DRAFT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

Norfolk Harbor Navigation Improvements Project, Thimble Shoal Channel, Chesapeake Bay Bridge Tunnel – Protective Rock Blanket Project

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I. EXECUTIVE SUMMARY

The purpose of this Supplemental Environmental Assessment (SEA) is to supplement the 2018 Final General Reevaluation Report and Environmental Assessment (GRR/EA) for Norfolk Harbor Navigation Improvements Project, Chesapeake Bay Bridge Tunnel (CBBT) – Installation of Protective Rock Blanket. The Protective Rock Blanket (PRB) element of the Norfolk Harbor Improvements Project includes an alternate means and methods of dredging and subsequent material placement that was not evaluated in the 2018 GRR/EA. The alternate dredging method utilizes a Water Injection Dredging (WID) method of removing the CBBT cover material. The WID action will require additional new work dredging by conventional dredging methods (e.g. mechanical or hopper dredging) in a limited adjacent channel area east of the CBBT cover area within the Thimble Shoal Channel (TSC) to construct a receiving trench for the WID material that will be removed over the existing CBBT. The Proposed Action also includes transport of suitable new work dredged material from the WID trench to Dam Neck Ocean Disposal Site (DNODS).

The following alternatives for the removal of the CBBT cover material were evaluated:

- Water Injection Dredging Method
- Conventional Dredging Methods
- No Action Alternative

The following alternatives were evaluated for the placement of dredged material:

- Dam Neck Ocean Disposal Site (DNODS)
- Permanent Placement of CBBT Cover Material in WID Trench
- Placement at Craney Island Dredged Material Management Area (CIDMMA)
- Upland placement of dredged material at Shirley Plantation (Weanack)
- Upland Solid Waste Disposal Sites
- Beneficial Uses of Dredged Material
- No Action Alternative

The 2018 GRR/EA analyzed conventional dredging methods to remove the CBBT cover material. During subsequent preconstruction engineering and design efforts, concerns about risk to the tunnel structure have been raised. An alternative dredging method identified as a safer and lower risk method of dredging through WID is considered in this SEA. This SEA is limited to the scope of CBBT protective cover removal and subsequent material placement since this represents the only changes in the Norfolk Harbor Navigation Improvements project since the 2018 GRR/EA. This SEA provides compliance with the National Environmental Policy Act of 1969 (NEPA) (42 United States Code [USC] 4331 et seq.), the regulations of the President's Council on Environmental Quality (CEQ) that implement NEPA procedures (40 Code of Federal Regulations [CFR] 1500-1508).

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LIST OF ACRONYMS

APE	Area of Potential Effect
AQCR	Air Quality Control Region
ATG	Automatic Tank Gauging
CAA	Clean Air Act
CBBT	Chesapeake Bay Bridge Tunnel
CCD	Coastal Consistency Determination
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIDMMA	Craney Island Dredged Material Management Area
CIEE	Craney Island Eastward Expansion
CY	Cubic yards
CZMA	Coastal Zone Management Act
DDT	Dichlorodiphenyltrichloroethane
DMMP	Dredged Material Management Plan
EA	Environmental assessment
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ERA	Ecological risk assessment
ERP	Environmental restoration program
FDA	U.S. Food and Drug Administration
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FIRM	Flood insurance rate map
FMP	Fisheries management plan
FONSI	Finding of No Significant Impact
IBI	Index of Biological Integrity
LPC	Limiting Permissible Concentration
MCY	Million cubic yards
MEC/UXO	Munitions of Explosive Concern/Unexploded Ordinance
MLLW	Mean lower low water
MPRSA	Marine Protection, Research and Sanctuaries Act
NAAQS	National Ambient Air Quality Standard
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NODS	Norfolk Ocean Disposal Site
NRCS	Natural Resources Conservation Service
NTU	Nephelometric Turbidity Unit
NWI	National Wetlands Inventory

OCDD	Octachlorodibenzo-p-dioxin
ODMDS	Ocean Dredged Material Disposal Site
PAH	Polycyclic aromatic hydrocarbon
PCB	Polycholorinated byphenyl
PCC	Portland cement concrete
PCT	Polycholorinated terphenyls
PP	Proposed plan
RA	Remedial Action
RAC	Risk Assessment Code
RD/RAWP	Remedial Design/Remedial Action Work Plan
RI	Remedial investigation
RONA	Record of Non-Applicability
SAV	Submerged aquatic vegetation
SEA	Supplemental Environmental Assessment
SIP	State implementation plan
SMMP	Site Management and Monitoring Plan
STFate	Short-Term Fate of Dredged Material Disposal
SVOC	Semi-volatile organic compounds
SWPPP	Storm Water Pollution Prevention Plan
TEQ	Toxicity equivalent
TSC	Thimble Shoal Channel
UFC	Unified Facilities Criteria
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Agency
VDCR	Virginia Department of Conservation and Recreation
VDEQ	Virginia Department of Environmental Quality
VDGIF	Virginia Department of Game and Inland Fisheries
VDHR	Virginia Department of Historic Resources
VIMS	Virginia Institute of Marine Sciences
VMRC	Virginia Marine Resources Commission
VNHR	Virginia Natural Heritage Resources
VOC	Volatile organic compounds
WID	Water Injection Dredging
WRDA	Water Resources Development Act
WQC	Water quality criteria

1. INTRODUCTION

The CBBT PRB project is a component of the Norfolk Harbor Navigation Improvements project which involves removing existing cover material and installing a protective rock blanket over the CBBT within the Thimble Shoal Channel. The Norfolk Harbor Navigation Improvements Project is authorized through Section 201 of the Water Resources Development Act (WRDA) of 1986 (Public Law 99-662) authorizing the depth of the Thimble Shoal Channel, which includes the CBBT cover area, to a required depth of -56 feet. Since its authorization in 1986, the project has been constructed in separable elements based on the needs of the port community and the financial capability of the non-Federal sponsor.

A General Reevaluation Report and Environmental Assessment (GRR/EA) for the Norfolk Harbor Navigation Improvements was finalized in 2018. The 2018 GRR/EA evaluated the comparison of costs, benefits, adverse impacts and feasibility of the alternatives of the improvements of the associated Norfolk Harbor Federal channels, including the general overview of the CBBT PRB element. The 2018 GRR/EA concluded that no significant impacts would occur with conventional dredging methods. Subsequently, a Finding of No Significant Impacts (FONSI) was signed. Both the GRR/EA prepared in 2018 and this SEA were developed in accordance with the NEPA of 1969, CEQ (40 CFR 1500-1508). The purpose of these documents is to inform decision makers and the public of the likely environmental consequences of the Proposed Action and alternatives.

This SEA identifies, documents and evaluates the potential environmental effects due to the following changes since the 2018 GRR/EA. The CBBT Protective Rock Blanket portion of the Norfolk Harbor Navigation Improvements Project will incorporate an alternate dredging method, WID for removal of the existing CBBT cover material. The WID method requires conventional new work dredging of a limited area of the Thimble Shoal Channel east of the CBBT to construct a WID receiving trench to contain the CBBT cover material transported as a bed-load. Additionally, the native sediments located within the WID trench construction area, to be excavated using conventional dredging methods, are proposed for transport for ocean disposal at the DNODS and placement in accordance with an EPA-approved testing plan and the subsequent results that demonstrate that the dredged material meets suitability requirements under the Marine Protection, Research, and Sanctuaries Act (MPRSA), Section 103.

1.1. PROPOSED ACTION OF THE SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

The CBBT PRB project requires the removal of the existing CBBT cover material as the primary phase of construction. The alternatives analysis in Section 3 of this SEA evaluated the different means and methods of the CBBT cover removal. The analysis resulted in the preferred alternative of removing the CBBT cover utilizing the WID method. Required for this dredging method is the construction of an adjacent contiguous receiving trench as a repository for the CBBT cover material sediment; this trench will act as a permanent one-time-use placement site. The proposed adjacent receiving trench will be dredged east of the existing CBBT cover by conventional dredging methods (e.g. hopper and/or clamshell bucket). The alternatives analysis of the WID trench material placement resulted in the suitable new work material being transported and placed at the DNODS.

The CBBT cover area will be dredged to -61 feet mean lower low water (MLLW), removing approximately 43,000 cubic yards (CY) through the WID method, and replaced with a three-feet-deep rock layer from -58 feet to -61 feet MLLW in the next phase of the Protective Rock Blanket Project as discussed in the 2018 GRR/EA. The proposed WID receiving trench will be dredged in a rectangular area contiguous with the CBBT cover area, up to 1,200 feet in length and 525 feet wide, and up to approximately 15 acres in size. The maximum proposed depth of the receiving trench is -70 feet MLLW. Dredging of the WID trench will result in approximately 250,000 CY of dredged material proposed for transport to and placement at the preferred disposal site alternative, DNODS. Utilizing the WID method, the CBBT cover material will be transported downslope by a gravity density gradient to the deeper water in the WID receiving trench, where it will reside below the maximum allowable dredging depth of the Thimble Shoal Channel of -61 feet MLLW.

1.2. BACKGROUND

The Thimble Shoal tunnel is the southernmost tunnel of the CBBT and resides underneath the Thimble Shoal Channel. Throughout this SEA, it will be referred to as the CBBT. This tunnel was constructed in 1960 using an immersed-tube construction method which consists of a cut and cover technique where sections of the tunnel were floated to the site, placed, and joined within a dredged trench. The CBBT is protected with a rock armor layer over portions of the tunnel structure primarily on the side slopes of the channel up to the portal islands. The existing CBBT cover material between the toes of the Thimble Shoal Channel consists of a combination of a medium to course-grained mix of sandy gravel hydraulic backfill that was placed following tunnel construction and natural fine sediments that have deposited since completion of tunnel construction.

The original design of the CBBT accounted for a maintained channel depth of -50 feet MLLW and a width of 1,000 feet and included 3 feet of over-dredge/advance maintenance allowance that would allow 10 feet of cover over the tunnel structure. Based on existing record drawings, the shallowest point of the tunnel structure within the footprint of the Federal project, is the 'top of tunnel' flange/bulkhead elevation, which varies with a shallowest elevation of -63 feet MLLW within the footprint of the channel. The tunnel itself is approximately 1.5 feet below the flange/bulkhead (CBBT, 1960).

The Norfolk Harbor Navigation Improvements Project was authorized under Section 201 of the Water Resources Development Act (WRDA) of 1985 (Public Law 99-662) which authorized deepening from -45 to -55 feet MLLW within most of the project area of the Norfolk Harbor and Channels in Virginia, and to a required depth of -56 feet MLLW in the Thimble Shoal Channel. This law also authorized the installation of the PRB cover over the CBBT to mitigate future reduced cover depth over the structure as a result of the planned channel deepening.

The 2018 General Reevaluation Report and Environmental Assessment for the Norfolk Harbor Navigation Improvements cited studies that determined the most feasible method to allow for a deeper channel over the CBBT (USACE, 1986 and Transystems 2002). Both studies concluded the most feasible alternative to protect the tunnel would be to provide a minimum of 5 feet of protective cover, including a minimum of 3 feet of that protective cover to be rock armor. The installation of the rock cover would then require the removal of the existing CBBT cover material to accommodate the rock armor. Reduction of the CBBT cover material within the Thimble Shoal Channel to 5 feet would accommodate a maintained channel depth of -56 feet MLLW.

1.3. PROJECT LOCATION

1.3.1. CBBT Cover

The CBBT crossing under the Thimble Shoal Channel is located in the southern part of the Chesapeake Bay, north of the shoreline of the City of Virginia Beach. The tunnel cover area proposed for removal is approximately 150 feet wide by 1,200 feet long area (Figure 1.1) in the Thimble Shoal Channel over the existing CBBT.

1.3.2. CBBT WID Trench

The WID trench area is contiguous with the east side of the CBBT cover area. The trench will be rectangular in shape, up to 1,200 feet in length and 525 feet wide (Figure 1.1). The dredging depths of the receiving trench will vary along the down-sloping gravity density gradient to a maximum dredging depth of -70 feet MLLW to accommodate the CBBT cover material.

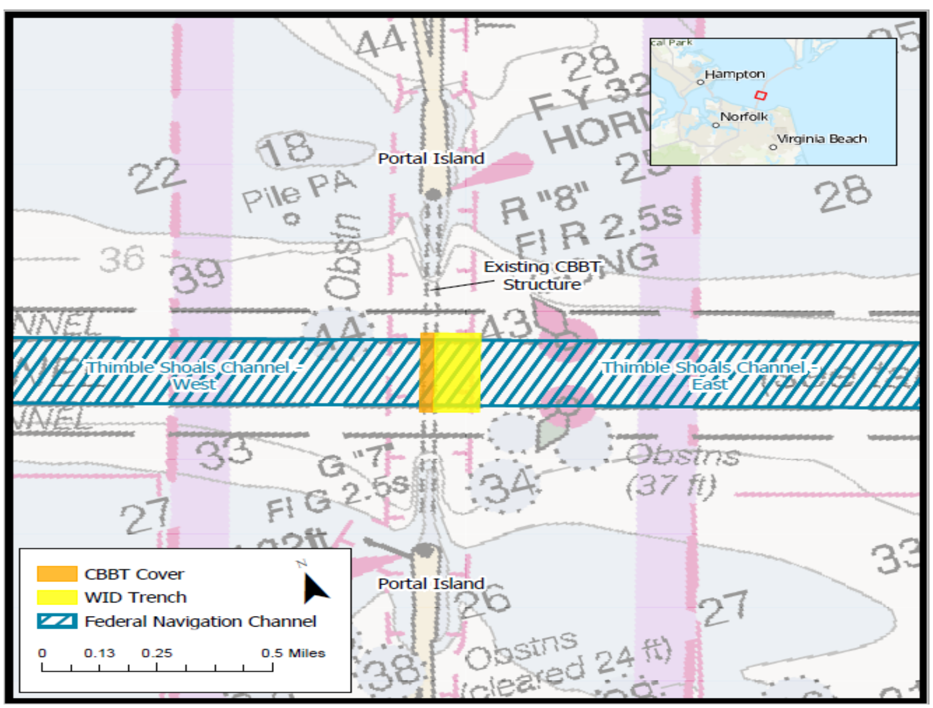

Figure 1.1 Project Location

1.3.3. Dredged Material Placement Sites

Dam Neck Ocean Disposal Site

The DNODS has an area of about 9-square nautical miles that is located off the coast of Virginia Beach, Virginia (Figure 1.2). Approximately 14 nautical miles one way from the proposed project site. The DNODS boundary coordinates are as follows:

36° 51' 24.1" N., 75° 54' 41.4" W.,
36° 51' 24.1" N., 75° 53' 02.9" W.,
36° 46' 27.4" N., 75° 51' 39.2" W.,
36° 46' 27.5" N., 75° 54' 19.0" W.,
36° 50' 05.0" N. 75° 54' 19.0" W.

Craney Island Dredged Material Management Area

The U.S. Army Corps of Engineers, CIDMMA is located in the City of Portsmouth, Virginia (Figure 1.2). The CIDMMA is approximately 16 nautical miles one way from the proposed project location through navigable waters.

Craney Island Eastward Expansion (CIEE) Project Site

The CIEE project site is located in the City of Portsmouth, Virginia. The project site is an expansion of the existing CIDMMA to the east by approximately 522 acres. The CIEE is approximately 16 nautical miles one way from the proposed project location through navigable waters.

Upland Placement at Shirley Plantation (Weanack)

The Shirley Plantation dredged material placement site is located in Charles City County, Virginia (Figure 1.2). It is approximately 74 nautical miles one way from the proposed project location through navigable waters.

