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

Virginia Beach, Virginia

Appendix E:
Essential Fish Habitat Assessment

January 2021

Prepared By:
U.S. Army Corps of Engineers
Operations Branch
803 Front Street
Norfolk, Virginia 23510

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

Reply to
Attention of

January 28, 2021

Operations Branch

Mr. David O'Brien
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 1346
1370 Greate Road
Gloucester Point, Virginia 23062

Re: Request for Essential Fish Habitat Consultation Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, for the Supplemental Norfolk Harbor Navigation Improvements Project – Thimble Shoal Channel, Chesapeake Bay Bridge Tunnel (CBBT) – Protective Rock Blanket (PRB) Project, Virginia Beach, Virginia

Dear Mr. O'Brien:

The U.S. Army Corps of Engineers, Norfolk District (USACE) is requesting to initiate Essential Fish Habitat (EFH) consultation with the National Oceanographic and Atmospheric Administration, National Marine Fisheries Service (NMFS) pursuant to Section 305(b)(2) of the Manguson-Stevens Fishery Conservation and Management Act and in accordance with 50 Code of Federal Regulations 600.06 – 600.930. The Act requires an EFH consultation for an action or proposed action authorized, funded, or undertaken by a Federal agency that may adversely affect EFH.

The scope of the consultation is to coordinate the updated means and methods for the Norfolk Harbor Navigation Improvements Project – Thimble Shoal Channel, CBBT – PRB Project, Virginia Beach, Virginia. The updated scope of the Supplemental CBBT – PRB Project consists of the following actions:

- Construction of a water injection dredging (WID) trench east of the CBBT - PRB site, via conventional dredging (i.e. clamshell bucket and/or hopper) to a maximum depth of -70 feet (ft) mean lower low water (MLLW), 1,200 ft long and 525 ft wide, removing approximately 250,000 cubic yards;
- Transport and placement of suitable WID trench material at the Dam Neck Ocean Disposal Site;
- Water injection dredging of the existing CBBT cover material to -61 ft MLLW of an area that is 150 ft wide by 1,200 ft long;
- Dredged material placement of the CBBT cover material through WID methods into the WID trench.

Attached for your review is the *Chesapeake Bay Bridge Tunnel – Protective Rock Blanket Essential Fish Habitat Assessment* with the EFH anticipated to occur and potential effects to EFH within the Region of Influence. USACE made the preliminary determination that the implementation of the updated CBBT-PRB scope *may affect, but not likely to substantially adversely affect Essential Fish Habitat.*

A Draft Supplemental Environmental Assessment (SEA) for the Norfolk Harbor Navigation Improvements Project – Thimble Shoal Channel, Chesapeake Bay Bridge Tunnel – Protective Rock Blanket Project, pursuant to the National Environmental Policy Act is being released for public review for a 60-day public and agency review. A public notice with links to the draft SEA and its appendices will be listed on the Norfolk District USACE (http://www.nao.usace.army.mil/) website.

Should you have any questions or require further information regarding this EFH consultation request, please contact Mrs. Javier Wright of my staff at (757) 201-7890 or via email JavierAnn.F.Wright@usace.army.mil. Thank you for your assistance.

Sincerely,

Keith B. Lockwood

Keith B. Lockwood
Chief, Water Resources Division
Norfolk District, U.S. Army Corps of Engineers

EFH ASSESSMENT WORKSHEET

General Project Information

Date Submitted: January 29, 2021

Project/Application Number:

Project Name: CBBT Protective Rock Blanket SEA

Project Sponsor/Applicant: U.S. Army Corps of Engineers

Federal Action Agency (if state agency acting as delegated): USACE

Fast-41 or One Federal Decision Project: ☐ Yes ☑ No

Action Agency Contact Name: Javier Wright

Contact Phone: 757-201-7890 Contact Email: Javierann.F.Wright@usace.army.mil

Latitude: 36.97 Longitude: -76.11

Address, City/Town, State:

Thimble Shoals Channel, Chesapeake Bay Bridge Tunnel (CBBT), Virginia Beach, VA

Body of Water: Mouth of the Chesapeake Bay

Project Purpose:

To dredge the CBBT cover material in preparation for the CBBT Protective Rock Blanket project - an element of the Norfolk Harbor Navigation Improvements Project.

Project Description:

The updated scope of this project supplements the 2018 EA coordination that was completed for the Norfolk Harbor Navigation Improvements Project. The means and methods of the CBBT - Protective Rock Blanket have been further developed to incorporate dredging methods that were not evaluated in the 2018 EA. Water injection dredging (WID) is currently proposed to dredge the CBBT cover material. This method pumps a high volume of water into bottom sediments to fluidize, displace, and convey the material. The cover area is 150 ft wide by 1,200 ft long and will be dredged to -61 ft MLLW removing approximately 43,000 cy of dredged material. The WID method requires an adjacent trench to be constructed contiguous on the east side of the CBBT cover area to receive the material. The receiving trench depth may be up to -70 ft MLLW with maximum trench dimensions of 1,200 ft long and 525 ft wide removing up to 250,000 cy to contain the CBBT cover material below navigable depths.

