NORTH CAROLINA PORTS

Wilmington Harbor, North Carolina
Navigation Improvement Project

Integrated
Section 203 Study
&
Environmental Report

APPENDIX M

SECTION 404 (B)(1) EVALUATION

June 2019

Section 404 (b) (1) Evaluation
For the Wilmington Harbor North Carolina
Navigation Improvement Project
Integrated Section 203 Study & Environmental Report

1 INTRODUCTION

Section 404(b)(1) of the Clean Water Act (CWA) of 1972 requires that any proposed discharge of dredged or fill material into waters of the United States must be evaluated using the guidelines developed by the Administrator of the United States Environmental Protection Agency (EPA) in conjunction with the Secretary of the Army. These guidelines can be found in Title 40, Part 230 of the Code of Federal Regulations (CFR). The following evaluation is prepared in accordance with the guidelines and follows the recommended format contained in Engineering Regulations (ER) 1105-2-100, of 28 December 1990. (Note that the proposed placement of material into the Ocean Dredged Material Disposal Site (ODMDS) is not included in this evaluation. Use of the ODMDS is regulated by the Marine Protection Research and Sanctuaries Act, and not the CWA. Information on the proposed use of the ODMDS is included within the main body of this Feasibility Study\Environmental Impact Statement [FS\EIS]. More detailed information on the ODMDS can be found in the Wilmington ODMDS Site Management and Monitoring Plan (SMMP) updated in December 2012 [EPA and United States Army Corps of Engineers (USACE) 2012].

2 PROJECT DESCRIPTION

The Wilmington Harbor Deepening Project (proposed project) would include deepening the federal navigation channel to 47-foot Mean Low Low Water (MLLW) depth to the Battery Island range and all ranges up to and including the Lower Anchorage. From Southport the Range to the pilot station, the depth will be increased to -49 feet (ft) MLLW to allow for adequate under keel clearance in areas affected by ocean waves. The improved channel will extend 48,000 out to sea from the junction with Baldhead Reach 3 to reach water that is consistently deeper than the maintained channel depth of -49 ft MLLW. The range offshore of the current pilot boarding station (Sta 490+00) will have a heading of approximately 30 degrees (°) (inbound), which, is approximately 16° shifted from Bald Head Shoal Reach 3 (14°). The purpose of this heading change is to reach deeper water in the most direct path and reduce dredging costs. In addition, the existing Lower Anchorage Basin, a portion of which is used to turn vessels, will be dredged from the existing authorized depth of -42 ft MLLW to -47 ft MLLW.

Construction dredging material will be placed within the New Wilmington ODMDS. Dredged sediment is expected to primarily include fine- to medium-grained sand with fines from the upper channel reaches and the anchorage basin. Dredged rock is expected to be siltstone and sandstone (sedimentary rock). Beneficial use of dredged material is being evaluated for:

- Beach placement on Bald Head Island and Oak Island;
- Battery Island shore placement;
- South Pelican and Ferry Slip Island restoration;
- Island creation adjacent to South Pelican and Ferry Slip Islands; and
- Wetland restoration on Battery, Shellbed, and Striking Islands using thin-layer placement.

A total of 56 aids to navigation are included in the -47-foot plan, which includes new offshore range markers, new and relocated Lateral Buoys, and relocated inshore range markers, including:

- Range Markers (steel multi-pile jacket structures, varying height steel skeleton towers with ranger markers attached):
    - Two (2) new range markers
    - Relocate ten (10) range markers
    - Buoys (floating aids with anchors and attached lights):
- Thirteen (13) new lateral marker buoys (this number could go up or down a couple depending on whether bend wideners are installed at each bend).
    - Relocate up to thirty-eight (38) lateral marker buoys.
    - Relocate the sea buoy.

The USACE anticipates that the project will require up to three years of construction.

2.1 Project Location

The Port of Wilmington is located in southeastern North Carolina, approximately 28 miles up the Cape Fear River from the Atlantic Ocean. The Cape Fear River borders Brunswick County to the west and New Hanover County to the east. The port has excellent intermodal transportation connections. Interstate Highway 40 connects Wilmington to the state capital Raleigh, and Interstate 95. State highway 74 and Interstate highway 74 connect the port to Charlotte, the state's most populous city. The CSX rail system connects the Port of Wilmington directly to intermodal transfer facilities in Charlotte. The Port of Wilmington is also connected to the CSX Carolina Connector rail hub.