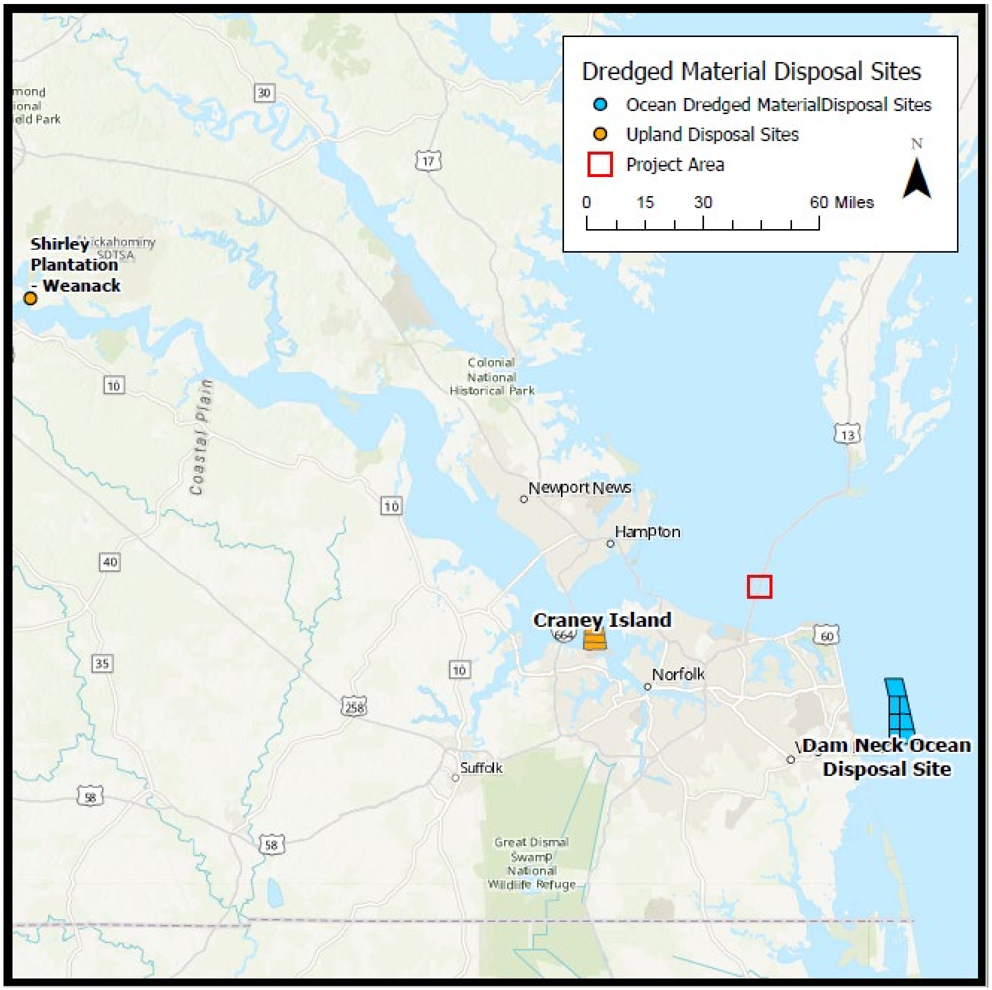

Figure 1.2 Dredged Material Placement Sites

Upland Solid Waste Disposal Sites

Three permitted landfills or treatment facilities are located within the region that may be considered for placement of dredged material considered unsuitable for ocean placement. These landfills are Big Bethel, Charles City, and Clearfield MMG, Inc. Big Bethel and Charles City landfills are located in the City of Hampton and Charles City County respectively. Clearfield MMG treatment facilities are located in the City of Chesapeake and the City of Suffolk (Figure 1.3). The dredged material would require scow transport to an offloading facility and subsequently truck-hauled to an Upland Solid Waste Disposal Site.

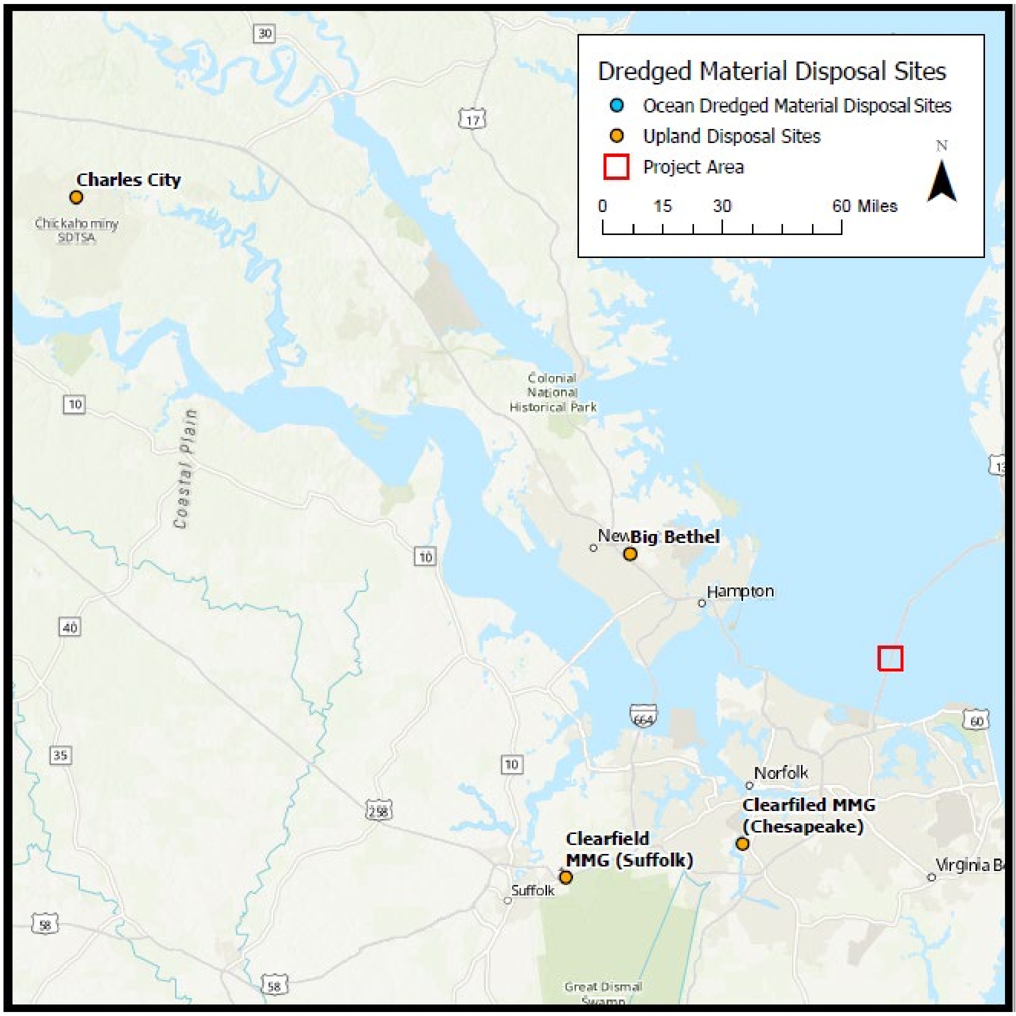

Figure 1.3 Upland Disposal Sites

<u>CBBT WID Trench</u>

The WID trench is proposed to be constructed directly adjacent on the eastern side of the CBBT cover material footprint. The trench will be rectangular in shape, up to 1,200 feet long and 525 feet wide. The adjacent trench will be a proposed placement site alternative for the permanent placement of the CBBT cover material (Figure 1.1).

1.4. PURPOSE AND NEED

The existing Norfolk Harbor Navigation Improvements Project approved in 2018 consists of a network of federal navigation channels extending from the Atlantic Ocean, through the Chesapeake Bay, and into the Port of Hampton Roads. The project authorizes the navigation improvements including deepening of the Norfolk Harbor Channels, construction of a meeting area east of the CBBT, expansion of Anchorage F, as well as the installation of the PRB over the CBBT. The purpose of the PRB is to mitigate the reduced cover depth over the tunnel from the Thimble Shoal Channel deepening by providing an armored layer over the tunnel within the channel as protection from vessel strikes or vessel anchor drags that may occur. The footprint of the CBBT cover area that needs to be removed prior to the installation of the rock armor is in immediate proximity to the tunnel structure, within just a couple feet, which causes concerns with the methods of removal. These shallow features of the tunnel structure are located at -63 feet MLLW within the channel, thus requiring analysis of different dredging methods to minimize risk to the existing CBBT infrastructure and applying the Federal Standard which requires the selection of the least cost environmentally acceptable alternative.

Traditional dredging methods (e.g. clamshell or hopper) over and around the existing tunnel structure pose a risk of damage to the tunnel. The purpose of the WID method is to minimize risk to the structure by injecting water into the in-situ sediment which will displace the sediments and transport the material as a bed-load along a constructed gravity density gradient from the cover area footprint toward a receiving trench. The equipment used in the WID method of dredging is positioned approximately one to two feet above the sediment surface while in operation, minimizing the potential for physical contact with the tunnel structure and providing a lower risk method of removing the cover material (Welp, et al., 2017). Eliminating the use of heavy equipment by traditional dredging methods in close proximity to the tunnel structure reduces the risk of damage to the existing tunnel structure.

The purpose of the adjacent trench is to provide a receiving basin for the WID material outside of the protective cover area footprint. The trench will be constructed such that once the WID material is settled, the sediment surface elevation of the placed cover material will remain below maximum authorized dredging depths of -61 feet MLLW[1] in the Thimble Shoal Channel. The proposed receiving trench dimensions have been specifically designed

[1] -61 feet MLLW depth includes a required depth of -56 feet MLLW plus -1 feet paid allowable overdepth dredging, -1 feet non-paid overdepth and an additional -3 feet of in-situ material characterized (in the event of inadvertent/localized dredging beyond the contract non-paid overdepth constraint) for ocean disposal. There are inherent excavation inaccuracies in the dredging process. To compensate for this, dredging contracts incorporate a paid allowable overdepth, meaning material removed from this specified overdepth is paid for under the terms of the dredging contract. Material removed beyond the limits of allowable overdepth is non-paid.

to establish the downward gradient between the CBBT cover area and the WID trench to allow for displacement and proper containment of the cover material. The capacity of the receiving trench needs to be one and a half to two times greater than the in-situ dredge material volume to contain it below the maintenance dredging prism within the Thimble Shoal Channel.

1.5. SCOPE OF THE SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

Under the requirements of Section 102 of the NEPA, this proposed project constitutes a major Federal action, and a SEA is therefore required in addition to the 2018 GRR/EA. This SEA has been prepared pursuant to NEPA and its implementing regulations.

The CBBT PRB project is one of the elements of the Norfolk Harbor Navigation Improvements Project and is the responsibility of the Virginia Port Authority (VPA) (e.g. local sponsor) under the Lands, Easements, Right-of-Ways, Relocations provision in the project's Memorandum of Understanding between the Department of the Army and the Commonwealth of Virginia through its statutory agent, the VPA, signed into effect on 12 July 2018. Although the 2018 GRR/EA and the associated FONSI include the PRB, details of the means and methods to accomplish the work have been further developed with a focus on minimizing risks to the CBBT structure which includes a method of dredging not specifically addressed in the noted reports. The purpose of this SEA is to evaluate the potential impacts associated with the alternative dredging methods of the CBBT cover removal including WID and subsequent placement in the WID trench, the associated new work dredging of the adjacent WID trench, and the associated placement options for the new work material from the WID trench. The 2018 GRR/EA analyzed the effects of the conventional dredging methods for the deepening of the Thimble Shoal Channel, which encompasses the WID trench footprint. This SEA will evaluate the localized deepening of that area of the channel for the WID trench that is needed to support the WID of the cover material.

The Proposed Action would be accomplished by implementing the Preferred Alternative discussed in Section 3.0. Section 3.0 of this SEA also describes the alternatives that were considered and not selected for further consideration. Section 4.0 describes the existing conditions that fall within the scope of this SEA and the environmental consequences envisioned as a result of implementing the Proposed Action.

This SEA focuses on impacts likely to occur from the conventional methods of dredging the CBBT cover material as well as the WID method. The WID method includes the new work dredging of the adjacent trench as well as transport and placement of new work dredging at DNODS. The document analyzes the effects of the Proposed Action and alternatives.

1.6. PUBLIC AND AGENCY INVOLVEMENT

The SEA was coordinated with the following:

- City of Norfolk
- City of Virginia Beach
- Delaware Nation
- Delaware Tribe
- U.S. Army Corps of Engineers (USACE)
- U.S. Coast Guard (USCG)
- U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)
- U.S. Environmental Protection Agency (EPA)
- U.S. Fish and Wildlife Agency (USFWS)
- Nansemond Tribe
- National Oceanic and Atmospheric Administration (NOAA)
- NOAA - National Marine Fisheries Service (NMFS)
- Pamunkey Indian Tribe
- Virginia Department of Conservation and Recreation (VDCR)
- Virginia Department of Environmental Quality (VDEQ)
- Virginia Department of Game and Inland Fisheries (VDGIF)
- Virginia Department of Historic Resources (VDHR)
- Virginia Institute of Marine Science (VIMS)
- Virginia Marine Resources Commission (VMRC)
- Virginia Port Authority (VPA)

Notifications will be provided to interested parties. There will also be a link to view the NEPA documents on the Norfolk District USACE (http://www.nao.usace.army.mil/) website.

2. DESCRIPTION OF PROPOSED PROJECT SCOPE AND ALTERNATIVES

The proposed scope is to dredge and dredged material placement of approximately 43,000 CY of the CBBT cover material by means and methods that represent the Federal Standard[2] of the least cost environmentally acceptable alternative. There are multiple means and methods considered as alternatives for this project to remove the CBBT cover material. This section describes the different means and methods of the CBBT cover material removal as well as the placement options of the dredged material.

In support of the Norfolk Harbor Navigation Improvements Project, and the deepening of the Thimble Shoal Channel, it is necessary to evaluate the alternatives to determine the most practical method that mitigates risks to dredge the CBBT cover material. The shallow features of the CBBT tunnel require analysis of different dredging methods to ensure the action meets the Federal Standard of least cost environmentally acceptable.

2.1. PROPOSED PROJECT SCOPE – CBBT COVER MATERIAL REMOVAL METHODS

The proposed scope considered in this SEA is to dredge approximately 43,000 CY of the CBBT cover material through conventional dredging methods (i.e. hopper or clamshell bucket) that were assessed during the 2018 GRR/EA or through water injection dredging. The CBBT cover area proposed for removal consists of 150 feet wide by 1,200 feet long area to a depth of -61 feet MLLW.

2.1.1. Conventional Dredging Methods

Conventional methods of dredging the CBBT cover material include mechanical (clamshell bucket) or hydraulic (hopper and/or cutterhead style) dredging. The conventional methods of dredging the CBBT cover material were discussed and analyzed in the 2018 GRR/EA. Mechanical dredges remove bottom sediment through the direct application of mechanical force to dislodge and excavate the material. The dredged material is then lifted mechanically to the surface at near-*in situ* densities (Averett et al. in

[2] The Federal Standard is defined in USACE regulations as the least costly dredged material disposal or placement alternative (or alternatives) identified by USACE that is consistent with sound engineering practices and meets all federal environmental requirements, including those established under the Clean Water Act (CWA) and the Marine Protection, Research, and Sanctuaries Act (MPRSA) (see 33 CFR 335.7, 53 FR 14902).

prep. in USEPA 1994). The material is then placed in a scow and transported to the dredged material placement location.

Hydraulic dredges that are most common are the hopper and cutterhead pipeline dredges. These hydraulic dredging methods use two different dredge cutting techniques. A drag-head is used for hopper dredging and cutterhead machinery is used for cutterhead dredging; each becomes embedded into the bottom sediment to remove the material. The material for each is driven up the suction tube in a slurry to be transported to a discharge area by different means.

The means of dredged material disposal from a hopper dredge include transporting the slurry dredged material by the hopper onboard the vessel to the placement area. Placement of dredged material occurs through bottom-dumping for overboard placement, or through a hydraulic pipeline pump-out operation to offload the material at a location with adequate depth and proximate to the placement area. The cutterhead dredge hydraulic pipeline is a direct pipeline fixed on the dredge from the dredging project area to the placement site. The cutterhead operation plant typically has a low freeboard and the hydraulic pipeline attached that is not safe for the high wave action project area. Due to the pipeline and low freeboard of the cutterhead style of hydraulic dredging, and the project location and associated environment and sea-state, it will not be considered viable for this project.

2.1.2. Water Injection Dredging Method

WID is a viable proposed method that may be used for the removal of the CBBT cover material. This method operates by using a dredge vessel that pumps water into channel bottom sediments at low pressure and relatively high-volume flow rates as the vessel traverses over the project footprint. The water is pumped from directly under the barge to a header that supplies water to the two pipes running alongside each side of the barge to the jet bar (manifold). The jet bar is a cylindrical hollow metal bar with holes (jets) that provide passageways for the pressurized water. The jet bar is positioned one to two feet above the sediment surface as the jets fluidize the material while the barge traverses over the dredging area (Figure 2.1) (Welp et al., 2017).

This action of water injection dilutes and fluidizes the sediments, creating a near-bottom layer (density current) with higher density than the surrounding condition; recent studies found this density current generally remain within the bottom three to five feet of the water column. A receiving trench will be required adjacent to the CBBT cover area in adequate dimensions to create the downgradient to aid in the material displacement, as well as to receive the fluidized material as it is transported downslope by gravity to deeper water (Welp et al., 2017).