Anticipated Duration of In-Water Work or Start/End Dates:

Approximate start date of 06/01/2022 and end date of 03/01/2023

Habitat Description

EFH includes the biological, chemical, and physical components of the habitat. This includes the substrate and associated biological resources (e.g., benthic organisms, submerged aquatic vegetation, shellfish beds, salt marsh wetlands), the water column, and prey species.

Is the project in designated EFH[2]? ☑ Yes ☐ No

Is the project in designated HAPC[2]? ☑ Yes ☐ No

Is this coordination under FWCA only? ☑ Yes ☐ No

Total area of impact to EFH (indicate sq ft or acres): 1,000 acres

Total area of impact to HAPC (indicate sq ft or acres): 1,000 acres

Current water depths: 53 to 58 feet Salinity: 25-30ppt Water temperature range: 34-84F

Sediment characteristics[3]: Fine to medium grained sand and gravel (75-90%)

What habitat types are in or adjacent to the project area and will they be permanently impacted? Select all that apply. Indicate if impacts will be temporary, if site will be restored, or if permanent conversion of habitat will occur. A project may occur in overlapping habitat types.

	Habitat Type	**Total impact (sq ft/acres)**	**Impacts are temporary**	**Restored to pre-existing conditions**	**Permanent conversion of all or part of habitat**
☑	Marine	19 acres	Temporary	No	No
☐	Estuarine				
☐	Riverine (tidal)				
☐	Riverine (non-tidal)				
☐	Intertidal				
☑	Subtidal	19 acres	Temporary	No	No
☑	Water column	1,000 acres	Temporary	Yes	No
☐	Salt marsh/ Wetland (tidal)				
☐	Wetland (non-tidal)				

[2] Use the tables on pages 7-9 to list species with designated EFH or the type of designated HAPC present.
[3] The level of detail is dependent on your project – e.g., a grain size analysis may be necessary for dredging.

	Habitat Type	Total impact (sq ft/acres)	Impacts are temporary	Restored to pre-existing conditions	Permanent conversion of all or part of habitat
☐	Rocky/hard bottom[4]:				
☑	Sand	19 acres	Temporary	Yes	No Conversion
☐	Shellfish beds or oyster reefs				
☐	Mudflats				
☐	Submerged aquatic vegetation (SAV)[5], macroalgae, epifauna				
☐	Diadromous fish (migratory or spawning habitat)				

Indicate type(s) of rocky/hard bottom habitat (pebble, cobble, boulder, bedrock outcrop/ledge) and species of SAV:

N/A

Project Effects

Select all that apply	Project Type/Category
☐	Hatchery or Aquaculture
☐	Agriculture
☐	Forestry
☐	Military (e.g., acoustic testing, training exercises)
☐	Mining (e.g., sand, gravel)
☐	Restoration or fish/wildlife enhancement (e.g., fish passage, wetlands, beach renourishment, mitigation bank/ILF creation)

[4] Indicate type(s). The type(s) of rocky habitat will help you determine if the area is cod HAPC.
[5] Indicate species. Provide a copy of the SAV report and survey conducted at the site, if applicable.

Select all that apply	Project Type/Category
☐	Infrastructure/transportation (e.g., culvert construction, bridge repair, highway, port)
☐	Energy development/use
☐	Water quality (e.g., TMDL, wastewater, sediment remediation)
☑	Dredging/excavation and disposal
☐	Piers, ramps, floats, and other structures
☐	Bank/shoreline stabilization (e.g., living shoreline, groin, breakwater, bulkhead)
☐	Survey (e.g., geotechnical, geophysical, habitat, fisheries)
☐	Other

Select all that apply	Potential Stressors Caused by the Activity	Select all that apply and if temporary or permanent		Habitat alterations caused by the activity
		Temp	Perm	
☑	Underwater noise			
☑	Water quality/turbidity/ contaminant release	☐	☑	Water depth change
☑	Vessel traffic/barge grounding	☐	☐	Tidal flow change
☐	Impingement/entrainment[6]	☐	☑	Fill
☐	Prevent fish passage/spawning	☐	☐	Habitat type conversion
☑	Benthic community disturbance			Other:
☑	Impacts to prey species			Other:

[6] Entrainment is the voluntary or involuntary movement of aquatic organisms from a water body into a surface diversion or through, under, or around screens and results in the loss of the organisms from the population. Impingement is the involuntary contact and entrapment of aquatic organisms on the surface of intake screens caused when the approach velocity exceeds the swimming capability of the organism.