2.2 Authority and Purpose

Construction of the federal navigation channel to its current dimensions was originally authorized as three separate projects by the Water Resources Development Acts of 1986 (WRDA 86), Public Law (PL) 99-662 and 1996 (WRDA 96), PL 104-303, PL 105-62, The Energy and Water Development Appropriations Act of 1998, combined the Wilmington Harbor Northeast Cape Fear River Project (WRDA 1986), the Wilmington Harbor Channel Widening Project (WRDA 1996), and the Cape Fear-Northeast (Cape Fear) Rivers Project (WRDA 1996) under a single project known as the Wilmington Harbor 96 Act Project. Completed improvements under the Wilmington Harbor 96 Act Project include deepening the ocean bar and entrance channels from the authorized depth of 40 ft to 44 ft; deepening the authorized 38-foot project to 42 ft through the Cape Fear Memorial Bridge (including the anchorage basin); widening the existing 400-foot wide channel to 600 ft over a total length of 6.2 miles, including the Lower and Upper Midnight and Lower Lilliput reaches; widening five turns and bends by 100 to 200 ft; and widening the Fourth East Jetty channel to 500 ft over a total length of 1.5 miles. Additional authorized improvements to the federal channel from the Cape Fear Memorial Bridge to the upper project limit in the Northeast Cape Fear River were deferred due to a marginal cost to benefit ratio.

This study of potential navigation improvements to the Wilmington Harbor federal navigation channel leading from the Atlantic Ocean to the Port of Wilmington, North Carolina, has been prepared by the North Carolina State Ports Authority (NCSPA) under the authority granted by Section 203 of Water Resources Development Act (WRDA) of 1986 (PL 99-662), as amended.

The NCSPA has conducted this Section 203 study to determine the feasibility of improvements to the federal navigation project at Wilmington Harbor. Potential improvements include deepening and widening of the federal navigational channel, extending the ocean entrance channel farther offshore, expansion of the turning basin, and expanded wideners at turns along the channel. The purpose of these potential improvements is to efficiently accommodate larger cargo vessels which are already using or are projected to use the port in the near future. This study identifies and evaluates alternatives that will:

1) accommodate recent and anticipated future growth in cargo vessel traffic;
2) improve the efficiency of operations for cargo vessels at Wilmington Harbor;
3) allow larger and more efficient cargo vessels to use Wilmington Harbor; and

4) allow for the Port of Wilmington to remain competitive as a port-of-call on major US East Coast containership services that also call at European and Asian ports.

Since the last major channel improvements were completed by the USACE in 2002, the Port of Wilmington has experienced significant growth in cargo volume, and in the size of vessels calling at the port. Over the intervening years, the NCSPA has made major investments in landside infrastructure to accommodate growth at the Port of Wilmington and the region that it serves. At the present time, the Port of Wilmington is the largest port in North Carolina and is a major component of the state's economy.

Inadequate channel capacity currently impacts trade at the Port of Wilmington and is projected to have a greater detrimental impact on trade in the future, providing the impetus for the NCSPA to conduct this Section 203 study. Pursuant to Section 203 of WRDA 1986, this study is intended to determine the feasibility and extent of federal and non-federal participation in improving the federal Wilmington Harbor navigation channel, consistent with the federal objective of maximizing contributions to National Economic Development (NED), and consistent with protecting the nation's environment.

3 GENERAL DESCRIPTION OF DREDGED OR FILL MATERIAL AND QUANTITY OF DREDGED MATERIAL

The construction and maintenance dredged material is expected to contain a mixture of silt, sand, and rock.

3.1 Quantity of Dredged Materials

The proposed project will result in additional dredged disposal volumes of approximately 4.168 million cubic yards (mcy) of rock and 22.685 mcy of sand and silt based on dredging to the 47-foot project depth with two feet allowable overdepth.

3.2 Sediment Characteristics

The geotechnical analysis evaluated potential opportunities for beneficial use of dredged materials (Main Report. Appendix B: Geotechnical). Several areas were identified as containing material that potentially be used for fill or beach nourishment projects. Interpretation of geotechnical and geophysical data suggest that channel flanks in Keg Island through Lower Lilliput and Horseshoe Shoal reaches likely contain material with low fines content, which may be desirable for use as fills. Lower Midnight, Reaves Point, Lower Swash reaches and north of the Anchorage Basin reach appear to have materials with a low fines content and may be desirable for repurposing as Category A and B materials. The other channel reaches appear to contain material with high fines content or substantial interbeds of fines (clay and silt) and do not appear to be desirable for fills and beach nourishment projects, which are considered Category C and/or D materials.