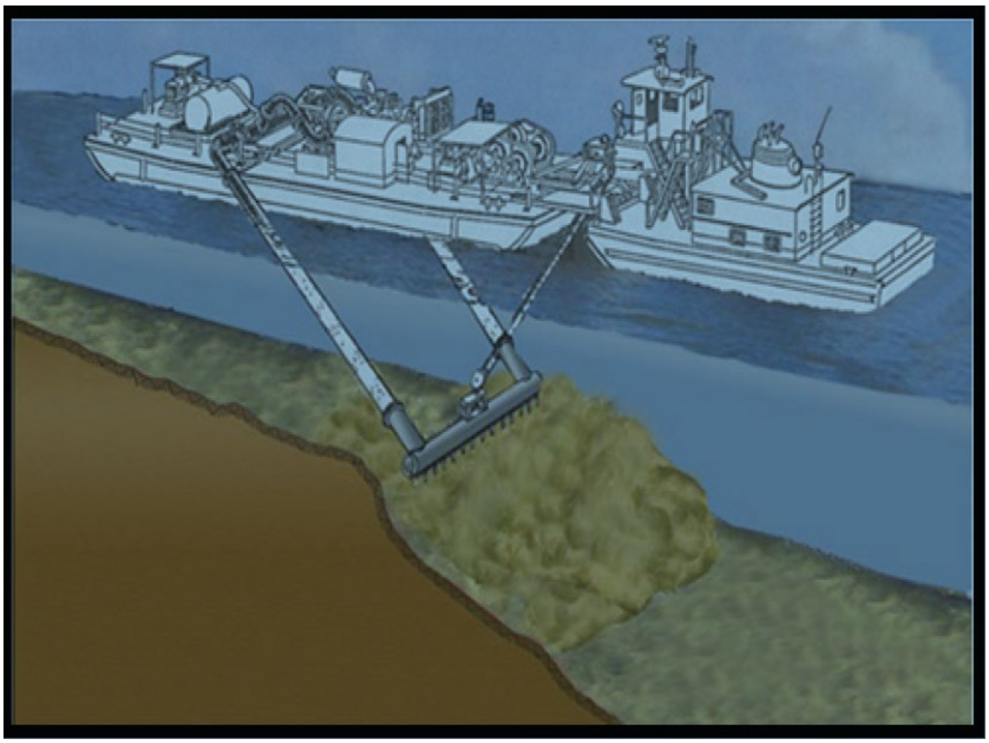

Figure 2.1 WID Plant Example (Welp et al., 2017)

2.1.2.1. WID Trench Dredging

The construction of a WID trench will be required to support the implementation of the WID alternative in Section 3.0 of this SEA. The Proposed Action of the WID method will require the downgradient created by the constructed slope into the WID trench to aid in the displacement of the fluidized CBBT cover material. The receiving trench area would be contiguous to the CBBT cover area located to the east of the tunnel to avoid conflicts with the CBBT Thimble Shoal Parallel Tunnel construction that is underway to the west of the CBBT. The trench will be rectangular in shape, up to 1,200 feet long and 525 feet wide or approximately 15 acres in size. The depths of the receiving trench may reach a maximum depth of -70 feet MLLW to provide the downgradient to efficiently displace the CBBT cover dredged material into the WID trench and to ensure that the cover material will remain below the maintenance dredging prism of the Thimble Shoal Channel. The proposed WID trench will be constructed through conventional dredging methods prior to the dredging of the CBBT cover area.

2.1.2.1.1. WID Trench Dredging Methods

Mechanical Dredging with Barge and/or Scow Placement

Mechanical dredging is a viable dredging method that may be used for the CBBT WID trench construction. This method may result in sediment resuspension in the water column from the stripping of sediments from the bucket as it is cycled from the bottom to the water surface. Resuspension of the material into the water column may occur as the bucket impacts the bottom, closes, and is pulled off the bottom into the water column. Generally, resuspension of the sediment is higher using mechanical clamshell dredges than hydraulic dredges but can be minimized by using an enclosed bucket that has a cover and sealed edges that encapsulate the material which better contains the material and reduces sedimentation resuspension rates. Mechanical dredges can be used in smaller footprint projects by being relatively stationary and having the ability to excavate sediment from a targeted footprint. If mechanical dredging is employed, the dredged material will be removed from the WID trench and placed into a scow/barge and taken to the preferred and authorized dredged material placement location (USACE, 2015).

Hydraulic Dredging with Hopper Barge

Hydraulic dredging with a hopper barge is a viable dredging method to perform the new work dredging of the CBBT WID trench. Hopper dredges hydraulically remove sediment from the seafloor through the use of trailing suction drag-heads. Sediment is sucked upward through a draghead into pipe (e.g. dragarm) by means of centrifugal pumps, and the slurry is transferred to the hopper bin that is internal to the vessel. Hopper dredging is a viable dredging method for the WID trench area in a scenario where the WID trench footprint may be coupled with another construction element of the Norfolk Harbor Navigation Improvements Project (i.e. Thimble Shoal Channel - East/ Meeting Area – 2). If a hopper dredge is employed to perform the work, the vessel will transport and dispose of the dredged material at the preferred alternative dredge material placement site through hydraulic offloading at a beneficial use site or release of the material through a split-hull system or hydraulic bottom doors that release the dredged material at an overboard placement area (USACE, 2015).

2.2. PROPOSED PROJECT SCOPE – DREDGED MATERIAL PLACEMENT SITES

The following dredged material placement sites are alternatives that will be considered in this SEA. This includes the dredged material placement from the CBBT cover area and the alternative WID trench dredged material placement sites. Approximately 43,000 CY of the CBBT cover material and approximately 250,000 CY of sediment from the dredging activities associated with the WID trench is proposed for the following placement alternatives.

2.2.1. Dam Neck Ocean Disposal Site

The Proposed Action considered in this SEA includes the placement of suitable dredged material from the proposed WID trench at the DNODS. Water depth within the disposal site averages about 40 feet. This bathymetry is typical of the inner continental shelf, with a smooth bottom and a gradual seaward slope (less than 1 foot per 1,000 feet). The dredged material would be transported by scow/barge or in a hopper vessel for the purpose of ocean placement at the DNODS. The material within the dredged material footprint has been tested in accordance with the MPRSA, and The Norfolk District has informally determined that the dredged material complies with the MPRSA criteria for ocean placement. The Norfolk District and Virginia Port Authority will be performing a follow-up MPRSA testing program with EPA approval to further document the dredged material suitability and to obtain EPA concurrence for placement of the WID trench dredged material at DNODS. The appropriate number of trips to the DNODS depends on the capacity of the scow/hopper bin and may range from 60 to 85 round trips.

2.2.1.1. DNODS History

The DNODS was designated by EPA pursuant to Section 102(c) of the MPRSA of 1972 as suitable for ocean disposal of dredged material from three federal navigation channels: the Atlantic Ocean Channel, the Cape Henry Channel, and the Thimble Shoal Channel. The final rule was promulgated by EPA on March 31, 1988 (FR. Vol. 53 No. 62), effective March 31, 1988.

The DNODS has been in use since 1967 when the Corps initially deepened Thimble Shoal Channel to 45 feet. Since that time, all new work and maintenance dredged material from Cape Henry Channel and Thimble Shoal Channel, have been deposited at the DNODS. These deposits included a variety of naturally occurring marine sediments, ranging from silts and clays to fine, medium, and coarse sands (Table 2.1). Disposal of dredged material at the DNODS has occurred using either a hopper dredge or bottom dump scow. However, this does not preclude the use of other disposal methods.

Table 2.1 DNODS Disposal History

Date	Channel	Quantity (CY)
2009	Cape Henry Channel - maintenance	93,345
2009	Thimble Shoal Channel -maintenance	200,471
2010	Thimble Shoal Channel -maintenance	44,552
2011	Thimble Shoal Channel -maintenance	368,460
2011	Cape Henry Channel - maintenance	725,043
2012	Cape Henry Channel - maintenance	857,561
2012	Thimble Shoal Channel -maintenance	21,712
2013	Thimble Shoal Channel -maintenance	21,713
2014	Thimble Shoal Channel -maintenance	863,933
2014	Cape Henry Channel - maintenance	1,686,859
2015	Cape Henry Channel - maintenance	357,372
2017	Thimble Shoal Channel -maintenance	1,098,514

2019	Thimble Shoal Channel -maintenance	1,306,064

2.2.1.2. DNODS Management

Current use of the DNODS is for maintenance and new work dredging of the Atlantic Ocean Channel, the Cape Henry Channel, and the Thimble Shoal Channel. Maintenance dredging of these channels involves removal and placement of approximately 1.2 million cubic yards (MCY) of dredged material in the site every two years (on average). Improvements of federal navigation channels (i.e. deepening and/or widening projects) may result in approximately 5 MCY per year during construction. The DNODS is estimated to have a remaining capacity of approximately 60 MCY. Future evaluation and management could increase this quantity.

The management objective for the DNODS area is to limit disposal quantities as to not produce unacceptable adverse effects to human health and welfare and the marine environment or human uses of the environment (as defined in EPA's Ocean Dumping Regulations and Criteria). Management of the DNODS and dredged material placement operations at DNODS are conducted in accordance with the Site Management and Monitoring Plan (SMMP). The SMMP for the DNODS site established specific requirements for the use of the site (USEPA, 2019). The SMMP provides that only dredged material that has been evaluated in accordance with the MPRSA Section 103 regulations may be placed at the site. Acceptable material includes unconsolidated fine to medium grain sands, silts, and clays. The SMMP does not specify specific methods of placement but does require an ocean disposal verification plan, such as the USACE Dredge Quality Management system. This plan must be implemented by all dredged material placement operations at the designated site to prevent mounding of dredged materials from becoming unacceptable navigation hazards. No seasonal restrictions to the placement of dredged material have been implemented for the site. The management plan requires that each ocean disposal event must be verified and documented through a computer database system. Scow or hopper dredge transits and actual placement activities at the DNODS are currently required to be tracked using the USACE Dredge Quality

Management program (DQM) (formerly “Silent Inspector”) for tracking vessel transit locations and dredged material placement locations and activities.

In order to manage site use (maximize site capacity, reduce multiple user conflicts, facilitate monitoring and management, and reduce potential adverse impacts to the marine environment) the USACE, in consultation with EPA, has designated seven (7) sediment management zones (or cells) within the ocean dredged material disposal site (ODMDS) for dredged material placement (Figure 2.2). Cells 1, 3, and 4 will generally be used to place sand from channel construction, if not used on beaches or elsewhere, and Cells 2, 5, 6, and 7 will generally be used for maintenance materials and material from channel construction which is predominantly clay and silt. Cells will be managed to maximize available capacity for specific sediment physical characteristics as assigned. These cells may be evaluated as needed to address future site capacity and needs.

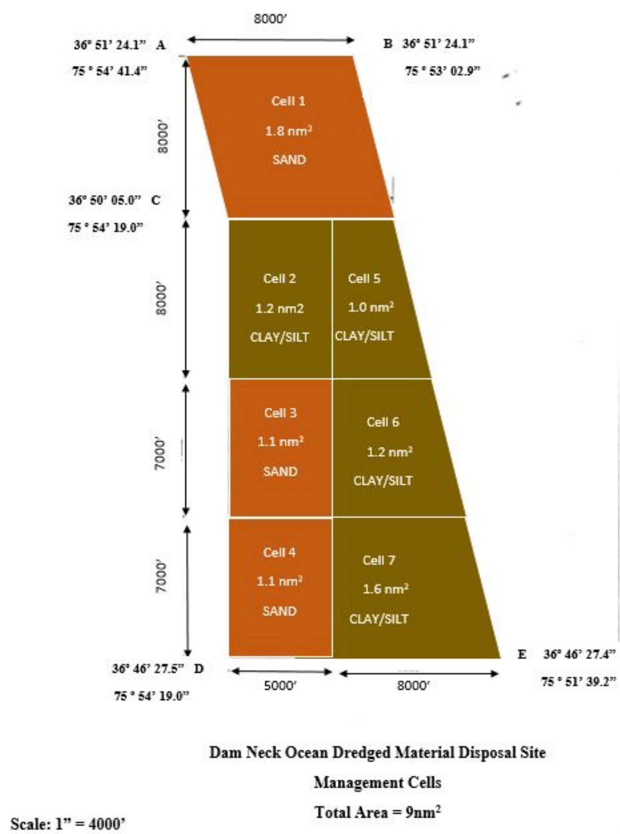

Figure 2.2 Dam Neck ODMDS Sediment Management Cells

2.2.2. Craney Island Dredged Material Management Area

The U.S. Army Corps of Engineers, CIDMMA is located in the City of Portsmouth, Virginia, is considered a beneficial use alternative for dredged material placement. The CIDMMA is a Congressionally authorized dredged material placement site that is approximately two miles square with existing ground elevations within the cells ranging from approximately +32 to +40 feet MLLW. CIDMMA is restricted to placement of material from dredging to support navigation in Norfolk Harbor and adjacent waters [(USACE)-Norfolk District Policy Memorandum WRD-01]. CIDMMA receives dredged material, which is pumped hydraulically into the cells, typically over the east dike. Existing perimeter dikes range in elevation from +35 to +45 feet MLLW (2018 GRR/EA).

The existing Dredged Material Management Plan (DMMP) is based on the current configuration of CIDMMA, which is divided into three cells: South Cell (734 acres for storage), Center Cell (766 acres for storage) and North Cell (689 acres for storage). Currently, Norfolk District rotates each of the three cells annually to allow two years of drying before dredged material is again pumped into the cell. Annual dredged material inflows typically very between 3 MCY and 5 MCY, and daily inflow rate are limited to 22,500 CY per day for each active containment cell per the Commander's Policy WRD-01.

To determine dredged material suitability for placement/disposal in Waters of the U.S. under Clean Water Act Section 404, dredged material is tested for contaminants in accordance with the Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S.- Testing Manual, Inland Testing Manual (USEPA 1998), USACE Manual, Evaluation of Dredged Material Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities – Testing Manual (2003); and the USACE (2013) Commander's Policy Memorandum WRD-01 Deposition of Dredged Material and Use of the CIDMMA, Norfolk Harbor, Virginia. The WID Trench dredged material physical characteristics are suitable for beneficial use at the CIDMMA as dike construction materials and may be considered as a viable alternative.

2.2.3. Upland Placement at Shirley Plantation (Weanack)

Placement of dredged material from the proposed project elements of the CBBT PRB project at Shirley Plantation/Weanack is considered a dredged material placement alternative. The dredged material must meet the Proposed Virginia Exclusionary Criteria requirements for upland placement at Shirley Plantation (Weanack). Results of preliminary bulk sediment testing for the WID trench indicate that the none of the tested constituents exceed the Virginia Exclusion Criteria. Lime amendments may be required to meet site objectives prior to upland disposal at the facility. Placement at this site would include scow placement of material, transportation of the scow 74 nautical miles one way to the facility, then followed by mechanical offloading (double handling) of material to maintain dredge production efficiencies.

2.2.4. Upland Solid Waste Disposal Site

Several permitted landfills or treatment facilities are located within the region that may be considered for placement of dredged material that is deemed unsuitable for ocean placement or other beneficial uses. These landfills are Tri-Cities, Big Bethel, Charles City, and Clearfield MMG, Inc. Tri-Cities, Big Bethel and Charles City landfills are located in the City of Petersburg, City of Hampton and Charles City County respectively. Clearfield MMG treatment facilities are located in the City of Chesapeake and the City of Suffolk. The regional landfill and treatment facilities do not have direct access to navigable waterways and would require off-loading of the dredged material at a transfer facility and subsequent truck haul operations to transport materials to a designated facility.

The upland disposal characterization of the WID sediments as solid wastes indicates that none of the constituents exceeded the Toxicity Characteristic Leaching Procedure (TCLP) criteria; the material is not ignitable, reactive, or corrosive; the material passes paint filter test (contains no free liquid); and the polychlorinated biphenyl (PCB) Aroclors, Total Petroleum Hydrocarbons (TPH), benzene, toluene, ethylbenzene, and xylene (BTEX) compounds, and extractable organic halides (EOX) were not detected (EA 2021). Landfills are engineered cells designed to contain municipal solid wastes and collect liquid or leachate that may have percolated through solid waste. Most solid waste facilities require a moisture content no greater than 15%. Therefore, if solid waste facilities are selected for disposal of the dredged material, it may likely require the addition of amendments such as lime or Portland cement to reduce pore water concentrations in saturated sediments.

2.2.5. WID Trench

The WID trench may be considered as a permanent placement site for the CBBT cover dredged material to support the implementation of the WID alternative in Section 3.0 of this SEA. The adjacent WID trench will be rectangular in shape, up to 1,200 feet long and 525 feet wide. The depths of the receiving trench will reach -70 feet MLLW to accommodate the downward gradient for the displacement of the fluidized dredged cover material. The proposed depths of -70 feet MLLW for the WID trench area will create sufficient capacity so that the cover material will remain below the maximum authorized dredging depth of -61 feet MLLW in the Thimble Shoal Channel. The proposed WID trench will be constructed prior to the dredging of the cover area through conventional dredging means and methods.