Details: project impacts and mitigation

The level of detail that you provide should be commensurate with the magnitude of impacts associated with the proposed project. Attach supplemental information if necessary.

Describe how the project would impact each of the habitat types selected above. Include temporary and permanent impact descriptions and direct and indirect impacts.

See supporting document

What specific measures will be used to avoid impacts, including project design, turbidity controls, acoustic controls, and time of year restrictions? If impacts cannot be avoided, why not?

See supporting document

What specific measures will be used to minimize impacts?

See supporting document

Is compensatory mitigation proposed? ☐ Yes ☑ No

If no, why not? If yes, describe plans for mitigation and how this will offset impacts to EFH. Include a conceptual compensatory mitigation and monitoring plan, if applicable.

No permanent impacts are expected from this undertaking.

Federal Action Agency's EFH determination (select one)	
☐	There is no adverse effect[7] on EFH or EFH is not designated at the project site. EFH Consultation is not required. This is a FWCA-only request.
☑	The adverse effect[7] on EFH is not substantial. This means that the adverse effects are no more than minimal, temporary, or can be alleviated with minor project modifications or conservation recommendations. This is a request for an abbreviated EFH consultation.
☐	The adverse effect[7] on EFH is substantial. This is a request for an expanded EFH consultation. We will provide more detailed information, including an alternatives analysis and NEPA document, if applicable.

EFH and HAPC designations[8]

Use the EFH mapper to determine if EFH may be present in the project area and enter all species and lifestages that have designated EFH. Optionally, you may review the EFH text descriptions linked to each species in the EFH mapper and use them to determine if the described habitat is present. We recommend this for larger projects to help you determine what your impacts are.

Species	EFH is designated/mapped for:				Habitat present based on text description (optional)
	EFH: eggs	EFH: larvae	EFH: juvenile	EFH: adults/ spawning adults	
Little Skate	☐	☐	☐	☑	☐
Atlantic Herring	☐	☐	☑	☑	☐
Red Hake	☑	☑	☑	☑	☐
Windowpane Flounder	☐	☐	☑	☑	☐

[7] An **adverse effect** is any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

[8] Within the Greater Atlantic Region, EFH has been designated by the New England, Mid-Atlantic, and South Atlantic Fisheries Management Councils and NOAA Fisheries.

Species	EFH is designated/mapped for:				Habitat present based on text description (optional)
	EFH: eggs	EFH: larvae	EFH: juvenile	EFH: adults/ spawning adults	
Winter Skate	☐	☐	☐	☑	☐
Clearnose Skate	☐	☐	☑	☑	☐
Sandbar Shark	☐	☐	☑	☑	☐
Atlantic Sharpnose Shark	☐	☐	☑	☑	☐
Sand Tiger Shark	☐	☐	☑	☑	☐
Sand Tiger Shark	☐	☐	☑	☑	☐
Bluefish	☐	☐	☑	☑	☐
Atlantic Butterfish	☑	☑	☑	☑	☐
Scup	☐	☐	☑	☑	☐
Summer Flounder	☐	☑	☑	☑	☐
Black Sea Bass	☐	☐	☑	☑	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

HAPCs

Select all that are in your action area.

☑	Summer flounder: SAV[9]	☐	Alvin & Atlantis Canyons
☑	Sandbar shark	☐	Baltimore Canyon
☐	Sand Tiger Shark (Delaware Bay)	☐	Bear Seamount
☐	Sand Tiger Shark (Plymouth-Duxbury-Kingston Bay)	☐	Heezen Canyon
☐	Inshore 20m Juvenile Cod	☐	Hudson Canyon
☐	Great South Channel Juvenile Cod	☐	Hydrographer Canyon
☐	Northern Edge Juvenile Cod	☐	Jeffreys & Stellwagen
☐	Lydonia Canyon	☐	Lydonia, Gilbert & Oceanographer Canyons
☐	Norfolk Canyon (Mid-Atlantic)	☐	Norfolk Canyon (New England)
☐	Oceanographer Canyon	☐	Retriever Seamount
☐	Veatch Canyon (Mid-Atlantic)	☐	Toms, Middle Toms & Hendrickson Canyons
☐	Veatch Canyon (New England)	☐	Washington Canyon
☐	Cashes Ledge	☐	Wilmington Canyon

[9] Summer flounder HAPC is defined as all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH. In locations where native species have been eliminated from an area, then exotic species are included. Use local information to determine the locations of HAPC.

EFH Data Notice: Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional Fishery Management Councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

Greater Atlantic Regional Office
Atlantic Highly Migratory Species Management Division

Query Results

Degrees, Minutes, Seconds: Latitude = 36º58'28" N, Longitude = 77º53'23" W
Decimal Degrees: Latitude = 36.97, Longitude = -76.11

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

*** W A R N I N G ***

Please note under "Life Stage(s) Found at Location" the category "ALL" indicates that all life stages of that species share the same map and are designated at the queried location.