In general, from the 25 Foot Project channel reach through the Upper Lilliput any type of deepening from the current channel bottom is likely to encounter rock. In addition, based on the average Unconfined Compressive Strength (UCS) data, deepening in the Fourth East Jetty, Lower Brunswick, and Keg Island reaches may require blasting [UCS > 4,300 pounds per square inch (psi)] to remove the encountered rock. From Lower Lilliput through Horseshoe Shoal, deepening of the channel is not likely to encounter rock. From Snows Marsh to approximately the end of Smith Island Channel, it is likely to encounter rock (interpreted to be Castle Hayne Unit B) if any deepening were to occur, although due to a lack of strength data it is uncertain if blasting will be required to excavate the material. Baldhead Reach 2 appears to be overlying a relatively large paleochannel and any deepening is not likely to encounter rock. Deepening between Baldhead Reach 2 and Baldhead Reach 3 is interpreted to likely encounter Castle Hayne Unit B materials.

3.3 Description of the Proposed Discharge Site

Construction dredging material will be placed within the New Wilmington ODMDS. Dredged sediment is expected to primarily include fine- to medium-grained sand with fines from the upper channel reaches and the anchorage basin. Dredged rock is expected to be siltstone and sandstone (sedimentary rock). Beneficial use of dredged material is being evaluated for:

- Beach placement on Bald Head Island and Oak Island;
- Battery Island shore placement;

- South Pelican and Ferry Slip Island restoration;
- Island creation adjacent to South Pelican and Ferry Slip Islands; and
- Wetland restoration on Battery, Shellbed, and Striking Islands using thin-layer placement.

3.4 Description of the Disposal Method

It is anticipated that the surface sediments (sand and silt) overlying the rock will be dredged by a hopper dredge. Several methods are anticipated for rock removal. Some rock areas will be dredged, without pre-treatment, by a mechanical dredge placing material in material transport scows. Other rock areas will be dredged by a cutter suction dredge pumping directly to material transport scows via a spider barge. The scows will discharge the material through the split-hull and then return to the dredge site. Other rock will be pre-treated in place by a cutter suction dredge or by confined underwater (CU) blasting and removed via mechanical dredges. Utilizing a cutter suction dredge to cut and fragment the underlying rock area will allow for more precise identification of the hardest rock that cannot be cut by this method and would require another form of pre-treatment, such as CU blasting or chiseling.

Based on the available rock quality designation and hardness characteristics of the channel, it is expected that some rock areas within the channel will need pre-treatment prior to excavation. There are several methods by which this can be accomplished, and the final means and methods will depend on the equipment available to the winning Contractor(s) and the Contractor(s)' experience. Pre-treatment can be performed using a cutterhead suction dredge, CU blasting, or hydraulic hammer.

A cutter suction dredge can be used for both dredging and rock pre-treatment. A cutter section dredge used for rock pre-treatment would be followed by excavation via mechanical dredging. Generally, it is more efficient to use hydraulic dredging with a cutter suction dredge without pre-treatment to avoid double-handling material. However, pre-treatment with a cutter suction dredge followed by mechanical excavation may be necessary in siltstone so that overflow from the dump scow does not exceed turbidity limits.

The use of CU blasting as a pretreatment technique is anticipated to be required for some areas of the channel where standard construction methods are unsuccessful due to the hardness of the rock. The areas requiring blasting will be determined by core boring logs and the performance of a cutter suction dredge on rock areas.

In confined blasting, each charge is placed in a hole drilled in the rock approximately five to ten feet below the desired excavation depth, depending on how much rock needs to be broken and the intended project depth. The hole is then loaded with an explosive charge, a detonation device, a delay-timing device, and ultimately capped with an inert material; such as crushed rock, to confine the energy within the rock. This process is referred to as "stemming the hole" and is a key feature to "confined" underwater blasting. Stemming requirements will be detailed in the project specifications. The blasting charge is set and the chain of explosives within the rock is detonated.

A hydraulic hammer can fracture rock up to 11,600 psi, which is likely harder than any of the rock within the project area. This method consists of hydraulically driving a hammer and chisel

into rock at any desired angle. The hydraulic hammer can be mounted on an excavator, backhoe, or cutter suction dredge and extraction occurs with the use of an extracting cat (spring buffer) placed on the leader profile in between the pulling line. The operation is generally limited to a depth of approximately 40 ft, but could be modified to accomplish the depths associated with the project. This method is extremely effective in very small areas of hard rock and is generally used on pinnacles or very small outcroppings.