2.2.6. Beneficial Use

It is possible that portions of the dredged material may be suitable for beneficial use projects. The Craney Island Eastward Expansion (CIEE) project and the Craney Island Dredged Material Management Area (CIDMMA) as well as beach nourishment projects in the City of Virginia Beach and the City of Norfolk will be considered for beneficial use of dredged material as an alternative of the dredged material placement. The CIEE project is a 522-acre open water site on the eastern side of CIDMMA that will provide additional capacity for dredged material as well as a suitable foundation for the construction of a container handling terminal. The dredged material discussed in this SEA could be used for the dike construction for the CIDMMA and CIEE project or used for beach nourishment projects placed landward of the depth of closure if the local sponsor is willing and able to pay the additional incremental costs for that placement over and beyond the costs of the Federal Standard.

Beach nourishment is a possible alternative for the dredged material placement based on physical characteristics of the sediments. Materials in some areas of the WID trench may be similar in geological make-up to the existing sediments of the native beach materials. Nourishment materials should have a low percentage of fine-grained sediments. The goal for typical local beach nourishment (Cities of Norfolk and Virginia Beach) material is a D50 grain size of greater than 0.2mm. Sandy dredged material may also be placed within the beach system landward of the depth of closure to add to the sediment budget within the littoral system of the Chesapeake Bay.

Beneficial use of suitable material will continue to be considered throughout the planning and construction phases if any local sponsors are able to partner to accept the material and cover any incremental costs over and beyond the costs of the federal standard. Beneficial use sites are subject to Section 207 of WRDA 1996, as amended whereby reuse represent a least costs disposal method and are reasonable in relation to the environmental benefits achieved. Any beneficial use not identified in the future as part of the base plan would need to be cost shared under a separate authority.

2.3. IMPACT TOPICS ELIMINATED FROM FURTHER ANALYSIS AND CONSIDERATION

Since the CBBT WID method of the cover material and the construction of the WID trench will not change the area of impact from the 2018 GRR/EA evaluation of the CBBT PRB, the Thimble Shoal Channel deepening, or construction of Meeting Area 2, the following environmental components relating to this SEA have been adequately assessed and considered by the 2018 GRR/EA (Appendix A) and are hereby incorporated by reference.

2.3.1. Hazardous, Toxic and Radioactive Waste

2.3.2. Upland Vegetation

2.3.3. Wetlands

2.3.4. Terrestrial Wildlife

2.3.5. Floodplain

2.3.6. Wetlands

2.3.7. Climate Change

2.3.8. Aesthetics

2.3.9. Recreation

2.3.10. Socioeconomics

2.3.11. Land Use and Induced Development

2.4. ADDITIONAL IMPACT TOPICS ELIMINATED FROM FURTHER ANALYSIS AND CONSIDERATION

2.4.1. Submerged Aquatic Vegetation

Virginia Institute of Marine Science (VIMS) has not identified any SAV in or adjacent to the project area (Figure 2.3); therefore, this impact topic was dismissed from further analysis in this SEA.

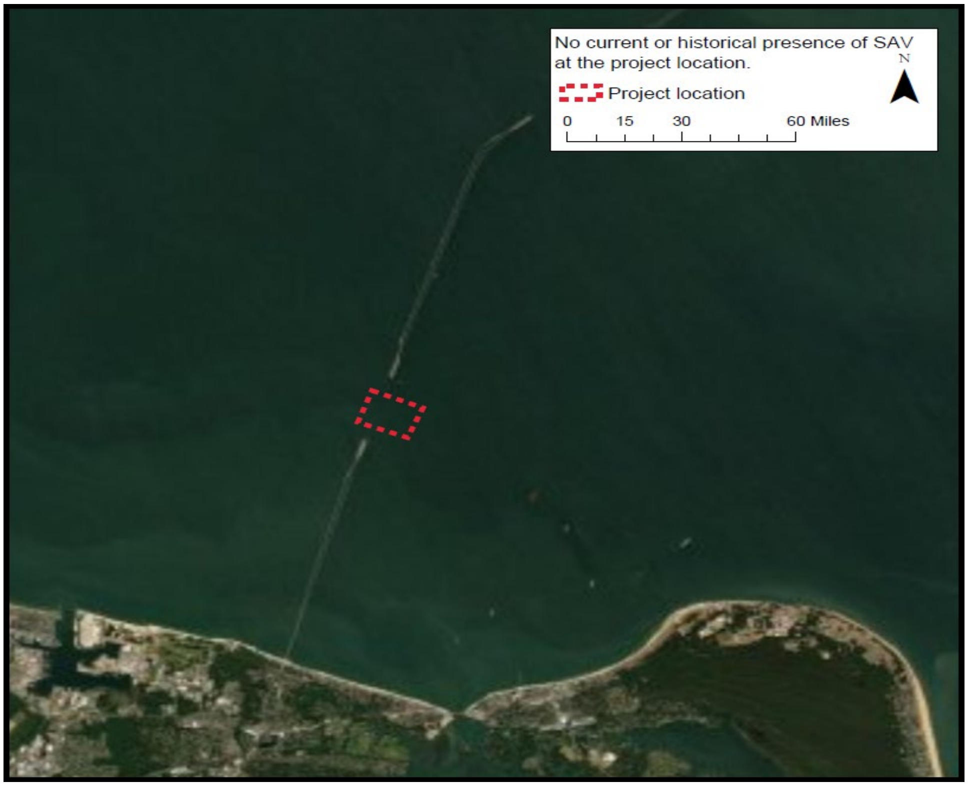

Figure 2.3 SAV Presence in the Project Area

2.4.2. Occupational Health and Safety

Occupational Health and Safety impacts were assessed in the 2018 GRR/EA with no changes anticipated with the activities described in this SEA.

2.4.2.1. Munitions of Explosive Concern/Unexploded Ordnance Safety (MEX/UXO)

MEX/UXO impacts were assessed in the 2018 GRR/EA with no changes anticipated with the activities described in this SEA.

2.4.3. Utilities

Utilities for the proposed project area were evaluated in the 2018 GRR/EA for the navigation channels and dredged material placement sites. The CBBT is the only utility in this project's scope. The WID method will pose a lower risk to damage of the utility through WID methods verses conventional methods with heavy equipment.

2.4.4. Cultural Resources

The 2018 GRR/EA evaluated the impacts to historical resources in the Area of Potential Effect (APE) with the conclusion that no submerged archaeological resources have been recorded within the surveyed parts of the APE for dredging. However, archaeological sites may exist within unsurveyed parts of the APE. A Programmatic Agreement with the State Historic Preservation Office was concluded during the 2018 GRR/EA that set forth procedures for mitigating adverse effects to historic properties if any are identified. After the 2018 GRR/EA was concluded, the Virginia Port Authority contracted Tidewater Atlantic Research (TAR) in April 2020 to survey the remaining areas that were not surveyed prior to 2018, and Panamerican Consultants to perform underwater investigations of the potential resources that were found by the TAR surveys. The conclusion of the surveys indicates that there are no resources within the APE for the Proposed Actions within this SEA, therefore no impacts to cultural resources are expected with this undertaking and no formal Section 106 consultation is required. The impact topic was dismissed from further analysis.

The Virginia Department of Historic Resources' statewide electronic cultural resources GIS and database (VCRIS) report for the project location identified the Pamunkey Indian Tribe, Delaware Nation, Nansemond Tribe, and the Delaware Tribe of Virginia Beach City and Northampton County as having potential interest in the area of potential effects. A review of VCRIS indicates that no Native American (prehistoric) archeological sites and/or Native American burial sites were identified within the project area. The project is not located on or near Tribal lands, and there are no known tribal treaty rights or protected tribal resources in or near the project area. The proposed activities do not have the potential to significantly (i.e., materially) affect protected tribal resources, tribal rights (including treaty rights) or tribal lands. The Corps initiated consultation with the Tribes of interest on November 24, 2020 with a letter of notification requesting consultation. There have been no positive responses of consultation to date (Appendix B).

3. ALTERNATIVES TO THE PROPOSED PROJECT SCOPE

Under NEPA, a supplemental environmental assessment must evaluate reasonable alternatives for a project. There are three project actions within the scope of removing the CBBT cover material that required an alternatives analysis for each; the method of dredging and the dredged material placement from the WID trench and the permanent placement of dredged material from the CBBT cover area.

3.1. ALTERNATIVES TO THE CBBT COVER MATERIAL DREDGING METHODS

Three (3) alternatives have been identified for the action of dredging the CBBT cover material:

- No Action Alternative
- Water Injection Dredging Method
- Conventional Dredging Methods

The WID method to remove the CBBT cover material was carried forward as part of the Proposed Action. This plan has been determined as to be the best and most appropriate action to meet the Federal Standard and allow for the most efficient method of dredging the CBBT cover material while reducing risk to existing infrastructure in preparation for the PRB installation.

3.1.1. No Action Alternative

NEPA regulations refer to the No-Action Alternative as the continuation of existing conditions of the affected environment without implementation of, or in the absence of, the Proposed Action. Inclusion of the No-Action Alternative is prescribed by the CEQ regulations as the benchmark against with Federal actions are evaluated. Under this alternative, the CBBT cover material dredging would not be performed. This alternative would eliminate the first element of the PRB project, therefore preventing the completion of the project. This would result in leaving the CBBT unprotected against vessel strikes or vessel anchor drags that may occur in the channel. The planned deepening of the Thimble

Shoal Channel will deepen the channel to a maximum depth of -58 feet MLLW[3] over the CBBT. Meanwhile, the CBBT structure within the channel has features that are as shallow as -63 feet MLLW. These shallow features of the tunnel would be more susceptible to damage of the tunnel structure as well as damage to the vessels navigating through the Thimble Shoal Channel.

3.1.2. Water Injection Dredging Method (Preferred Alternative)

The WID method is the preferred dredging method for the CBBT cover area. The means and methods of the WID operation provide a safe and effective dredging method that poses the lowest risk of impacts to the CBBT tunnel structure when compared to the other alternatives in Section 3.1.3 of this SEA. The WID barge is positioned over the dredging footprint as the water pump located amidship is engaged, pumping water in through the manifold which is lowered to a depth approximately one to two feet above the surface of the sediment (Welp et al., 2017). No contact will be made with the sediment surface and therefore minimizes the risks of damage to the tunnel structure with this method of dredging. This method has been determined to be the best and most appropriate action to meet the technical requirements while reducing risk to critical infrastructure while allowing for the efficient completion of the removal of the CBBT cover material.

3.1.2.1. WID Trench Dredging

The WID trench is integral to the preferred alternative of the WID of the CBBT cover area. To create a gravity density gradient for the fluidized cover material to be conveyed down-gradient and out of the navigation prism, a contiguous adjacent trench on the east side of the CBBT cover area will be dredged as a placement site for the WID cover material. The receiving trench will reach maximum dimensions of -70 feet MLLW deep to accommodate the downward gradient to move the fluidized CBBT cover material, and 1,200 feet long and 525 feet wide to accommodate the CBBT cover

[3] -58 feet MLLW depth includes a required depth of -56 feet plus 1-foot paid allowable overdepth dredging, and 1-foot non-paid overdepth dredging. There are inherent excavation inaccuracies in the dredging process. To compensate for this, dredging contracts incorporate a paid allowable overdepth, meaning material removed from this specified overdepth is paid for under the terms of the dredging contract. Material removed beyond the limits of allowable overdepth is non-paid.

material below maximum navigation dredging depths within the Thimble Shoal Channel.

3.1.3. Conventional Dredging Methods

Conventional dredging methods of mechanical or hydraulic dredging (e.g. clamshell or hopper dredging) was considered as an alternative to the removal of the CBBT cover material. The heavy equipment that is used in these methods pose a risk to damaging the CBBT tunnel structure, which has the potential to increase costs relating to damages. This alternative was discarded since this method poses high risk of damaging existing critical infrastructure and therefore may not meet safety requirements or the least costs alternative under the Federal Standard.

3.2. ALTERNATIVES OF THE PROPOSED ACTION OF DREDGED MATERIAL PLACEMENT OF WID TRENCH MATERIAL

Six (6) alternatives have been identified for the action of dredged material placement of the WID trench material:

- No Action Alternative
- Ocean Disposal at the DNODS
- Upland Solid Waste Disposal Sites
- Upland Placement at Shirley Plantation (Weanack)
- Placement at Craney Island Dredged Material Management Area (CIDMMA)
- Beneficial Uses of Dredged Material

The placement of suitable WID trench dredged material at the DNODS was carried forward as part of the Proposed Action. This plan has been determined to be the best and most appropriate action to meet the Federal Standard and allow for the efficient completion of the project.

3.2.1. No Action Alternative

NEPA regulations refer to the No-Action Alternative as the continuation of existing conditions of the affected environment without implementation of, or in the absence of, the Proposed Action. Inclusion of the No-Action Alternative is prescribed by the CEQ regulations as the benchmark against which Federal actions are evaluated. Under this alternative, the WID trench would not be constructed, and would not be a placement site for the CBBT cover material. The preferred alternative of WID method of the CBBT cover material fluidizes the dredged material and displaces it out of the dredging footprint. Without a receiving trench and in the absence of the down gradient, the material to be dredged will not be displaced from the CBBT cover area, therefore the WID method of dredging would be unsuccessful and pose a potential navigation hazard.

3.2.2. Ocean Disposal at Dam Neck Ocean Disposal Site (Preferred Alternative)

Placement of suitable dredged material at the DNODS is the most viable placement site for the WID trench material. Pursuant to Section 102(c) of the MPRSA, DNODS is suitable for ocean disposal of dredged material from the Thimble Shoal Channel. The WID trench material within the dredged material footprint has been informally tested in accordance with MPRSA. Based on a preliminary data report, it is expected that the dredged material will meet the MPRSA Limiting Permissible Concentration for ocean placement (Appendix H). The Norfolk District and Virginia Port Authority intend to conduct a formal follow-up MPRSA testing program with EPA approval to further document the dredged material suitability and to obtain EPA concurrence for placement of the WID trench dredged material at DNODS. The DNODS is the most proximate disposal alternative, approximately 14 nautical miles one way from the project location. Alterations to the placement site are not necessary to increase capacity, as there is approximately 60 MCY of available capacity to support this material from the WID trench.

3.2.2.1. Need for Ocean Disposal (Compliance With 40 CFR Part 227 Subpart C)

Sections 3.2.3 through 3.2.6 of this SEA analyze the alternative placement sites in accordance to the MPRSA Section 103, 40 CFR 227.14 – Criteria for evaluating the need for ocean dumping and alternatives to ocean dumping. The relative environmental risks, impact and cost for ocean disposal as opposed to the other alternatives are analyzed within. DNODS was designate specifically for placement of suitable dredged material from Thimble Shoals Channel, Atlantic Ocean Channel, and Cape Henry Channel. Continued use of the DNODS for this project element would be consistent with site designation. Upland placement at the privately-owned upland facilities, such as Port Tobacco at Weanack-Shirley Plantation and upland placement at the CIDMMA were considered as alternate placement options for the dredged material from the WID trench. The upland placement sites have finite capacity, modifications to increase capacity of the facility and reducing the pore water in the dredged material prior to placement would require additional costs. The upland facilities and waste treatment facilities also require a greater distance of travel for the scow/barge/upland traversing vehicles when compared to the DNODS. Double handling the material, chemical treatment prior to disposal (i.e. liming), hauling time and fuel also raises the cost of the placement method. The most viable alternate option for the dredged material from CBBT receiving trench is ocean placement at the DNODS.

3.2.3. Upland Solid Waste Disposal Sites

Placement of the dredged material from the WID trench at various upland solid waste disposal sites was considered as an alternative. Sanitary landfills and treatment facilities have finite capacity that are generally intended for disposal of municipal wastes streams, or more highly contaminated materials that are not suitable for other disposal alternatives or beneficial uses. Upland dredged material placement capacity is limited in the southern Virginia region and is preferential for projects with sediments that may not meet the requirements for ocean or open-water placement. Disposal of sediments from dredging projects at upland facilities may require the addition of amendments to reduce the moisture content of saturated sediments to minimize leachate in the landfill system. The addition of amendments results in the bulking of the material creating additional volume or tonnage to be disposed. Permitted facilities often have a maximum volume of material that may be accepted daily. Constraints for daily disposal volumes can protract dredging schedules and escalate costs. Dredged material testing from the WID trench indicates that the character of the material does not require management and disposal as a solid waste in upland solid waste disposal sites. This placement alternative does not meet the Federal Standard due to apparent cost escalation associated with the necessary double handing and treatment of the material when compared to the preferred alternative.

3.2.4. Upland Placement at Shirley Plantation (Weanack)

Placement of dredged material from the WID trench at Shirley Plantation/Weanack upland disposal facility was considered as an alternative. Upland placement at Shirley Plantation meets the Virginia Exclusionary Criteria (as specified in the facility permit). However, this alternative was not the preferred alternative since this site is located 74 nautical miles one way from the project location and placement at this site would include double handling of material to maintain dredge production efficiencies. After considering logistical and dredge production constraints associated with this alternative, it does not meet the Federal Standard requirement of selecting the least cost, most environmentally acceptable alternative.