EFH

Show	Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
			Little Skate	Adult	New England	Amendment 2 to the Northeast Skate Complex FMP
			Atlantic Herring	Juvenile Adult	New England	Amendment 3 to the Atlantic Herring FMP
			Red Hake	Adult Eggs/Larvae/Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP
			Windowpane Flounder	Adult Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP
			Winter Skate	Adult	New England	Amendment 2 to the Northeast Skate Complex FMP
			Clearnose Skate	Adult Juvenile	New England	Amendment 2 to the Northeast Skate Complex FMP

Show	Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
			Sandbar Shark	Adult Juvenile Neonate	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
			Atlantic Sharpnose Shark (Atlantic Stock)	Adult Juvenile	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
			Sand Tiger Shark	Neonate/Juvenile Adult	Secretarial	Amendment 10 to the 2006 Consolidated HMS FMP: EFH
			Bluefish	Adult Juvenile	Mid-Atlantic	Bluefish
			Atlantic Butterfish	Eggs Larvae Adult Juvenile	Mid-Atlantic	Atlantic Mackerel, Squid,& Butterfish Amendment 11
			Scup	Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
			Summer Flounder	Larvae Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass
			Black Sea Bass	Juvenile Adult	Mid-Atlantic	Summer Flounder, Scup, Black Sea Bass

HAPCs

Show	Link	Data Caveats	HAPC Name	Management Council
			Sandbar Shark	AHMS
			Summer Flounder (Mid Atlantic)	MAFMC

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data.
****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**

Mid-Atlantic Council HAPCs,
No spatial data for summer flounder SAV HAPC.

Project Scope

This EFH consultation supplements the 2018 Norfolk Harbor Navigation Improvements Project General Reevaluation Report/Environmental Assessment (GRR/EA), Appendix H Final EFH Assessment. The 2018 GRR/EA analyzed conventional dredging methods (e.g. mechanical and hopper) to remove the CBBT cover material as a part of the CBBT Protective Rock Blanket (PRB) Project. During subsequent preconstruction engineering and design efforts, concerns about risk to the tunnel structure were raised. Through the alternatives analysis in Section 3 of the Supplemental Environmental Assessment (SEA), Water Injection Dredging (WID) was identified as a safer dredging method to reduce risk to the existing CBBT structure and was selected as the Preferred Alternative to remove the CBBT cover material.

This WID 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, without making physical direct contact with the channel bottom. The WID method will require additional new work dredging by conventional dredging methods (e.g. mechanical or hopper dredging) in a limited area adjacent to and east of the CBBT cover area within the Thimble Shoal Channel (TSC) to construct a receiving trench for the CBBT cover material removed via WID methods. The WID Trench will act as the permanent placement site for the CBBT cover material. The Proposed Action also includes transport of suitable new work dredged material from construction of the WID trench for placement at Dam Neck Ocean Disposal Site (DNODS) located in federal waters.

The new work conventional dredging (including mechanical and hopper) methods of the Norfolk Harbor Channels including the CBBT PRB project were specifically addressed in the 2018 GRR/EA EFH Assessment. After USACE consultation with the National Marine Fisheries Service, the effects conclusion was determined to be “negligible to minor, adverse impacts to some EFH is anticipated, however no impacts are anticipated to substantively impact EFH.” 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/EA EFH Assessment, USACE Norfolk District has determined that the conventional new work

dredging portion of the proposed alternative is covered in the 2018 GRR/EA FCD finalized on 20 March 2018. Therefore, this EFH assessment mainly focuses on the impacts associated with the WID methodology.

Scope of Dredging and Dredged Material Placement

The tunnel cover area proposed for removal is approximately 150 feet wide by 1,200 feet long area (Figure 1) in the Thimble Shoal Channel over the existing CBBT. Dredging of the CBBT cover area will be performed by WID means and methods to a maximum depth of -61 feet MLLW displacing up to 43,000 cubic yards (CY) of material for permanent dredged material placement into the adjacent WID trench. The construction of the WID trench will be required in order to facilitate the displacement of the CBBT cover material through a downgradient density current, and to act as a depository for the dredged material. 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. The proposed depth of the WID trench is also necessary to effectively contain the CBBT cover dredged material below the maximum authorized dredging prism of the Thimble Shoal Channel of -61 feet MLLW. The receiving trench will be rectangular in shape, up to 1,200 feet long and 525 feet wide, approximately 15 acres in size and contiguous with the CBBT cover area. Construction of the WID trench will require the removal of approximately 250,000 cy of dredged material within the channel footprint. The WID trench will be dredged by a mechanical or hopper dredge and placed onto ocean-going vessel/scow for dredged material transport to the DNODS (Figure 2).

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 dredged material discussed in this assessment and in the 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.