3.5 Anticipated Schedule

The proposed project, if approved, will begin in 2023 and completed in 2027 The construction schedules provide one means of accomplishing the project within three years, where dredging is only permitted from 15 June to 15 February, and CU blasting is only permitted from 1 October to 15 February. This schedule is contingent upon agency review, Congressional approval of proposed plans, and any necessary fiscal appropriations.

4 FACTUAL DETERMINATIONS

This section considers factors described in 40 CFR Part 230.11(a), 230.20 and applicable portions of Subpart H.

4.1 Physical Substrate Determinations

4.1.1 Substrate Elevation and Slope

Channel deepening will result in side slope cuts to achieve the authorized depth of the navigation channel, where appropriate. Side slopes in the existing channel are expected to be modified, as the deeper channel will require relocating the side slopes landward to accommodate the same channel bottom width. No direct impacts of this widening are anticipated.

4.1.2 Sediment Type

Dredged sediment is expected to primarily include fine- to medium-grained sand with fines from the upper channel reaches and the anchorage basin. Dredged rock is expected to be siltstone and sandstone (sedimentary rock). The dredged material was categorized based on its potential beneficial use:

- Category A = Potentially Suitable for Engineering Structural Fill or Beach Nourishment; Fines content typically less than 10 percent (%) and low calcium carbonate content;
- Category B = Potentially Suitable for Non-Engineered Fill; Fines content typically between 10 and 20%; may include thin lenses of fine-grained deposits;
- Category C = Potentially Suitable for Low-Quality Fills (e.g. habitat restoration and development, offshore berms, parks and recreation, etc.); Fines content 20 to 25%; and
- Category D = Disposal Area (Upland or Offshore).

Any material used for beneficial use will meet these standards.

4.1.2.1 Physical Effects on Benthos

Dredging will impact benthos within the area of hydraulic dredge influence, as the animals living in the sediments are suctioned into the dredge pipe and pump system. However, these species reproduce rapidly and adjacent, undisturbed sediments will supply a ready source of organisms to recolonize the remaining sediments. Where rock is removed for channel deepening, recolonization of the rock with algae and the small organisms (e.g. worms, clams, etc.) that live on the surface of and in the crevices of the rock will recover via mechanisms similar to the benthos living in unconsolidated sediments. Maintenance dredging may suppress recovery in certain areas that are prone to shoaling.

The benthos at beach or nearshore placement sites will be buried under the deposits of materials from channel dredging and subsequent maintenance activities. However, the same process of rapid recolonization from adjacent undisturbed habitat is expected to occur in these areas.

4.1.2.2 Physical Effects on Water Column Species

Water column species without sufficient speed to avoid the falling sediment and sediment plume may suffer clogged gills if swimming in a plume of the suspended sediment, or burial if entrained in a column of falling sediment. The noise produced by the hopper dredge and attending vessels may cause some species to avoid the general area.

4.1.2.3 Physical Effects on Beach Habitats

Animals living within the intertidal and supratidal beach would experience burial if beach disposal is used. The beaches proposed for sand placement provide nesting habitat for endangered marine turtles; therefore, appropriate protective measures would be implemented.

Beach and nearshore sand placement would be colonized by the species occupying adjacent areas. The beach and nearshore environment are physically dynamic with resident species selected for their ability to reproduce rapidly as a response to the harsh environment.

4.1.2.4 Actions Taken to Minimize Impacts

Beneficial use placement would be performed in accordance with applicable federal biological opinions and the state permit in order to minimize potential impacts to swimming and nesting turtles and turtle nests. Observers aboard the dredge and material transport vessels would help spot and as necessary avoid impacts to turtles, marine mammals, or other listed or managed species, in particular by waiting to release sediments until the located animals have left the area.

5 WATER CIRCULATION, FLUCTUATION, AND SALINITY DETERMINATIONS

This section considers factors described in 40 CFR Part 230.11(a), 230.20 and applicable portions of Subpart H related to the proposed discharge of dredged sediments.

5.1 Water

Project dredging and disposal activities would be performed in compliance with State of North Carolina water quality standards. In accordance with the Coastal Zone Management Act, state consistency review will be performed as part of stakeholder and agency coordination of the FS\EIS. The USACE expects that the State of North Carolina will concur with the determination that the project is consistent with the enforceable policies of the North Carolina Coastal Zone Management Program.