3.2.5. Placement at Craney Island Dredged Material Management Area (CIDMMA)

The U.S. Army Corps of Engineers, CIDMMA is located in the City of Portsmouth, Virginia, and was considered an alternative for dredged material placement for the WID trench material. The CIDMMA is a Congressionally authorized dredged material placement site. In addition to the DNODS, CIDMMA is another alternative identified to be feasible for dredged material placement of sediments from the WID trench. CIDMMA is 16 nautical miles one way from the WID trench project location. CIDMMA is restricted to placement of material from dredging to support navigation in Norfolk Harbor and adjacent waters within a defined geographic service area, which does not include the WID trench area. However, the District Commander can approve the use of CIDMMA outside of its authorized geographic boundaries for navigation-related material if the dredged material is beneficial to the facility (USACE, 2013). The dredged material meets the compliance criteria under Clean Water Act Section 404, in accordance with the Inland Testing Manual (USEPA, 1998), Upland Confined Disposal Facilities – Testing Manual (2003), and the USACE Commander's Policy Memorandum WRD-01 (USACE, 2013).

The current management strategy for operating CIDMMA is based on Section 148 of the Water Resources Development Act (WRDA) of 1976 (P.L. 94-587) that states the "Chief of Engineers, shall…extend the capacity and useful life of dredged material disposal areas such that the need for new dredged material disposal areas is kept to a minimum." CIDMMA storage capacity is periodically increased by raising the facility's dike height. Currently the dikes have been raised to elevations ranging from +36 to +40 feet above MLLW, with the interior dike heights currently ranging from +33 to +36 feet above MLLW, which maintains 3 of freeboard. The dikes at CIDMMA will continue to be raised as appropriate for future capacity needs. These qualifiers make CIDMMA a feasible placement site for the WID trench material placement, but capacity constraints and distance from the project location do not make this the preferred placement site. After considering the logistical constrains of pumping the dredged material into the upland facility of CIDMMA, the limited capacity, the greater distance of travel for the scow/barge, this alternative does not meet the Federal Standard requirement of selecting the least cost environmentally acceptable alternative. However, consistent with other beneficial use projects, project costs over and beyond the federal standard costs would need to be cost shared under a separate authority.

3.2.6. Beneficial Uses of Dredged Material

It is possible that portions of the dredged material may be suitable for beneficial use projects. The CIEE project and the Craney Island Dredged Material Management Area (CIDMMA) as well as beach nourishment projects in the City of Virginia Beach and the City of Norfolk will be considered for beneficial use of dredged material as an alternative of the dredged material placement. The CIEE project is a 522-acre open water site on the eastern side of CIDMMA that will provide additional capacity for dredged material as well as a suitable foundation for the construction of a container handling terminal. The dredged material discussed in this SEA could be used for the dike construction for the CIDMMA and CIEE project or used for beach nourishment projects placed landward of the depth of closure if the local sponsor is willing and able to pay the additional incremental costs for that placement over and beyond the costs of the Federal Standard.

Beach nourishment is a possible alternative for the dredged material placement based on physical characteristics of the sediments. Nourishment materials should have a low percentage of fine-grained sediments. The goal for typical local beach nourishment (Cities of Norfolk and Virginia Beach) material is a D50 grain size of greater than 0.2mm. Sandy dredged material may also be placed within the beach system landward of the depth of closure to add to the sediment budget within the littoral system of the Chesapeake Bay. Physical analyses of WID trench sediments indicate that project sands may be suitable for nourishment or for addition to a sand budget within the littoral system in the near-shore environment landward of the depth of closure.

Beneficial use of suitable material will continue to be considered throughout the planning and construction phases if any local sponsors are able to partner to accept the material and cover any incremental costs over and beyond the costs of the federal standard. Beneficial use sites are subject to Section 207 of WRDA 1996, as amended whereby reuse represent a least costs disposal method and are reasonable in relation to the environmental benefits achieved. Any beneficial use not identified in the future as part of the base plan would need to be cost shared under a separate authority.

3.3. ALTERNATIVES OF THE PROPOSED ACTION OF DREDGED MATERIAL PLACEMENT OF THE CBBT COVER MATERIAL

Six (6) alternatives have been identified for the action of dredged material placement of the CBBT cover material:

- No Action Alternative
- WID Trench Material Permanent Placement
- Placement at Craney Island Dredged Material Management Area (CIDMMA)
- Upland Placement at Shirley Plantation (Weanack)
- Upland Solid Waste Disposal Sites
- Beneficial Uses of Dredged Material

The permanent placement of suitable CBBT cover dredged material in the proposed WID trench was carried forward as part of the Proposed Action. This plan has been determined to be the best and most appropriate action to meet the Federal Standard and allow for the efficient completion of the project.

3.3.1. No Action Alternative

NEPA regulations refer to the No-Action Alternative as the continuation of existing conditions of the affected environment without implementation of, or in the absence of, the Proposed Action. Inclusion of the No-Action Alternative is prescribed by the CEQ regulations as the benchmark against which Federal actions are evaluated. Under this alternative, the selected Preferred Alternative in Section 3.1 of this SEA of utilizing the WID method to dredge the CBBT cover material would not be performed in the absence of a viable placement site. The WID method in general fluidizes the designated dredged material and displaces it out of the dredging footprint by utilizing the downgradient created by the construction of an adjacent receiving trench. Without a WID trench placement site, the material to be dredged will not be displaced from the CBBT cover area, which may cause a potential hazard to navigation if the material were to shoal within the Federal channel. Therefore, the WID method of dredging would be unsuccessful and would not be performed, ultimately eliminating the PRB project and leaving the CBBT structure vulnerable to vessel strikes and/or anchor drags as a result of the planned Thimble Shoal Channel deepening.

3.3.2. WID Trench Material Permanent Placement (Preferred Alternative)

Placement of suitable dredged material in the WID trench is the most viable permanent placement site for the CBBT cover material removed via WID methods. The CBBT cover material was sampled and tested in accordance with the joint EPA and USACE manual "Evaluation of Dredged Material for Discharge in Waters of the U.S.- Inland Testing Manual" (USEPA, 1998). This manual was used as a procedural guide to evaluate the CBBT cover material to determine compliance with Section 404(b)(1) Guidelines of the Clean Water Act for open water placement. Section 4.2.3 of this SEA and the Interim Sampling Data Report (Appendix H) details the sampling procedures as well as the sediment chemical and toxicity results. The Norfolk District performed a Section 404(b)(1) analysis and determined the CBBT cover material is suitable for permanent placement in the proposed WID trench and is requesting State 401 Certification through this NEPA and CZMA FCD document (Appendix C) as described in Section 4.1 of this SEA.

The WID trench is an integral component of the WID method to displace the CBBT cover material. The downward gradient created by the proposed dredging depths of the WID trench compared to the existing depths of the CBBT cover drives the displacement of the fluidized material from the CBBT cover area and into the WID trench where it will settle and reside. The bathymetry of the WID trench area after the completion of the WID is expected contain the CBBT cover material below the maximum allowable dredging depths of -61 feet MLLW in the Thimble Shoal Channel. This replacement of material in the WID trench would mitigate bathymetry impacts by partially restoring depths within the trench from -70 ft MLLW to varying depths shallower than -70 ft MLLW and gradual attenuation of depths through natural shoaling process over time. Permanent placement of the material in the WID trench would avoid additional impacts of another dredging cycle in order to remove it for placement at an alternate disposal site.

In order to use an alternate site as the permanent placement site for the CBBT cover material, it would require additional dredging of the CBBT cover material likely by conventional dredging methods out of the proposed WID trench. The material would be loaded into a scow for transport to the alternate placement site or facility. Upland placement would require additional handling of the dredged material to facilitate upland vehicle transportation all which would result in costs escalation to the project. The additional dredging may result in further minor effects to the various impact topics including turbidity, noise, protected species and critical habitat, and various other environmental impact topics at the WID trench project location and during the transportation of the material to the alternate placement site. Dredging the CBBT cover material from the WID trench would also cause more long-term impacts to the bathymetry of the site as it would result in a deeper footprint in the WID trench footprint. This deeper footprint at the trench site would take additional time for natural shoaling processes and sedimentation to attenuate the localized depths in the WID trench compared to if the CBBT cover material were to permanently reside in the WID trench.

The WID trench is the most practical permanent placement site for the CBBT cover material. The CBBT cover material currently resides within the system. The WID trench is necessary to displace the material via WID methods, leaving the CBBT cover material within the confinements of the WID trench would allow for attenuation of the WID trench creation, and avoid and minimize the cost and environmental impacts of additional handling of the CBBT cover material to an alternate placement site. The analysis of this alternative represents the Federal Standard of least cost environmentally acceptable alternative.

3.3.3. Placement at Craney Island Dredged Material Management Area (CIDMMA)

The U.S. Army Corps of Engineers, CIDMMA is located in the City of Portsmouth, Virginia, and was considered an alternative for dredged material placement for the WID trench material. The CIDMMA is a Congressionally authorized dredged material placement site. CIDMMA is another alternative identified to be feasible for dredged material placement of sediments from the CBBT cover, after it is conveyed to the WID trench. CIDMMA is 16 nautical miles one way from the CBBT cover and WID trench project location. CIDMMA is restricted to placement of navigation-related dredged material in Norfolk Harbor and adjacent waters within a defined geographic service area, which does not include the project area. However, the District Commander can approve the use of CIDMMA outside of its authorized geographic boundaries for navigation-related material if the dredged material is beneficial to the facility (USACE, 2013). The dredged material meets the compliance criteria under Clean Water Act Section 404, in accordance with the Inland Testing Manual (USEPA, 1998), Upland Confined Disposal Facilities – Testing Manual (2003), and the USACE Commander's Policy Memorandum WRD-01 (USACE, 2013).

The current management strategy for operating CIDMMA is based on Section 148 of the Water Resources Development Act (WRDA) of 1976 (P.L. 94-587) that states the "Chief of Engineers, shall…extend the capacity and useful life of dredged material disposal areas such that the need for new dredged material disposal areas is kept to a minimum." CIDMMA storage capacity is periodically increased by raising the facility's dike height. Currently the dikes have been raised to elevations ranging from +36 to +40 feet above MLLW, with the interior dike heights currently ranging from +33 to +36 feet above MLLW, which maintains 3 of freeboard. The dikes at CIDMMA will continue to be raised as appropriate for future capacity needs and the CBBT cover material may be suitable for that beneficial use. These qualifiers make CIDMMA a feasible placement site for the CBBT cover material, but capacity constraints, distance from the project area, and the need to identify viable program or local sponsor funding to cover incremental costs beyond the federal standard are unfavorable for this alternative.

In order to use CIDMMA as the permanent placement site for the CBBT cover material, the material would be dredged via conventional methods from the WID trench and loaded into a scow for transport to CIDMMA, where it would be hydraulically offloaded into the upland cells. This alternative would require dredging at the WID trench and transportation and offloading to CIDMMA and would result in additional minor environmental impacts and would require additional costs of construction.

After considering the environmental impacts, the funding constraints involving identifying a viable local sponsor or program funding to pay additional incremental costs, the limited capacity at CIDMMA, and the greater distance of travel for the scow/barge resulting in costs escalation, this alternative does not meet the Federal Standard requirement of selecting the least cost environmentally acceptable alternative. However, consistent with other beneficial use projects, project costs over and beyond the Federal Standard costs would need to be cost shared by a local sponsor or through other available program funding.

3.3.4. Upland Placement of Dredged Material at Shirley Plantation (Weanack)

Placement of the CBBT cover material dredged from the WID trench at Shirley Plantation/Weanack upland disposal facility was considered as an alternative. Upland placement at Shirley Plantation meets the Virginia Exclusionary Criteria (as specified in the facility permit). However, this alternative was not the Preferred Alternative after consideration of the impacts of removing the CBBT cover material from the WID trench, as well as the site being located 74 nautical miles one way from the project location and placement at this site would include additional handling of material to maintain dredge production efficiencies. After considering logistical and dredge production constraints resulting in construction costs escalation associated with this alternative, it does not meet the Federal Standard requirement of selecting the least cost environmentally acceptable alternative.

3.3.5. Upland Solid Waste Placement Site

Placement of the CBBT cover material dredged from the WID trench at various upland solid waste disposal sites was considered as an alternative. Sanitary landfills and treatment facilities have finite capacity that are generally intended for disposal of municipal wastes streams, or more highly contaminated materials that are not suitable for other disposal alternatives or beneficial uses. Upland dredged material placement capacity is limited in the southern Virginia region and is preferential for projects with sediments that may not meet the requirements for ocean or open-water placement. Disposal of sediments from dredging projects at upland facilities may require the addition of amendments to reduce the moisture content of saturated sediments to minimize leachate in the landfill system. The addition of amendments results in the bulking of the material creating additional volume or tonnage to be disposed. Permitted facilities often have a maximum volume of material that may be accepted daily. Constraints for daily disposal volumes can protract dredging schedules and escalate costs. Dredged material testing from the CBBT cover indicates that the character of the material does not require management and disposal as a solid waste in upland solid waste disposal sites. This placement alternative does not meet the Federal Standard due to apparent cost escalation associated with the additional handing and treatment of the material when compared to the preferred alternative.

3.3.6. Beneficial Uses of Dredged Material

It is possible that portions of the dredged material may be suitable for beneficial use projects. The CIEE project and the Craney Island Dredged Material Management Area (CIDMMA) as well as beach nourishment projects in the City of Virginia Beach and the City of Norfolk will be considered for beneficial use of dredged material as an alternative of the dredged material placement. The CIEE project is a 522-acre open water site on the eastern side of CIDMMA that will provide additional capacity for dredged material as well as a suitable foundation for the construction of a container handling terminal. Approximately 4.8 MCY of sand is required to complete the CIEE construction of three cross dikes, and portions of the main dike as part of the project (USACE 2018). The dredged material from the CBBT cover material could be used for the dike construction for the CIDMMA and CIEE project or used for beach nourishment projects placed landward of the depth of closure if the local sponsor is willing and able to pay the additional incremental costs for that placement over and beyond the costs of the Federal Standard.

Beach nourishment is a possible alternative for the dredged material placement based on physical characteristics of the sediments. Nourishment materials should have a low percentage of fine-grained sediments. The goal for typical local beach nourishment (Cities of Norfolk and Virginia Beach) material is a D50 grain size of greater than 0.2mm. Sandy dredged material may also be placed within the beach system landward of the depth of closure to add to the sediment budget within the littoral system of the Chesapeake Bay.

Physical analyses of the CBBT cover material sediments indicate that project sands may be suitable for nourishment or for addition to a sand budget within the littoral system in the near-shore environment landward of the depth of closure.

Beneficial use of suitable material will continue to be considered throughout the planning and construction phases if any local sponsors are able to partner to accept the material and cover any incremental costs over and beyond the costs of the federal standard. Beneficial use sites are subject to Section 207 of WRDA 1996, as amended whereby reuse represent a least costs disposal method and are reasonable in relation to the environmental benefits achieved. Any beneficial use not identified in the future as part of the base plan would need to be cost shared under a separate authority.

4. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This SEA focuses specifically on the affected environment and potential impacts relating to the WID of the CBBT cover material along with the associated new work dredging of the WID trench within the Thimble Shoal Channel – East segment. The impacts resulting from the WID means and methods of the CBBT PRB project element were not assessed in the 2018 GRR/EA. This section describes the existing conditions of the affected environment along with the anticipated consequences (impacts) associated with the Proposed Action and the No-Action Alternative. Table 4.1 summarizes the environmental impacts associated with the Proposed Action.

Effects or impacts is defined as changes to the human environment from the Proposed Action or alternatives that are reasonably foreseeable and have a reasonable close causal relationship to the Proposed Action or alternatives, including those effects that occur at the same time and place as the Proposed Action or alternatives and may include effects that are later in time or farther removed in distance from the Proposed Action or alternatives (40 CFR 1508.1 (g)). Impacts may be discussed as positive or negative, significant or minor, as appropriate to the resource area. Positive impacts occur when an action results in a beneficial change to the resource, whereas negative impacts occur when an action results in a detrimental change to the resource. Significant impacts occur when an action substantially changes or affects the resource, while a minor impact occurs when an action causes impact, but the resource is not substantially changed. Impacts are also discussed as temporary as well as short and/or long-term impacts and are associated with relative time frames as the direct result of the action. In this case, temporary refers to an impact only during the period of construction. Short-term describes the impact for one to three years post construction, whereas long-term describes the permanent impacts that would be expected to remain for many years. This section is organized by resource area. Some resource topics were excluded from further evaluation, a brief discussion of those topics can be found in Section 2.3.

Each resource category was reviewed for its potential to be impacted. Through this analysis, resource categories clearly not applicable to the alternatives, or categories that were discussed thoroughly in the 2018 GRR/EA (Appendix A) with no impact changes with this SEA were screened from further evaluation (and were briefly described in Section 2.3). Only those affected resources applicable to the Proposed Action are discussed further in this section.

