OF FINANCIAL CAPABILITY
FOR DECISION DOCUMENTS

I, ____Susan Goodwin_____, do hereby certify that I am the **Director of Finance of the City of Newport News** (the "Non-Federal Sponsor"); that I am aware of the financial obligations of the Non-Federal Sponsor for the J**ames River Shoreline Emergency Streambank and Shoreline Protection, James River Shoreline, Newport News, Virginia**; and that the Non-Federal Sponsor will have the financial capability to satisfy the Non-Federal Sponsor's obligations for that project. I understand that the Government's acceptance of this self-certification shall not be construed as obligating either the Government or the City of Newport News to implement a project.

IN WITNESS WHEREOF, I have made and executed this certification this 4th day of May, 2021.

BY: Susan Goodwin

TITLE: Director of Finance

DATE: 5/4/21

NORFOLK DISTRICT LEGAL CERTIFICATION

James River Shoreline, Newport News, VA
Continuing Authority Program, Section 14
Emergency Streambank & Shoreline Protection

APPENDIX E

OCTOBER 2021

U.S. Army Corps
of Engineers
Norfolk District

CERTIFICATION OF LEGAL REVIEW

The Continuing Authorities Program Section 14, Emergency Streambank and Shoreline Protection, James River Shoreline, Newport News, Virginia Draft Integrated Feasibility Report/Environmental Assessment has been reviewed by the Office of Counsel, Norfolk District, and has been determined to be legally sufficient.

Date: 29 April 2021

Thomas M. Emerick
District Counsel