5.1.1 Salinity

The proposed project will dredge material from the most saline portion of the Wilmington Harbor federal navigation channel and dispose of that material on an Atlantic Coast beach or nearshore area. Salinity in the dredging locations ranges from near marine levels to as little as two parts per thousand (ppt) or less.

5.1.2 Clarity/Color/Odor/Taste/Nutrients/Eutrophication

The dredging activities will likely produce temporary turbidity that will remain within the state water quality certification requirements. Ongoing Wilmington Harbor federal channel maintenance dredging projects have not resulted in significant turbidity exceedances. Because the sediments are primarily sand and silt with some rock, the USACE does not anticipate addition of greater turbidity levels or increases in water column nutrient concentrations during the dredging or as a result of nearshore disposal or other means of dredged material disposal.

While dredging will temporarily disturb the sediments, the sediments do not likely carry sufficient nutrients to stimulate eutrophication or cause algal blooms. The water circulation is dominated by the tides of the Atlantic Ocean and water residence times remain low under most conditions.

5.2 Current Flow and Water Circulation

Placement of materials at beneficial use sites will not likely affect general current flow and water circulation in the area, as these currents are the result of much larger processes occurring within the regional ocean.

5.2.1 Stratification and Salinity

Placement of dredged material at any of the proposed alternative locations would not materially influence stratification conditions or salinity in the placement area or beyond.

The channel in the proposed dredging area is relatively deep (42 ft+) and strongly influenced by marine tides. Higher salinities are found as you approach the ocean. The potential dredge disposal sites are all well within the influence of marine waters, so salinity gradients would be

minimal and mixing would rapidly reduce and eliminate any salinity gradient that developed at the point of discharge.

5.2.2 Hydrologic Regime

The proposed sediment discharges will have minimal to no impact on the hydrologic regime of surface and groundwater in the project area.

5.2.3 Normal Water Level Fluctuations

In general, dredging will slightly increase the overall tidal prism in the estuary. The smallest changes occurred at the upstream riverine sites and downstream at the mouth of the Cape Fear Estuary (i.e., Baldhead Shoal). For the Low and Intermediate sea level rise (SLR) scenarios, the largest increase of Mean Tide Range occurs at the Anchorage Basin (approximately 0.3 ft). The change in tide range, though, is disproportional as Mean High Water (MHW) increases up to 0.12 ft while Mean Low Water (MLW) decreases up to 0.18 ft at this location. For the High SLR with high river flow scenario (Main Report, Table 7-1), these changes are minimally increased by approximately 0.01 ft for MHW and MLW, and by approximately 0.02 ft for Mean Tide Range. The largest increase in range under all conditions (0.31 ft) occurs at the Lower Anchorage Basin under the High Relative Sea Level Rise (RSLR) scenario with high flow. Placement of dredged materials in the beneficial use sites will have negligible effects.

5.2.4 Salinity Gradients

Salinity intrusion increases with the dredging project, with the bottom layer having larger salinity increases relative to the surface layer at each location. Locations near Wilmington, such as Battleship and Lower Anchorage Basin, have the highest salinity increases compared to other locations: about 0.6-1.4 ppt at the surface layer, 2.0-5.0 ppt at the middle layer, and 2.3-6.1 ppt at the bottom layer across low, intermediate, and high RSLR conditions. The salinity differences decrease downstream and upstream from these two stations with the last noticeable change upstream occurring at Ness Creek to Cape Fear River station NECF02 (with increases of about 0.1 ppt in the surface layer and 0.2 ppt in the bottom layer for the low RSLR scenario and increases of about 0.4 ppt in the surface layer and 0.6 ppt in the bottom layer for the high RSLR scenario) and at CFR01 (with increases of about 0.2 ppt in the surface layer and 1.2 ppt in the bottom layer for the low RSLR scenario and increases of about 0.5 ppt in the surface layer and 1.2 ppt in the bottom layer for the high RSLR scenario).

Discharges of sediment at any of the beneficial use sites are of insufficient magnitude (compared to the water bodies in which they are placed to create any more than very local effects. Depending on riverine salinity, sediment-water might be considerably lower than that of the ocean and local, temporary gradients could develop at the nearshore location or other locations used for disposal. These gradients would disperse over time with diffusion of the fresher water out and saline water into the deposited sediments.