The footprint of the WID of the CBBT cover material is approximately 4 acres. The cover area is 150 feet wide by 1,200 feet long and will be dredged to -61 feet MLLW removing approximately 43,000 cubic yards of material. The proposed WID trench footprint will be up to approximately 15 acres in size, 1,200 feet long by 525 feet in width, contiguous on the east side of the CBBT cover area. In total, there will be approximately 19 acres in the total project footprint of the CBBT cover removal by the WID method. Impacts from the Proposed Actions would primarily be found within the project footprint, and were accounted for in the 2018 GRR/EA. Suitable dredged material removed through conventional dredging methods to construct the WID trench would be transported and placed at the DNODS prior to the CBBT WID cover removal. The material from the CBBT cover area will be removed and conveyed along a gravity density gradient by the WID method into the constructed WID trench.

Table 4.1 Environmental Consequences Summary

Impact Topic	Proposed Action	No Action Alternative
Dredged Material Characterization	• No anticipated contamination issues	• No impact to existing conditions
Protected Species and Critical Habitat	• Localized, short-term adverse impacts to benthos at dredging and placement site(s)	• No impact to existing conditions

Soils	• Long-term impact due to removing soil from the project site(s)	• No impact to existing conditions
Bathymetry	• Long-term impact due to the deepening of the project site(s)	• No impact to existing conditions
Water Quality: WID Trench Dredging Site	• Temporary, localized adverse impacts due to resuspension of sediments at dredging site(s)	• No impact to existing conditions
Water Quality: CBBT Cover Dredging Site	• Temporary, localized adverse impacts due to resuspension of sediments at dredging site and adjacent in vicinity of adjacent receiving trench	• No impact to existing conditions
Water Quality: Dredged Material Placement Site (DNODS)	• Temporary, localized adverse impacts due to resuspension of sediments at placement site(s)	• No impact to existing conditions
Benthic Fauna	• Localized, short-term impacts to benthic fauna at dredging and placement site(s)	• No impact to existing conditions
Noise and Vibration	• Localized, short-term impacts due to dredging equipment around project location and placement site(s)	• No impact
Plankton Community	• Localized, short-term impacts due to resuspension of sediment at dredging and placement site(s)	• No impact to existing conditions

4.1. COASTAL ZONE MANAGEMENT ACT (CZMA), FEDERAL CONSISTENCY DETERMINATION

A Federal Consistency Determination (FCD) is submitted as an attachment to this SEA to comply with the requirements of the CZMA passed in 1972 (Attachment C). The Act provides for management of the nation's coastal resources and balances economic development with environmental conservation. It requires that Federal agencies be consistent in enforcing the policies of state coastal zone management programs when conducting or supporting activities that affect a coastal zone. The CZMA is intended to ensure that Federal activities are consistent, to the maximum extent practicable, with state programs for the protection and, where possible, enhancement of the nation's coastal zones.

To implement the CZMA and to establish procedures for compliance with its Federal consistency provisions, the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), promulgated regulations which are contained in 15 CFR Part 930. As per 15 CFR 930.37, a Federal agency may use its NEPA documents as a vehicle for its consistency determination. The FCD is included in Appendix C "Federal Consistency Determination and Clean Air Act General Conformity Rule Record of Non-Applicability" with the request of the State's review, with the recommendation that the Proposed Action is consistent to the maximum extent practicable with the enforceable policies of the Virginia Coastal Resources Management Program.

The Clean Water Act Section 404(b)(1) Guidelines evaluation for the CBBT cover material proposed for placement in the proposed WID trench is included with the FCD (Appendix C). Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the Preferred Alternative was tested for compliance with Section 404(b)(1) Guidelines. As described in Section 4.2.3 of this SEA, USACE has determined that the CBBT cover area material is compliant for placement in Waters of the U.S. in accordance to the Clean Water Act Section 404(b)(1) Guidelines (40 CFR 230). In accordance with the 02 October 2015 letter from Dave Paylor concerning the "Regulation of Dredging and Aquatic Resources Restoration Activities Conducted by the U.S. Army Corps of Engineers in Commonwealth of Virginia Waters," the USACE is requesting State 401 water quality certification through coordination of this NEPA and CZMA document for the dredged material discharges associated with the CBBT cover material removal and placement in the WID trench (Appendix C).

4.2. DREDGED MATERIAL CHARACTERIZATION

4.2.1. Proposed Action

To ensure the Proposed Action's dredged material of the WID trench is suitable for placement at the DNODS, sediment cores from four separate locations within the WID trench dredging footprint were collected to elevation -70 feet MLLW (Figure 4.1). In the CBBT cover area, grab samples were collected from six locations along the centerline of the tunnel and sediment cores extending to approximately 10 feet below sediment surface (elevation -65 feet MLLW) were collected from six locations adjacent to the tunnel. Site water samples were also collected from the vicinity of the CBBT and the WID trench for chemical analysis.

Samples from the CBBT cover and from the WID trench footprint were collected between 06 August and 11 September 2020 via vibracore or Van Veen surface sampler and were evaluated in accordance with Section 404 of the Clean Water Act and Section 103 of the MPRSA respective to the locations. Reference sediments were also collected and evaluated simultaneously for comparison with the Proposed Action's dredged material. Reference and control sediments were collected at EPA approved locations at Willoughby Bank reference site, the Atlantic Ocean reference site, and the Chesapeake Bay control site. Results of the grain size analysis indicated that the physical characteristics of the WID trench and the CBBT cover material were most comparable to the Atlantic Ocean reference.

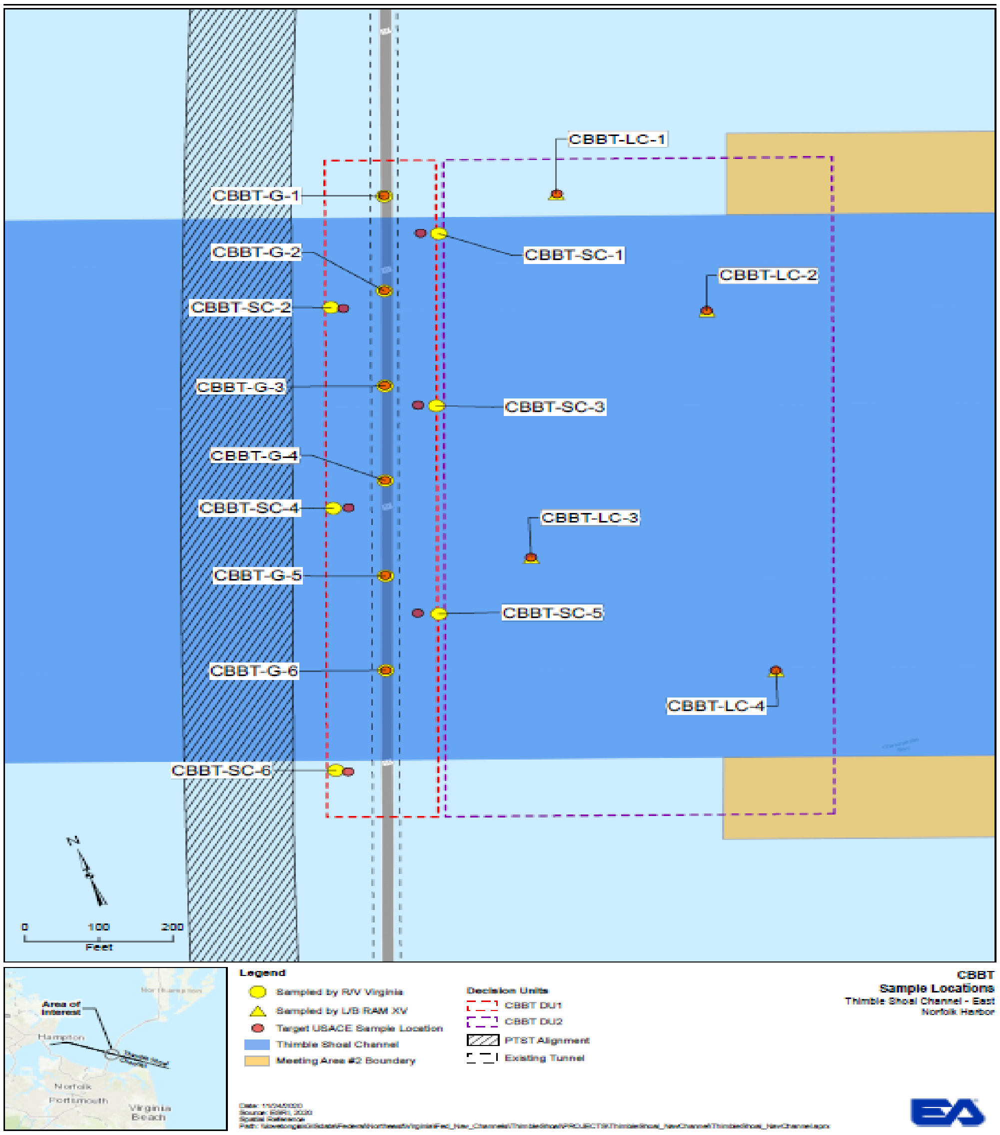

Figure 4.1. Sampling Locations in the CBBT Cover Removal Area and WID Dredging Footprint

4.2.2. WID Trench Material MPRSA Section 103 Regulations

The transport of dredged material for the purpose of ocean disposal is regulated under Section 103 of the MPRSA of 1972 (Public Law 92-532). The law states that any proposed placement of dredged material into ocean waters must be evaluated through the use of criteria published by the EPA in Title 40 of the Code of Federal Regulations, Parts 220-228 (40 CFR 220-228). The primary purpose of Section 103 of the MPRSA is to limit and regulate adverse environmental impacts of ocean placement of dredged material. Dredged material proposed for ocean placement must comply with 40 CFR 220-228 (Ocean Dumping Regulations) and 33 CFR 320-330 and 335-338 (USACE Regulations for discharge of dredged materials into waters of the U.S.) prior to being issued an ocean placement authorization. The technical evaluation of potential contaminant-related impacts that may be associated with ocean placement of dredged material is conducted in accordance with 40 CFR 220-228 and the *Ocean Testing Manual* (USEPA/USACE 1991). The criteria in 40 CFR Part 227 are used to determine compliance.

The WID trench dredged material was evaluated for water column impacts and benthic impacts in four specific cases to comply with the Limiting Permissible Concentration (LPC) (as defined in 40 CFR 227.27):

- Water quality criteria compliance (liquid phase)
- Water column toxicity compliance (liquid and suspended particulate phase)
- Benthic toxicity (solid phase)
- Benthic bioaccumulation (solid phase)

Preliminary LPC data from the sediment sampling performed in August and September of 2020 was evaluated for Section 103 MRSA compliance. The full interim data report can be found in Appendix H.

4.2.2.1. WID Trench Material Evaluation

Water quality criteria compliance (liquid phase)

Results of standard elutriate testing and Short-Term Fate (STFATE) of Dredged Material Modeling (EA 2021) indicated that the elutriate created using the WID trench sediment and dredging site water meets the Limiting Permissible Concentration (LPC) for water quality criteria for ocean placement at the DNODS.

Water column toxicity compliance (liquid and suspended particulate phase)

Results of water column bioassays using three benchmark species of aquatic marine organisms, *Mytilus edulis* (blue mussel), *Americamysis bahia* (mysid shrimp), and *Menidia beryllina* (silverside minnows) indicated that the 100% elutriate was not toxic to the three test species (EA 2021). The median lethal concentration (LC50) and/or median effective concentration (EC50) was greater than 100 percent elutriate for each of the three species. Therefore, the elutriate created with WID trench sediment and dredging site water meets the LPC for water column toxicity for ocean placement the DNODS.

Benthic toxicity (solid phase)

Results of 10-day whole sediment bioassays using two amphipod species, *Ampelisca abdita* and *Leptocheirus plumuolosus*, indicated that organism survival in the WID trench sediments was not significantly different than organism survival in reference sediment (EA 2021). Therefore, the WID trench sediments meet the LPC for benthic toxicity for ocean placement at the DNODS.

Benthic bioaccumulation (solid phase)

Two marine species, *Macoma nasuta* (blunt-nosed clam) and *Neries virens* (sand worm), were used to assess bioaccumulation of contaminants from the WID sediments during 28-day laboratory exposures. Following the 28-day exposure period, the tissues were analyzed for target constituents (metals and organics) based on the results of the bulk sediment testing. Results of the tissue analysis are pending. Based on the weight of evidence from other physical, chemical and biological testing, the WID sediments are expected to meet the LPC for benthic bioaccumulation for ocean placement at the DNODS.

The Norfolk District has determined that the dredged material from the WID trench complies with the MPRSA criteria for ocean placement. The preliminary and interim data characterization generated and presented in Appendix H of this SEA were in accordance with established MPRSA testing protocols with the intent to inform the Norfolk District concerning appropriate management of the project's dredged material. The Norfolk District will be re-evaluating the WID trench dredged material under an EPA-approved sampling program to obtain EPA independent evaluation and concurrence for placement at the DNODS. Placement at the DNODS for the WID trench dredged material will receive MPRSA Section 103 concurrence from EPA prior to disposal.

4.2.3. CBBT Cover Dredged Material Section 404(b)(1) Guidelines Compliance

The USACE conducts Civil Works dredging and dredged material discharge activities in accordance with Section 404 of the Clean Water Act (CWA). Section 404 further requires that discharge sites be specified through the application of the Section 404(b)(1) Guidelines (Guidelines) developed by EPA in conjunction with the USACE. Section 404 requires that the "Guidelines shall be based upon criteria comparable to the criteria applicable to the territorial seas, contiguous zone, and the ocean". The Guidelines, which impart other requirements in addition to those associated with contaminant-related impacts, are published in 40 CFR 230.

The joint EPA and USACE manual "Evaluation of Dredged Material For Discharge in Waters of the U.S.- Testing Manual" (USEPA, 1998) normally referred to as the "Inland Testing Manual" (ITM), provides testing procedures through a tiered approach (I-IV) that are applicable to determining the potential for contaminant-related environmental impacts associated with the discharge of dredged material. The ITM is used as a procedural guide to evaluate dredged material to satisfy all other applicable requirements of 40 CFR 230-232, 33 CFR 320-330, and 33 CFR 335-338 in order to comply with the Guidelines and to be authorized for discharge under the Clean Water Act.

The tiered approach to testing described in the ITM is used by the EPA and USACE to evaluate the suitability of dredged material for various placement options in accordance to the Guidelines. It is necessary to proceed through the tiers only until information sufficient to make factual determinations has been obtained. The following describes the tiers in the ITM:

1. The initial tier (Tier I) uses readily available, existing information (including all previous testing).
2. Tier II is concerned solely with sediment and water chemistry.
3. Tier III is concerned with well-defined, nationally accepted, toxicity and bioaccumulation testing procedures.
4. Tier IV allows for case-specific laboratory and field-testing and is intended for use in unusual circumstances.

At any tier except for Tier IV, failure to satisfactorily determine the potential for unacceptable aquatic environmental impact, or to develop sufficient information to make factual determinations, results in additional testing at a subsequent, more complex tier unless a decision is made to seek other disposal alternatives (thereby avoiding the potential for unacceptable aquatic environmental impacts) (USEPA 1998).

As noted in Section 230.61 of the Guidelines, the evaluation process will usually entail investigation of potential biological effects (Tier III), rather than merely chemical presence (Tier II), of the possible contaminants. Biological evaluations serve to integrate the chemical and biological interactions of the suite of contaminants which may be present in a dredged material sample, including their availability for biological uptake, by measuring their effects on test organisms. Within the constraints of experimental conditions and the endpoints of effects measured, biological evaluations provide for a quantitative comparison of the potential effects of a dredged material when compared to reference sediments. Thus, a specified level of change compared to reference conditions and a statistically significant result in this comparison indicate that the discharge of the dredged material in question may cause a direct and specific biological effect under test conditions and, therefore, has the potential to cause an ecologically undesirable impact, which does not comply with Section 404(b)(1) Guidelines (USEPA 1998).

The ITM explains the usual approach is to enter Tier I and proceed as far as necessary to make factual determinations. Although it is not always necessary that all dredged material be evaluated through all tiers, there must be enough information available to make determinations on all aspects of the 404(b)(1) Guidelines relating to water column impact, benthic toxicity and benthic bioaccumulation. It is acceptable to carry water-column and benthic evaluations, or toxicity and bioaccumulation evaluations, to different tiers to generate the information necessary and sufficient to make these determinations.

Conservative screening assessments were performed to determine the suitability of placing dredged material from the CBBT cover area into the WID trench, a proposed one-time-use placement site specific for the CBBT cover material within the Thimble Shoal Federal Navigation Channel. The CBBT cover material posed high uncertainty of the physical and chemical characteristics through a Tier I analysis. Therefore, conservative screening to Tier II and Tier III was used to determine the suitability of dredged material for placement to ensure compliance with State water quality standards (WQS) and consistency with Section 404(b)(1) Guidelines.