Dredging of the WID trench and CBBT cover area is expected to commence in June/July 2022 and be completed within approximately 180 to 270 days.

EFH Assessment Supplemental Questions

Describe how the project would impact each of the habitat types selected above. Include temporary and permanent impact descriptions and direct and indirect impacts.

- Noise

Noise and vibration sources from the proposed project are likely to occur in the project footprint and action area as a result of the water injection dredge, dredged material placement/disposal areas, and the transit of dredging and support vessels through the project area. The 2018 GRR/EA evaluated the impacts of noise and vibration levels of hydraulic pipeline cutterhead dredges, hopper dredges, bucket dredges. The noise levels of water injection dredging (WID) are comparable, if not lower than the conventional methods that were already discussed with 2018 GRR/EA (PLA, 2007). Therefore, minimal temporary impacts from WID are expected.

- Water Quality

The Proposed Action would result in temporary impacts to water quality at the dredging and placement sites. Placement of the WID trench material at the DNODS must receive MPRSA Section 103 concurrence from EPA prior to disposal. Placement of the CBBT cover material through WID methods must receive State 401 Water Quality Certification prior to the start of construction.

  - *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 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. It should be noted, the CBBT cover material is sandy/gravely with minimal fines and 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 dilute and disperse quickly, minimizing long-term impacts to water quality. These factors combined with the operational controls like enclosed buckets 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.

- *Impacts to Water Quality at the CBBT Cover Water Injection Dredging Site and 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 physically comparable to the material found in the upper Mississippi River, therefore similar fall or settling velocity effects are anticipated. The WID method has been shown to induce very little TSS into the water column. Most of the fluidized material remains close to the sediment bed in a 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, displaced 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. Due to the minimal impact of the suspended solids in the water column and relatively small Action Area, the Proposed Action of WID would not significantly impact water quality.

- *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, pending EPA concurrence. Temporary turbidity impacts to water quality during dredged material disposal would occur at the proposed placement site. The material plume will primarily settle through the lower half of the water column due to the high density of the dredged material and the estimated release point for the dredged material in fully loaded scows or hopper dredges varies between -19 to -30 feet below the sea surface depending on the vessel characteristics. 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. 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 acute water quality criteria for aquatic life. Water column bioassay results do not indicate the dredged material will result in acute toxicity to appropriately sensitive benchmark organisms exposed to the liquid and suspended particulate phase of dredged material.

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 at the DNODS.

- Vessel Traffic

Vessel traffic impacts from the water injection dredging barge will be short in duration, causing minor and temporary effects. The Proposed Action of WID is projected to be short in duration, with a period of performance of approximately 270 days. The long term impacts of vessel traffic from the Norfolk Harbor Navigation Improvements Project were assessed in the 2018 GRR/EA, concluding that the vessel traffic would actually decrease with the planned deepening of the Norfolk Harbor Channels because larger ships in the fleet would carry more goods, thus requiring a smaller number of ships to transport the same amount of goods.

- Benthic Community Disturbance

The CBBT cover removal project would result in localized, temporary impacts to existing resources in the dredging area and placement sites. The dredging activities within the CBBT cover area, WID trench and placement at the DNODS would result in the destruction of the existing non-motile benthic community; however, repopulation of benthic organisms within the impact area would begin quickly. The benthic community should repopulate within one to two years.

- Impacts to Prey Species

Impacts to migration and spawning of prey species can lead to indirect adverse impacts to EFH designated for bluefish, summer flounder, windowpane flounder, and other piscivorous fishes that feed on anadromous fishes migrating through the Action Area. The extent of the turbidity plume in the Action Area is expected to be minor due to the high density of the dredged material and high fall rate. The Action Area is centered in the middle of the mouth of the Chesapeake Bay; a 22,000-meter open water project area which allows for migrating prey species to continue to migrate around the dredging site.

Benthic impacts from dredging activities will likely result in some mortality of benthic prey species consumed by managed fishes, but it is likely that these prey species would quickly re-colonize the area following dredging events and essential habitats would return to their current

state. While we would anticipate impacts to managed species as a result of increased depths and dredging frequency of the federal navigation channels, impacts are anticipated to be minor and temporary in nature.

- Water Depth Change

The water depth of the WID trench will be increased to a maximum depth of -70 ft MLLW for a short duration, anticipating the acceptance of the CBBT cover material. After the WID of the CBBT cover area, and as the fluidized material is conveyed to the WID trench, it is expected that the water depth will vary but be no shallower than -61 ft MLLW within the WID trench at completion of project activities. Natural shoaling processes of native alluvial sediments is expected to accrete in the WID Trench until the area reaches an equilibrium with surrounding channel depths. Therefore, changes in the water depth of the WID trench would be temporary.