5.3 Actions That Will Be Taken to Minimize Impacts

Disposal of dredged sediments will have only very localized effects on water circulation, fluctuation, and salinity. If temporary actions are necessary to minimize changes to salinity in the location of beneficial use discharges, the water could be held in the sites until the salinity of the river returns to a level closer to that of the discharges. However, the discharge at the

beneficial use is so small compared to the river discharge that such discharges would likely only affect a very small area. For the other alternative disposal sites, material disposal will follow all applicable rules and regulations associated with the disposal location and particular sediment qualities.

6 SUSPENDED PARTICULATE/TURBIDITY DETERMINATIONS

Guidance for this section of the 404(b)(1) evaluation is furnished in Title 40 CFR 230.11(c) and 230.21.

6.1 Particulate/Turbidity Effects

6.1.1 Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Dredging and Disposal Site

Turbidity plumes generated by regular channel maintenance activities in the proposed project footprint remain within permit-required turbidity levels. The dredging and dredged material management associated with the deepening project will be conducted to remain within the requirements of environmental permit conditions for that project. Permit conditions are expected to include monitoring of any plume produced by the dredging and disposal of dredged materials with actions required if the plume exceeds the marine state turbidity standard.

6.1.2 Contaminants

Dredged material is not generically considered as either a "hazardous substance" under the definitions of the Comprehensive Environmental Response, Compensation and Liability Act [42 United States Code (USC) 9601(14)], nor a "hazardous waste" under the definitions of the Resource Conservation and Recovery Act (42 U.S.C. 6921 et seq.). Specific to this project area, the USACE has performed Marine Protection, Research, and Sanctuaries Act Section 103 Evaluation of Dredged Material Proposed for Ocean Disposal, Wilmington Harbor Federal Navigation Project (2017); which did not identify contaminants of concern within the harbor deepening project area.

Some industries transport goods through the harbor that could be considered hazardous or toxic. The US Coast Guard establishes procedures for movement of such goods to ensure those operations are done safely. No such movements have resulted in spills that caused widespread threats to human health or safety.

For past offshore disposal, sediments dredged from the Wilmington Harbor Navigation Project have been subject to Tier III analyses and evaluation. Tier III tests include (1) determination of water column toxicity and (2) assessment of toxicity and bioaccumulation from the material to be dredged. These tests have documented no long-term impacts to water quality. Based on previous survey results, disposal operations at the proposed alternative sites should not cause significant effects on concentrations of contaminants in the water column given that only dredge material of suitable quality will be permitted for disposal.

6.1.3 Pathogens

Since effluent originates from the Cape Fear River and no biological organisms are added during the dredging operation, no new pathogens are expected as a result of the dredging.

6.1.4 Aesthetics

Some visual impacts from turbidity are expected from the open water discharges. However, they are expected to be temporary in nature, and diluted by river and ocean currents.

6.1.5 Effects on Biota

Suspended particulates could have some temporary adverse impact on filter feeders. Nearshore disposal would occur for relatively short periods of time and particles would quickly settle or mix with surrounding waters. The USACE would follow the recommendations of the United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) concerning the disposal operations on the beach and in nearshore waters.

6.1.6 Primary Production, Photosynthesis

Suspended particulates may be expected to have negligible effect on primary production because the occurrence of turbidity is localized and temporary. No change to overall productivity of the estuary, the river or coastal waters is expected.

6.1.7 Suspension/Filter Feeders

Suspended particulates could have some localized and temporary adverse impacts on filter feeders.

6.2 Actions taken to Minimize Impacts

During dredging and disposal activities, turbidity monitoring will occur at the dredging site and at any disposal site and will adhere to permit required monitoring protocols and actions in the case of turbidity exceedance.

Disposal to beaches would follow practices required by permits for the activity, which will likely include management activities to reduce turbidity of materials discharged.

7 ECOSYSTEM AND ORGANISM DETERMINATIONS

7.1 Effects of Ecosystems and Organisms

7.1.1 Effects on Benthos

Dredging and disposal of dredged materials will result in temporary disruption in benthic communities. However, recolonization occurs relatively rapidly. There will be a temporary impact on benthic communities at nearshore, open water disposal sites, as some organisms will be buried. Some organisms, which inhabit the underwater sites, are capable of burrowing upward through the disposed material and should survive. Benthic organisms at the nearshore and proposed beach disposal sites are typically subject to changes associated with the daily shifts in their habitat substrate. In addition, these organisms commonly recolonize nourished beaches. Turbidity effects may be produced by unconfined nearshore disposal, but they are expected to be temporary and minor.