Section 401 of the CWA requires that all Federal projects, including those for the discharge of dredged material into waters of the United States, authorized pursuant to Section 404 of the CWA, must be certified as complying with applicable State WQS. The Guidelines at 40 CFR 230.10(b) state in part that "No discharge of dredged or fill material shall be permitted if it: (1) Causes or contributes, after consideration of disposal site dilution and dispersion, to violations of any applicable State water quality standard." This applies at the edge of a State designated mixing zone (USEPA 1998). A Tier II analysis is used to determine Section 401 State WQS compliance.

The CBBT cover material was sampled for Tier II and Tier III evaluation. Tier II included elutriate tests to determine water quality compliance with Section 401 State WQS, and to comply with 40 CFR 230.10(b) of the Guidelines (liquid phase). Water column toxicity tests are also used to provide information on the toxicity of contaminants not included in water quality standards, and to indicate possible interactive effects of multiple contaminants through a Tier III evaluation. The CBBT cover material was also evaluated under the Tier III evaluation for water column toxicity impacts, benthic toxicity impacts, and benthic bioaccumulation to comply with the Section 404(b)(1) Guidelines for open water placement and is described below in Section 4.2.3.1 of this SEA.

Conclusions reached utilizing the ITM are used below to make factual determinations of the potential effects of a proposed discharge of dredged material on the physical, chemical and biological components of the aquatic environment. Such factual determinations are used to make findings of compliance or noncompliance with relevant parts of Sections 230.10(b) (including compliance with established State water quality standards) and 230. 10(c) (determinations of potential contaminant-related impacts to aquatic resources). A preliminary data report for the CBBT cover material and the WID trench can be found in Appendix H.

4.2.3.1. CBBT Cover Material Evaluation

Water quality criteria compliance (liquid phase)

Results of standard elutriate testing (EA 2021) indicated that none of the constituents detected in the 100% elutriates created using the CBBT cover material and dredging site water exceeded USEPA or Commonwealth of Virginia acute water quality criteria for aquatic life. Therefore, the elutriates comply with the water quality toxicity 404(b)(1) Guidelines and Section 401 State WQS for open water placement.

Water column toxicity compliance (liquid and suspended particulate phase)

Results of water column bioassays using three species of aquatic marine organisms, *Mytilus edulis* (blue mussel), *Americamysis bahia* (mysid shrimp), and *Menidia beryllina* (silverside minnows) indicated that the 100% elutriate for was not toxic to the three test species (EA 2021). The median lethal concentration (LC50) and/or median effective concentration (EC50) was greater than 100 percent elutriate for each of the three species. Therefore, the elutriates created with CBBT cover material and dredging site water comply with the water column toxicity as described in 40 CFR 230.61(b)(2) of the 404(b)(1) Guidelines for open water placement.

Benthic toxicity (solid phase)

Results of 10-day whole sediment bioassays using two amphipod species, *Ampelisca abdita* and *Leptocheirus plumuolosus*, indicated that organism survival in the CBBT cover sediments was not significantly different than organism survival in reference sediment (EA 2021). Therefore, the CBBT cover sediments comply with the benthic toxicity as described in 40 CFR 230.61(b)(3) of the 404(b)(1) Guidelines for open water placement.

Benthic bioaccumulation (solid phase)

Two marine species, *Macoma nasuta* (blunt-nosed clam) and *Neries virens* (sand worm), were used to assess bioaccumulation of contaminants from the CBBT cover sediments during 28-day laboratory exposures. Following the 28-day exposure period, the tissues were analyzed for target constituents (metals and organics) based on the results of the bulk sediment testing. Results of the tissue analysis are pending. Based on the weight of evidence from other physical, chemical and biological testing, the CBBT cover sediments are expected to comply with the benthic bioaccumulation toxicity as described in 40 CFR 230.61(b)(3) of the 404(b)(1) Guidelines for open water placement. Final bioaccumulation results will be incorporated into final SEA and appendices to supplement project decision document.

The characterization data generated and presented in this document were in accordance with the ITM testing procedures to determine compliance with the Section 404 (b)(1) Guidelines developed by EPA in conjunction with the USACE. The Norfolk District recommends that the dredged material from the CBBT cover area, proposed for WID and WID trench placement, complies with the Section 404(b)(1) Guidelines of the Clean Water Act through the ITM decision framework described above and found in Appendix H of this SEA. USACE is requesting State 401 certification through coordination of this NEPA and CZMA document for the dredged material discharges associated with the CBBT cover material removal and placement in the WID trench (Appendix C).

4.3. PROTECTED SPECIES AND CRITICAL HABITAT

Wildlife found in this area is typical for a subaqueous environment. Eight federally threatened species are listed on the NOAA Fisheries ESA Section 7 Mapper (Appendix D): Atlantic sturgeon (*Acipenser oxyriynchus*), shortnose sturgeon (*Acipenser brevirostrum),* green sea turtle (*Chelonia mydas*), kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta)*, north Atlantic right whale (*Eubalaena glacialis*), fin whale (*Balaenoptera physalus*). Four additional species were included based on stranding records analyzed in the 2018 GRR/EA: hawksbill sea turtle (*Eretmochelys imbricata*), sperm whale (*Physeter macrocephalus*) sei whale (*Balaenoptera borealis*), and the blue whale (*Balaenoptera musculus*).

Table 4.2 Species Conclusions Table

Project Name: CBBT Protective Rock Blanket SEA

Date: December 4, 2020

Species / Resources Name	ESA Section 7 Determination	Notes / Documentation
Shortnose Sturgeon	May affect, not likely to adversely affect	Entrainment from WID is unlikely. Collisions with dredging vessels would be unlikely and discountable. Dredging would result in a temporary loss and impact to prey species. Dredging may result in a disturbance effect where sturgeon leave the Action Area from the

		increased levels of Total Suspended Solids, turbidity, and noise. Effects would be insignificant and discountable.
Atlantic Sturgeon	May affect, not likely to adversely affect	Entrainment from WID is unlikely. Collisions with dredging vessels would be unlikely and discountable. Dredging would result in a temporary loss and impact to prey species. Dredging may result in a disturbance effect where sturgeon leave the Action Area from the increased levels of Total Suspended Solids, turbidity, and noise. Effects would be insignificant and discountable.
Green Sea Turtle	May affect, not likely to adversely affect	Entrainment from WID is unlikely. Collisions with dredging vessels would be unlikely and discountable. Dredging would result in a temporary loss and impact to prey species. Dredging may result in a disturbance effect where sea turtles leave the Action Area from the increased levels of Total Suspended Solids, turbidity, and noise. Effects would be insignificant and discountable.
Kemp's Ridley Sea Turtle	May affect, not likely to adversely affect	Entrainment from WID is unlikely. Collisions with dredging vessels would be unlikely and discountable. Dredging would result in a temporary loss and impact to prey species. Dredging may result in a disturbance effect where sea turtles leave the Action Area from the increased levels of Total Suspended Solids, turbidity, and noise. Effects would be insignificant and discountable.
Leatherback Sea Turtle	May affect, not likely to adversely affect	Entrainment from WID is unlikely. Collisions with dredging vessels would be unlikely and discountable. Dredging would result in a temporary loss and impact to prey species. Dredging may result in a disturbance effect where sea turtles leave the Action Area from the increased levels of Total Suspended Solids, turbidity, and noise. Effects would be insignificant and discountable.
Loggerhead Sea Turtle	May affect, not likely to adversely affect	Entrainment from WID is unlikely. Collisions with dredging vessels would be unlikely and discountable. Dredging would result in a temporary loss and impact to prey species.

		Dredging may result in a disturbance effect where sea turtles leave the Action Area from the increased levels of Total Suspended Solids, turbidity, and noise. Effects would be insignificant and discountable.
Hawksbill Sea Turtle	No affect	There is no documented occurrence of the hawksbill sea turtle in the Action Area, and there is no preferred habitat for this species in the Action Area, and only one documented occurrence in the Virginia stranding records; therefore, there would be "no affect" to the hawksbill sea turtle and this species is dismissed from further analysis.
North Atlantic Right Whale	May affect, not likely to adversely affect	Collisions with dredging vessels would be unlikely. Dredging may impact prey species and cause whales to leave the Action Area from the dredging turbidity plume and noise disturbances. Effects would be insignificant and discountable.
Fin Whale	May affect, not likely to adversely affect	Collisions with dredging vessels would be unlikely. Dredging may impact prey species and cause whales to leave the Action Area from the dredging turbidity plume and noise disturbances. Effects would be insignificant and discountable.
Sei Whale	May affect, not likely to adversely affect	Collisions with dredging vessels would be unlikely. Dredging may impact prey species and cause whales to leave the Action Area from the dredging turbidity plume and noise disturbances. Effects would be insignificant and discountable.
Sperm Whale	No affect	There is only one limited occurrence of a stranded sperm whale in the Action Area and because of the preferred offshore distribution of this species we would not anticipate the sperm whale to typically occur in the Action Area; therefore, there would be "no affect" to the sperm whale and this species is dismissed from further analysis.
Blue Whale	No affect	Based on our review of the survey and Virginia stranding data, there is no documented

		occurrence of the blue whale in the Action Area or in coastal waters of Virginia. Also, blue whales have a predominantly offshore distribution. Therefore, we determined this species would not likely occur in the Action Area and therefore, there would be "no affect" to the blue whale and this species is dismissed from further analysis.

New work conventional dredging (including mechanical and hopper) methods were specifically addressed in the 2018 GRR/EA, Biological Assessment (BA) and the subsequent 2018 NMFS Batched Biological Opinion concluded the project "may adversely affect but is not likely to jeopardize the continued existence of any DPS of Atlantic sturgeon, Kemp's ridley or green sea turtles or the Northwest Atlantic DPS of loggerhead sea turtles and is not likely to adversely affect leatherback sea turtles, hawksbill sea turtles, shortnose sturgeon, fin whales, sei whales, blue whale, sperm whales, and North Atlantic right whales." Additional new work dredging by means of conventional dredges will be required for the construction of the WID receiving trench (as part of the WID method). However, since the additional conventional dredging will be conducted within the previously coordinated Action Area as part of the same project and in the same manner as coordinated in the 2018 GRR/BA, USACE Norfolk District has determined that the conventional new work dredging portion of the proposed alternative is covered in the 2018 NMFS Batched Biological Opinion (F/NER/2018/14816) finalized on 5 October 2018 and reinitiating formal ESA consultation is not necessary (Appendix F). USACE Norfolk District requests NMFS concurrence with these determinations through a separate supplemental informal ESA Section 7 Consultation.

The CBBT cover material removal through the WID method would result in localized, temporary impacts to existing resources in the dredging areas and adjacent WID receiving trench placement site. In consideration of the proposed alternative dredging method (WID) within the previously coordinated Action Area, listed species known to inhabit the project area, and the potential effects on those species, USACE Norfolk District has determined the proposed method of WID may affect, but is not likely to adversely affect Atlantic sturgeon, Shortnose sturgeon, Kemp's ridley, green, leatherback, or the Northwest Atlantic DPS of loggerhead sea turtles, fin whales, sei whales or North Atlantic right whales. USACE Norfolk

District has determined the proposed method of WID will not affect hawksbill sea turtles, blue whales, or sperm whales.

The means and methods of the WID method is considered to have a low probability of impacts to protected species in the Action Area. Based on recent a study of turbidity during WID operations with sediment of similar physical characteristics to the CBBT cover, it is anticipated that the elevated turbidity from WID of the CBBT cover material will be the maximum stressor and localized to the lower three to five feet of the water column (Welp et al., 2017). The study recognized that the minimal turbidity in the WID projects was due to the medium-grained sand size having a higher fall velocity and did not stay suspended in the water column as long as the projects that dredged fine-grained silts (Welp et al., 2017). While the increase in suspended sediments may cause Atlantic and shortnose sturgeon to alter their normal movements, these minor movements will be too small to be meaningfully measured or detected. While the increase in suspended sediments may cause sea turtles to alter their normal movements, these minor movements will be too small to be meaningfully measured or detected. Sea turtles and whales breathe air and would be able to swim away from the turbidity plume and would not be adversely affected by passing through the temporary increase in total suspended solids (TSS). The Action Area is in open waters at the mouth of the Chesapeake Bay, it is expected that the sturgeon, sea turtles, and whales will be able to swim through the plume and/or avoid the area with no adverse effects (NOAA 2020). Due to the small localized area of the CBBT cover area, those adverse effects are considered discountable.

The manifold with the water jets stays 1 to 2 feet above the surface sediment as a tug pushes the working barge at speeds of up to 4 to 6 knots over the project area (Welp et al., 2017). This slow-moving action allows for any protected species in the project area to be able to leave the disturbance area from the turbidity plume and avoid vessel strikes.

Sediment removal may also cause effects on sturgeon and sea turtles by reducing and removing benthic prey species through the alteration of the existing biotic assemblages and habitat in the immediate vicinity of the CBBT and the WID trench. Sturgeon or sea turtles are not likely to use any portions of the Action Area as foraging grounds due to the absence of subaquatic vegetation, the substrate being a regularly maintained navigation channel, and high vessel transit in the area. Therefore, the alteration of the habitat as a result of sediment removal is not likely to remove critical amounts of prey resources for sturgeon or sea turtles. Therefore, there would not be any disruption of essential behaviors such as foraging.

Increased depths from dredging in estuarine environments also has the potential to alter salinity levels within the dredging footprint and can also potentially result in changes in Dissolved Oxygen (DO) levels. If DO levels drop significantly, anoxic conditions may ensue, which can result in stress induced illness or mortality to fish. However, after the WID of the CBBT cover material is complete, the WID trench will be filled to approximately -65 feet to -62 feet MLLW, which is only one to four feet deeper than the maximum allowable depth of the Federal Navigation Channel, resulting in minimal change of the final bathymetric elevation. Also, dredging operations have occurred in the project area and adjacent areas for more than 30 years, no dredging operation has been recorded to result in an anoxic fish kill or harmful algal bloom (2018 GRR/EA). Therefore, anoxic or hypoxic conditions, or harmful algal blooms following dredging operations seems unlikely with implementation of the Action Alternative. The behavioral response of estuarine fish species to TSS and turbidity has been documented in a number of studies; it has been found that the suspension of fine particles hinders gas exchange with the water by coating the respiratory epithelia of juvenile and adult fish (Clarke and Wilbur 2000). The larger suspended particles can be trapped in the gill filaments and fill the opercular cavity, which may lead to asphyxiation by prohibiting the passage of water through the gills (Johnston 1981; Clarke and Wilbur 2000). Even so, increased sediment loading in the water column is predicted to be temporary, with the effects subsiding within a few days or weeks of dredging or dredged material placement operations. Another behavioral response may be for fish and/or prey species to move away from the disturbance and visual effects. Overall, adverse impacts to fishes and fish habitat are predicted to be temporary in duration, and based on the water quality modeling conducted for the 2018 GRR/EA (Liu et al. 2017; Shen et al. 2017; Zhang et al. 2017; Wang et al. 2017), indicated salinity and DO impacts to range from negligible to minor in intensity.

Impacts on listed species from conventional dredging (e.g. mechanical and/or hopper), transport, and placement of material at the disposal site, and cumulative impacts (e.g. future vessel traffic, Virginia Port growth, exposure to contaminants, development, etc.) as a result of the project as a whole would be the same as those discussed in the 2018 Norfolk Harbor

Navigation Improvements Project GRR/EA, Appendix E2 Biological Assessment, and subsequent 2018 NMFS Batched Biological Opinion. Therefore, this analysis focuses only on the potential impacts from the alternative means and methods of using the WID method.

4.3.1. Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act, or MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan (FMP). Section 305(b)(2) of the MSA requires Federal action agencies to consult with National Marine Fisheries Service (NMFS) on all actions, or Proposed Actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH. As part of the EFH consultation process, the guidelines require Federal action agencies to prepare a written EFH Assessment describing the effects of that action on EFH (50 CFR 600.920(e)(1)). This SEA will serve to initiate consultation for the scope of the Proposed Action. An EFH assessment is included in Appendix E, "CBBT WID EFH Assessment" with the conclusion "adverse effect on EFH is not substantial."

4.3.2. Informal Endangered Species Act Section 7 Consultation

"Under Section 7 Federal agencies must consult with NOAA Fisheries when any action the agency carries out, funds, or authorizes may affect either a species listed as threatened or endangered under the Endangered Species Act (ESA), or any critical habitat designated for it. If the agency taking the action (referred to as the "action agency" under Section 7) concludes that the project is not likely to adversely affect (NLAA) listed species and/or critical habitat, they submit an informal consultation request to NOAA Fisheries (referred to as the "Consulting Agency" under Section 7) for concurrence. A NLAA determination is the appropriate conclusion to be made when effects on ESA listed species and/or critical habitat are expected to be discountable (extremely unlikely to occur), insignificant (so small they cannot be meaningfully measured, detected or evaluated), or wholly beneficial (all effects benefit the species and/or critical habitat). If consultation cannot be concluded informally because adverse effects to listed species are expected, the action agency must request formal consultation" (NOAA 2017).