- Fill

The CBBT cover area was tested to determine dredged material suitability for placement in Waters of the U.S. in accordance to Section 404 of the Clean Water Act of 1977 (Public Law 95-217). The Norfolk District has determined that the dredged material from the CBBT cover area, proposed for WID and WID trench placement, complies with the Section 404(b)(1) of the Clean Water Act. The preliminary characterization data generated and presented in the Supplemental Environmental Assessment were in accordance with Section 404 (b)(1) Guidelines developed by EPA in conjunction with the USACE (Appendix H).

What specific measures will be used to avoid impacts, including project design, turbidity controls, acoustic controls, and time of year restrictions? If impacts cannot be avoided, why not?

The project is designed with the minimal footprint necessary to complete the project purpose, minimizing impact to the essential fish habitat. Turbidity impacts from the water injection dredging method are mainly unavoidable but are considered to have lower adverse effects compared to conventional methods (i.e. hopper and clamshell). Turbidity from the WID method are anticipated to remain in the lower 3 feet to 5 feet of the water column (Welp et al., 2017). The fine to medium grained sand in the within the project area will likely settle out of the water column at a faster rate than fine sediments, minimizing the impacts of the turbidity caused by the WID method.

The project location is within the Thimble Shoal Channel at the mouth of the Chesapeake Bay. The width of the Bay is approximately 22,000 meters wide at the project location, allowing for aquatic life in the project area to be able to leave the disturbance area out of the turbidity plume.

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. 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).

What specific measures will be used to minimize impacts?

- Agitation and operation of the water injection dredging would not begin until the manifold is in the immediate vicinity of the substrate, minimizing turbidity in the upper water column.
- Disposal of dredged material will occur within the confines of the Dam Neck Ocean Disposal Site and within the WID trench. No unconfined disposal of contaminated sediments would occur with implementation of the Action Alternative.