7.1.2 Effects on Plankton and Nekton

Impacts on plankton and nekton would be primarily due to increases in turbidity during dredging and sediment disposal operations. Increased turbidity could include a decrease in phytoplankton growth from decreased light availability due to absorption or reflection of light by suspended particulates. A decrease in feeding by nekton could result from reduced phytoplankton availability, limited visibility of prey, or interference in feeding behavior from increased particulates. These temporary impacts are not expected to result in significant impacts on plankton or nekton.

7.1.3 Effects on Aquatic Food Web

Aside from temporary and localized effects of turbidity, no appreciable effects on the aquatic food web are anticipated, other than the potential indirect effects of salinity shifts upriver As stated previously, coordination with other agencies will identify means to minimize impacts to aquatic resources by standard actions such as devoted observers for listed species, turbidity monitoring, and boat operation restrictions.

7.1.4 Effects on Special Aquatic Sites

The dredging project area (including dredging template, potential disposal areas, and potential effects area) does not include any Special Aquatic Sites. Primary Nursery Areas (PNA) and Anadromous Fish Spawning Areas occur within the Cape Fear River; however, dredging has been minimized to reduce effects on shallow water benthic habitat within PNA habitat.

7.1.5 Sanctuaries and Refuges

The dredging project area (including dredging template, potential disposal areas, and potential effects area) does not include any Sanctuaries or Refuges.

7.1.6 Submerged Aquatic Vegetation and Wetlands

Identified beneficial use sediment disposal locations do not include submerged aquatic vegetation (SAV) or wetlands.

7.1.7 Threatened and Endangered Species

A Biological Assessment of Threatened and Endangered Species (BA) has been prepared for the deepening Wilmington Harbor. The BA concluded that the proposed project may affect, is likely to adversely affect the Atlantic sturgeon (and Critical Habitat), shortnose sturgeon, loggerhead, green, and Kemp's sea turtles; may affect but not likely to adversely affect whales, leatherback sea turtles, and West Indian manatees.

Listed bird species will use the beneficial use sites proposed for sediment disposal. Proposed dredging operations and placement of material within the ODMDS will have no effect on piping plover, red knot, or American wood stork. Placement of material on adjacent beaches and inshore islands for beneficial use may affect but is not likely to adversely affect these species; including their life stages, food supplies, and habitats. Standard protective measures to protect nesting during construction covered in this document will be adhered to.

7.1.8 Other Wildlife

The USACE will, as appropriate and necessary, propose and coordinate to develop specific mitigation plans for potential salinity-induced impacts to wetlands, benthic macroinvertebrates, and fisheries associated with the proposed deepening.

7.2 Actions to Minimize Impacts

To ensure that dredging operations are not likely to adversely impact sea turtles, all dredging operations would be done in compliance with the appropriate Biological Opinion for navigation channels and hopper dredge operations in the southeast issued by the NMFS. The proposed action would follow the terms and conditions of the South Atlantic Regional Biological Opinion from the NMFS (http://el.erdc.usace.army.mil/seaturtles/refs-bo.cfm) for use of a hopper dredge. With respect to blasting, (1) measures would be taken to minimize the impact of blasting on the environment and (2) monitoring would be used to minimize blasting in proximity of sea turtles and manatees.

Standard manatee protection measures would be followed. No dredging would occur in an "Important Manatee Area" (http://www.saj.usace.army.mil/Missions/Regulatory/SourceBook .aspx). With respect to blasting, the same measures and monitoring for other marine mammals would be used.

With respect to blasting, an Incidental Harassment Authorization would be obtained from the USFWS and NMFS for marine mammals including manatees and dolphins. The monitoring and blasting plan would be similar to that defined for blasting in Miami Harbor (www.nmfs.noaa.gov/pr/pdfs/permits/acoe_miamiharbor_iha_application.pdf).

8 PROPOSED DISPOSAL SITE DETERMINATIONS

8.1 Summary

Avoidance of potential impacts and mitigation of unavoidable impacts will be incorporated into construction plans. The dredging, handling, and disposal of material similar to that already being processed, as part of previous deepening efforts and ongoing maintenance efforts, without adverse impact indicates the likely path of the proposed project.