USACE will be submitting and coordinating the Section 7 Consultation to NMFS NOAA Fisheries Protected Resources Division (PRD) alongside this SEA. USACE has made the preliminary determination and is seeking concurrence for "not likely to adversely affect" (NLAA) species listed as threatened or endangered within NMFS jurisdiction under the ESA of 1973 (Appendix G).

4.3.3. No-Action Alternative

Under the No-Action Alternative the Proposed Action would not occur; therefore, there would be no impacts to existing wildlife and aquatic biota.

4.4. SOILS

Sediment in the CBBT cover and WID trench project area is considered medium to fine-grained sand and gravel hydraulic backfill material from the time of the CBBT construction with embedded natural alluvial sediments and previously disturbed maintenance material along with undisturbed new work material, respectively. A geotechnical investigation was performed in 2014 by Furgo Consultants, Inc. in the footprint of the proposed new Thimble Shoal Parallel Tunnel which is located approximately 200 feet to the west of the western boundary of the existing CBBT. Two formations are estimated to exist within the CBBT Trench footprint; the top layer is a relatively thin layer (2-5 feet), described as the Baymouth Shoal Deposits (Qb) formation. This material is characterized as recent deposits of estuarine fine-grained sediments that are presently being deposited. Below the Qb layer lies the Channel Fill Deposits-Predominately Coarse Grained (Qcs) formation. This formation is approximately 20 feet thick and will be the majority of the WID trench new work material. The Qcs material is characterized as sandy silt to silty sand (Furgo, 2014).

A recent sediment investigation performed by EA Engineering characterized the physical characteristics of the CBBT cover area and the WID trench CBBT. The cover area is composed of sandy/gravel material and naturally deposited alluvial sediments, while the WID trench is composed of maintenance and new work sediment that comprise the Qb and Qcs geologic formations. To determine if WID trench dredged material may be suitable for placement at the DNODS, sediment and site water samples within the WID trench footprint were tested for compliance with MPRSA criteria or CWA 404(b)1 Guidelines (See Section 4.1). Physical testing of the material indicates the sediment grain size distribution are predominantly > 90%

sand and gravel in the CBBT cover material and approximately 75% sand and 25% silt/clay in the WID trench.

Long-term impacts, typical of dredging projects would be expected from the Proposed Action. Up to 250,000 CY of material would be dredged from the WID trench area to achieve a maximum depth of up to -70 feet MLLW. Suitable WID trench dredged material would be transported to the DNODS for ocean disposal. Approximately 43,000 CY of material from the CBBT cover area will be removed to achieve a depth of -61 feet MLLW and conveyed via a gravity-density gradient into the receiving trench via the WID method.

4.4.1. No-Action Alternative

Under the No-Action Alternative, the Proposed Action would not occur; therefore, there would be no impacts to soils.

4.5. BATHYMETRY

The CBBT was constructed in the 1960s using an immersed-tube method. The existing CBBT cover material between the toes of the Thimble Shoal Channel consists of a hydraulic fill and natural sediments that have deposited over time. The recent sampling event indicated the physical characteristics of the CBBT cover material is >90% sand and gravel (EA 2021). The WID trench location east of the CBBT follows the natural bathymetry of the lower Chesapeake Bay. The CBBT cover area and the WID trench within the Thimble Shoal Channel is currently maintained to a depth of -50 feet MLLW.

The proposed Project Action's intent is to remove sediment in the CBBT cover area in preparation for the PRB Project. Utilizing the water injection method of sediment removal, the CBBT cover area will be deepened to -61 feet MLLW. The WID adjacent receiving trench will be dredged to a depth of up to -70 feet MLLW temporarily in preparation to receive the WID cover material. The proposed dredging depths of the WID trench are intended to accept the cover material and contain that material below navigable depths and maximum maintenance dredging depths of -61 feet MLLW in the Thimble Shoal Channel. The result of this action would create long term impacts to the existing bathymetry which ranges from -51 feet MLLW to -57 feet MLLW over the entirety of the project footprint. It is anticipated that the surface elevation of the WID trench would eventually fill with natural/alluvial sediment to the elevation of the deepened/maintained channel.

Physical characteristics of the existing CBBT cover material indicate that the material transferred into the WID receiving trench will remain indefinitely within the trench. As the grab samples of the granular backfill over the tunnel indicate, the cover material is coarser than the surrounding in-situ materials within the channel (~4% fines compared to ~25% fines). Given that the natural sediments are fairly stable, it can be concluded that the coarser materials, located within a contained trench several feet deeper than the surrounding area, will likewise be stable and will not disperse.

4.5.1. No-Action Alternative

Under the No-Action Alternative, the Proposed Action would not occur; therefore, there would be no impacts to bathymetry.

4.6. WATER QUALITY

The Proposed Action would result in temporary impacts to water quality at the dredging and placement sites. Placement at the DNODS will receive MPRSA Section 103 concurrence from EPA prior to disposal.

4.6.1. Impacts to Water Quality at the WID Trench Dredging Site

Resuspension of sediment is expected with dredging however, this impact can be minimized through operational controls. Impacts to water quality from conventional dredging (i.e. clamshell bucket and/or hopper barge) dredging would be minor, temporary and localized to the area around the dredge. Localized turbidity would dissipate once dredging has ceased (USACE, 2018). Based on data collected from the 2020 sediment testing, event by E.A. Engineering, the ambient turbidity at the project location averaged to 2.56 NTU at the surface, and 9.86 NTU at the bottom of the water column. (EA 2021).

TSS concentrations associated with mechanical clamshell bucket dredging operations have been shown to range from 105 mg/L in the middle of the water column to 445 mg/L near the bottom (210 mg/L, depth- averaged) (USACE, 2001). TSS concentrations associated with a hopper barge dredging operation in the Thimble Shoal Channel in 1978 showed 2000mg/L in the overflow plume near-surface. In the absence of overflow, a turbidity plume is not encountered in the surface or middle of the water column depths and the maximum suspended sediment level in the near-bottom plume was 70 mg/L (USACE, 2015).

The Proposed Action will cause a temporary increase in the amount of turbidity and TSS in the action area; however, suspended sediment is expected to settle out of the water column within a few hours and any increase in turbidity and TSS will be short term. Increased depths from dredging in estuarine environments also has the potential to alter salinity levels within the dredging footprint and can also potentially result in changes in DO levels. The CBBT cover material is sandy/gravely with minimal fines and minimal organic material that may have an oxygen demand.

The flushing rate (due to the water exchange and tidal fluctuations) within the project area will minimize potential impacts due to changes in the DO levels. This flushing rate will also cause TSS/turbidity plumes to disperse quickly, minimizing long term impacts to water quality. These factors combined with the operational controls on the dredge will help to minimize impacts to water quality (Wilbur and Clarke 2001). The CBBT cover material is comprised of greater than 90% sand and gravel, which is expected to settle quickly into the WID trench. The WID trench material is approximately 25% fine-grained silt/clay and 75% fine-grained sand, also expected to have a high settling rate, comparable to the Thimble Shoal Channel dredging for the deepening. Due to the area of impact and relatively short duration of the dredging activity, the Proposed Action would not significantly impact water quality in the area of potential impacts.

4.6.2. Impacts to Water Quality at the CBBT Cover WID Site and WID Trench Placement Site

Impacts to water quality from the water injection method of dredging has showed to be minor and temporary. A study completed by the U.S. Army Engineer Research and Development Center indicated that most of the material moved by the WID in the upper Mississippi River remained within the bottom three to five feet of the water column and was not dispersed into the upper portion of the water column (Welp et al., 2017). The physical characteristics of the material in the CBBT cover area is comparable to the material found in the upper Mississippi River, therefore similar fall velocity effects are anticipated. The WID method induces very little TSS into the water column. Most of the fluidized material remains close to the density current. (Wilson, 2007).

The Proposed Action of WID of the CBBT cover material will cause a temporary increase in turbidity and TSS in the Action Area while the material is being fluidized, moved and deposited in the WID trench. The suspended solids are expected to follow the density gradient created by the construction of the WID trench and stay in the bottom few feet of the water column for a short period of time. The water quality impacts of deepening the CBBT cover area to -61 feet MLLW was considered in the 2018 GRR/EA. Due to the minimal impact of the suspended solids in the water column and relatively small Action Area, the Proposed Action would not significantly impact water quality.

4.6.3. Impacts to Water Quality at the Proposed Placement Site (DNODS)

Dredged material removed from the proposed WID trench site would be transported to the DNODS for ocean disposal. Temporary turbidity impacts to water quality during dredged material disposal would occur at the proposed placement site. Increased sediment loads in the water column can result in a reduction of DO through biochemical oxygen demand. These impacts may be more pronounced during late summer months when water temperatures are warmer and less capable of holding DO. Water quality impacts from dredged material placement at the DNODS was considered in the 2018 GRR/EA/BA. Analysis of elutriate data for both the CBBT material and the WID materials indicate that neither the dredging nor placement activities are expected to result in release of metals or organic contaminants to the water column above those reported in ambient site water or in excess of EPA and Commonwealth of Virginia acute water quality criteria for aquatic life. Due to the area of impact and relatively short duration of the discharge activity, the Proposed Action is not likely to significantly impact water quality.

4.6.4. No-Action Alternative

Under the No-Action Alternative, the Proposed Action would not occur; therefore, there would be no impacts to water quality.

4.7. BENTHIC FAUNA

The main composition of the Thimble Shoal Channel bottom was discussed in the 2018 GRR/EA as being sandy without shell and muddy sand without shell. The recent sediment investigation indicated that the channel bottom within the Action Area of the CBBT cover area is greater than 90% sand and gravel, and the upper five feet of material in the WID trench ranged from 58.1% to 78.4% sand and gravel (EA 2021). The existing overall health of the general benthic community of the Chesapeake Bay was last evaluated by the Chesapeake Bay Long-Term Benthic Monitoring Program in 2018. This program establishes an Index of Biological Integrity (IBI-Score) for Benthic Habitat in the Chesapeake Bay and its tributaries by measuring water quality, sediment quality and the abundance and richness of benthic invertebrates. In the most recently published data in 2018, the Benthic Habitat or IBI-score for the lower Chesapeake in the general location of the Action Area was determined to be “marginal” with a score of 2.7-2.9 and “meets goals” with a score of greater than 3.0 (CBBMP 2019).

The CBBT cover removal project would result in localized, temporary impacts to existing resources in the dredging area and placement sites. Some permanent, potential shifts in salinity and DO may occur with implementation of the Action Alternative from the increased depths in the channel. This could potentially reduce the B-IBI, however, most species found in the channel are quite tolerant of lower DO than more motile life, such as fish and blue crabs. However, the hydraulic modeling (Wang et al. 2017) conducted to simulate conditions of the Action Alternative indicate that this change would be negligible to minor and would not result in a composition change in the benthic community. The benthic community should repopulate within one to two years. Therefore, with implementation of the dredging activities and placement at the DNODS, it is anticipated that adverse impacts would be minor and temporary.

4.7.1. No-Action Alternative

Under the No-Action Alternative, the Proposed Action would not occur; therefore, there would be no impacts to benthic fauna.

4.8. NOISE AND VIBRATION

Noise and vibration sources from the proposed project include the project footprint to be dredged, dredged material placement/disposal areas, and the transit of dredging vessels through the project area. The 2018 GRR/EA evaluated the impacts of noise and vibration levels of conventional dredging methods with the conclusion that the relative level of impact would be slightly higher than the No Action Alternative due to dredging and dredged material placement (Appendix A). The noise levels of water injection dredging are comparable, if not lower than the conventional methods that were already discussed with 2018 GRR/EA (PLA, 2007).

4.8.1. No-Action Alternative

Under the No-Action Alternative, the Proposed Action would not occur; therefore, there would be no impacts from noise.

4.9. PLANKTON COMMUNITY

Plankton are free-floating organisms found in freshwater and marine ecosystems that are largely transported by wind and currents. Phytoplankton (microalgae) are tiny, single-celled organisms. Phytoplankton are primary producers because they generate food and oxygen in the Chesapeake Bay and its surrounding tributaries by a process called photosynthesis. To perform photosynthesis, phytoplankton need the energy of sunlight and they are typically found in the upper reaches of the water column. There are hundreds of species of phytoplankton in Chesapeake Bay but the most abundant phytoplankton in Chesapeake Bay and its surrounding tributaries are typically the diatoms and dinoflagellates (Chesapeake Bay Foundation 2015).

The abundance of phytoplankton in the Chesapeake Bay fluctuates seasonally with the highest abundance occurring during the spring when the highest concentration of nutrients flow into the Chesapeake Bay from melting snow and rain events. Nutrient pollution can cause algal blooms that can reduce oxygen levels in the Chesapeake Bay and its surrounding tributaries (Chesapeake Bay Foundation 2015). During a bloom, phytoplankton may accrue so densely in the water column that light availability for other photosynthetic organisms is diminished. After a bloom, phytoplankton sink to the benthos, which can produce anoxic conditions that can cause mortality of fish and other benthic organisms.

The area of potential impact for the plankton community includes the areas transited by dredging vessels/equipment, areas of navigation channel and Anchorage F dredged, and dredged material placement/disposal areas. The area of potential impact also includes the area of anticipated circulation patterns shifts and water quality impacts that has the potential to impact the plankton community. The geographic extent of water quality impacts is dependent upon factors such as the type of dredging equipment, the dredging depth, and environmental conditions such as wind and currents (USACE 1983). The impacts of the Proposed Action are considered localized and short-term due to the relatively small Action Area and short duration of dredging.

4.9.1. No-Action Alternative

Under the No-Action Alternative, the Proposed Action would not occur; therefore, there would be no impacts to the plankton community.

5. CONCLUSIONS

The Norfolk District USACE has prepared this NEPA documentation for the Proposed Action of dredging operations over the CBBT and the contiguous WID trench within the Thimble Shoal Channel in the southern portion of the Chesapeake Bay. The purpose of this project is to facilitate the construction of the CBBT Protective Rock Blanket Project to mitigate the planned Thimble Shoal Channel deepening with protection of the tunnel structure against possible vessel strikes and/or anchor drags. This SEA supports the 2018 GRR/EA Norfolk Harbor Navigation Improvements Project by evaluating the impacts from the means and methods of WID of the CBBT cover material which involves dredging of the proposed WID trench, the transport of WID trench dredged material for ocean placement at the DNODS, and the subsequent WID of the CBBT cover material and permanent placement of the cover material in the WID trench. The CBBT cover area will be dredged by WID to a maximum depth of -61 feet MLLW, which is necessary to allow for the planned three feet of protective cover installment. The WID trench will be dredged by conventional dredging methods to a maximum of -70 feet MLLW to accommodate the CBBT cover material. The WID trench dredged material will be transported to the DNODS for ocean disposal following EPA concurrence.

The Proposed Action needs to be completed to efficiently support the planned CBBT PRB project. The planned deepening of the Thimble Shoal Channel may reduce the depths of the channel over the CBBT to a maximum of -58 feet MLLW, meanwhile, the CBBT structure within the channel has features that are as shallow as -63 feet MLLW. Removal of the CBBT cover area sediment and placement of the PRB is necessary to protect the CBBT against vessel strikes and/or vessel anchor drags that may occur within the channel. The WID is the safest method to dredge the CBBT cover material in preparation for the PRB to minimize the potential for damage to the tunnel. Without the action of dredging the WID trench, using WID methods to dredge the CBBT cover will not be effective in removing the cover material in the absence of a downward gradient.

Short-term adverse impacts associated with the Proposed Action include localized impacts to the benthic environment at the dredging and placement sites. Temporary, localized adverse impacts to water quality, utilities, air emissions, noise, and benthos would occur at the dredging and placement sites. Long-term impacts to soils and bathymetry, typical for a dredging project, would be expected as a result of the Proposed Action.

The Proposed Action requires coordination with Federal, State and local agencies for the discharge of dredged material. Any required authorizations would be obtained prior to the start of construction.

This SEA was prepared by the Norfolk District USACE in compliance with the NEPA and all applicable implementing regulations. Based on the evaluation of environmental impacts described in Section 4 and summarized in Table 4.1, no significant impacts would be expected from the Proposed Action; therefore, an Environmental Impact Statement will not be prepared and a FONSI will be prepared and signed prior to the start of construction.

6. CONTACT INFORMATION

If you have any questions or wish to provide comments, please contact Javier Wright of the U.S. Army Corps of Engineers, Norfolk District, at JavierAnn.F.Wright@usace.army.mil or 757-201-7890.

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