Figures

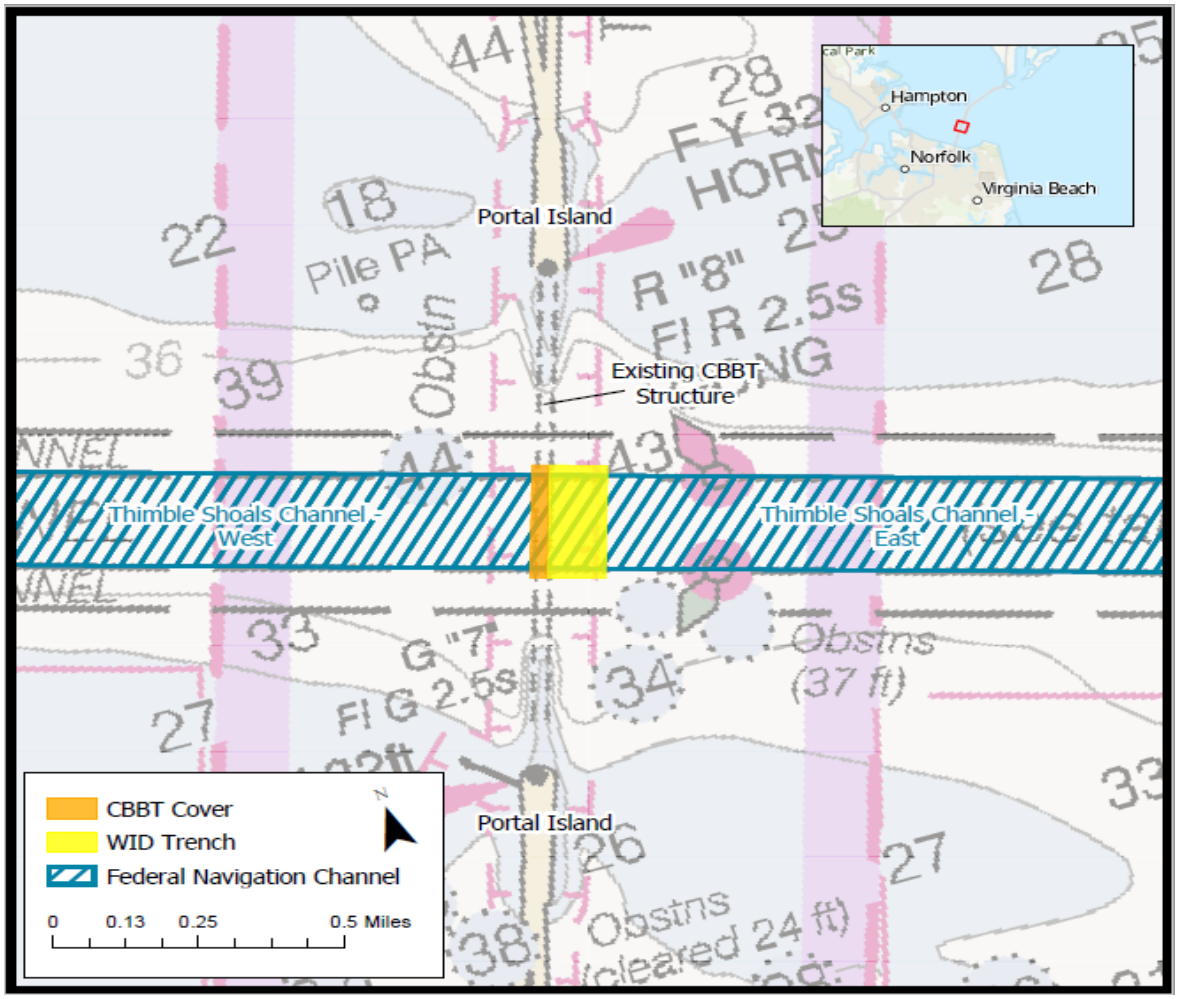

Figure 1: Project Location

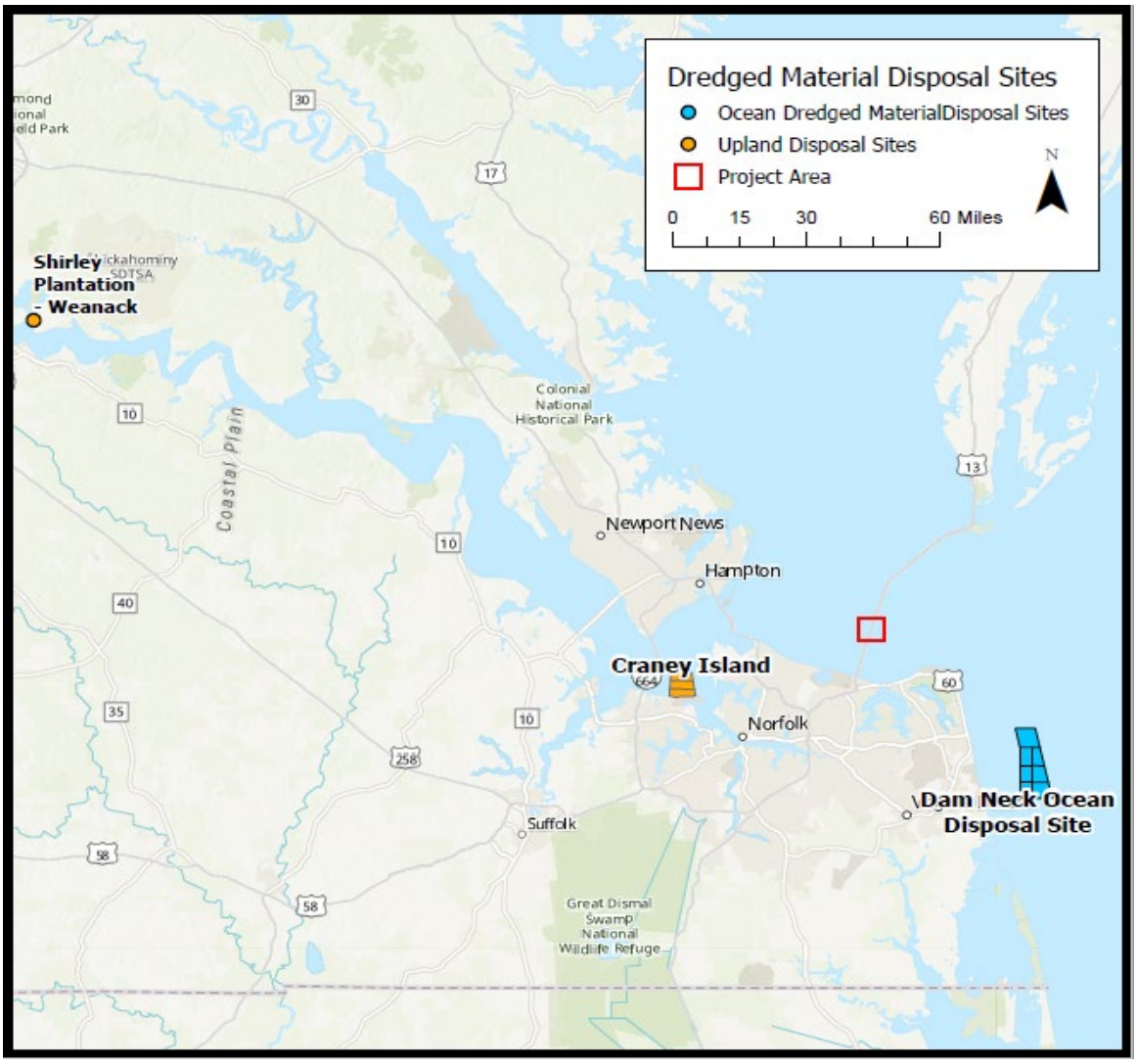

Figure 2: Dam Neck Ocean Disposal site in relation to project area (Preferred Alternative)

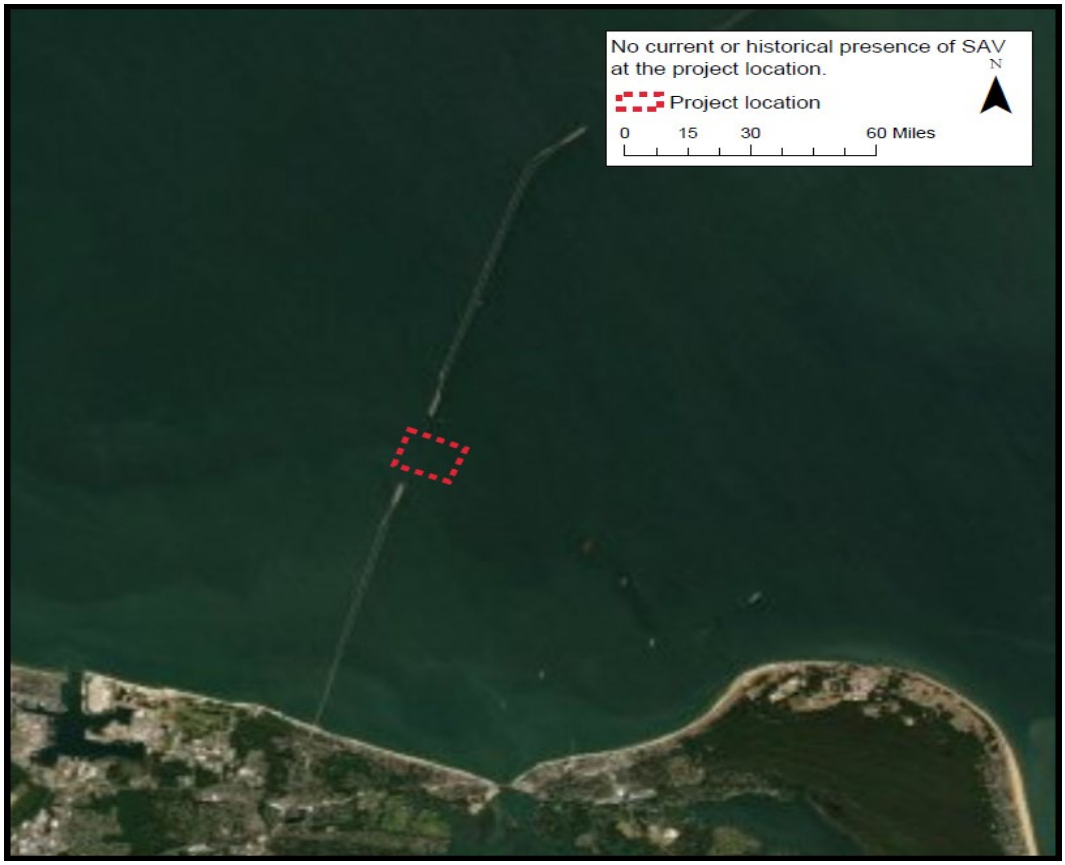

Figure 3: SAV Presence in the Project Area

References

EA Engineering, Science, and Technology, Inc. 2021. Evaluation of Dredged Material: Norfolk Harbor Improvements Project –Thimble Shoal Channel, Meeting Area 2, CBBT Cover. Prepared for Virginia Port Authority.

Port of London Authority (PLA). June 2007. Baseline Document for Maintenance Dredging.
U.S. Army Corps of Engineers (USACE) June 2018. Norfolk Harbor Navigation Improvements. Final General Reevaluation Report and Environmental Assessment.

U.S. Army Corps of Engineers (USACE). July 2015. Dredging and Dredged Material Management, Engineer Manual. EM 1110-2-5025. Washington, DC: http://publications.usace.army.mil/publications/

U.S. Army Corps of Engineers (USACE). 2001. Monitoring of Boston Harbor confined aquatic disposal cells. Compiled by L.Z. Hales, ACOE Coastal and Hydraulics Laboratory. ERDC/CHLTR-01-27.

Welp, T. L., M. W. Tubman, D. A. Wilson, and C. E. Pollock. 2017. Water injection dredging. ERDC TN-DOER-T14. Vicksburg, MS: U.S. Army Engineer Research and Development Center. www.wes.army.mil/el/dots/doer

Wilbur, D.H. and D.G. Clarke. 2001. Biological effects of suspended sediments: A review of suspended sediment impacts on fish and shellfish with relation to dredging activities in estuaries. North American Journal of Fisheries Management 21:4, 855-875.

Wilson, D. A. 2007. Water injection dredging in U. S. waterways: History and expectations. In Proceedings, World Dredging Congress. Orlando, FL.