8.2 Determination of Compliance with Applicable Water Quality Standards

Water quality certifications will be requested from the State of North Carolina for the proposed deepening project as part of the National Environmental Policy Act process. The environmental effects evaluation for the proposed dredged material indicated that the project will meet applicable water quality standards (WQS) for all contaminants of concern at the edge of the mixing zone set up for dredging and disposal activities.

8.3 Stormwater Runoff Determinations

The proposed action will not impact any of the dredge disposal areas in any manner that would require a change in existing stormwater management or stormwater regulatory framework.

8.4 Potential Effects of Human Use Characteristic

8.4.1 Recreational and Commercial Fisheries

Dredged material disposal activities are expected to only minimally affect pelagic species. The combined activities areas (transport paths) are small with respect to the habitat area for inhabitant fishes. Fishes may avoid the area where ships are operating. Adult fishes within and immediately adjacent to the disposal area may experience a short-term reduction in dissolved oxygen uptake through the gills due to the presence of suspended particles clogging opercular cavities and gill filaments (Doudoroff 1957), as well as a slight decrease in available oxygen due to the biological oxygen demand of the dredged material. Adult fishes may also experience stress from avoidance reactions. However, conditions that could impact pelagic fishes are expected to be short-term and localized, and the effects on pelagic adults in the water column are not expected to be significant.

8.4.2 Water Related Recreation and Aesthetics

The project will result in only temporary impacts to water quality, primarily as a result of turbidity generated during dredging and sediment disposal, whether at the proposed beneficial use sites. While viewing a plume from dredging or dredged material disposal may temporarily decrease the aesthetic experience of that view, these effects are temporary. Ongoing maintenance creates similar conditions, so while the construction will occur more intensely than maintenance dredging at various locations, the effects will again be temporary and end with the completion of construction.

8.4.3 Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

The dredging project area (including dredging template, potential disposal areas, and potential effects area) does not include any Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, or Similar Preserves.

8.5 Determination of Cumulative Effects on the Aquatic Ecosystem

The disposal of and potential beneficial uses of dredged material will incur only minor cumulative effects on the aquatic/marine ecosystem into which the fill is placed, or into which discharge from beneficial use sites.

While nearshore or beach placement of dredged material will bury existing benthic infauna, recolonization is expected to occur rapidly. This process of burial and recolonization will continue, as the much larger surrounding and undisturbed benthic habitat will continue to serve as a colonization source. The project represents a minor impact to the infaunal community and those species that feed on the infaunal community.

8.6 Determination of Secondary Effects on the Aquatic Ecosystem

Secondary effects on the aquatic system may include some general wildlife avoidance of the project area over time because of dredging-produced turbidity and noise during dredging and disposal activities occurring over the next 50 years. A small increase in risk of vessel strikes will occur during dredging and dredged material disposal operations. An increase in risk of vessel strikes may occur after project construction, if the project construction results in additional ship calls to Wilmington Harbor. The USACE NED analysis has indicated that fewer ships (albeit larger in size) may call on the port after project construction, so a smaller risk of vessel strikes to listed and managed species may also be a secondary effect of the project.

9 FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

9.1 Determinations

(a) An ecological evaluation of discharges of dredged material associated with the proposed deepening of the Wilmington Harbor has been made following the evaluation guidance in 40 CFR 230.6, in conjunction with the evaluation considerations in 40 CFR 230.5. The evaluation concluded that the proposed project is in full compliance with Section 404(b)(1) of the CWA. Applicable state WQS will be met for discharges. The least environmentally damaging practicable alternatives were chosen to meet the project goals and objectives.

(b) The work will be conducted in accordance with state Water Quality Certifications to the extent practicable. Should it become apparent that operation of the project is resulting in a violation of state WQS, coordination with the appropriate state agency will be initiated to determine the appropriate course of action. The disposal operation will not violate the Toxic Effluent Standards of Section 307 of the CWA.

(c) Operation of the project will not jeopardize the continued existence of any federally listed threatened or endangered species or its designated critical habitat. The Project will follow the provisions, which the USFWS and NMFS state as necessary through the Section 7 consultation process.

(d) The proposed discharges will not result in significant degradation of the Waters of the United States. There will be no significant adverse effects on human health and welfare, municipal and private water supplies, recreation and commercial fisheries, plankton, fish, shellfish, wildlife, special aquatic sites, life stages of aquatic life and other wildlife dependent on aquatic ecosystems, aquatic ecosystem diversity, productivity and stability, or recreational, aesthetic and economic values.

(e) The discharges will include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem, including mitigation for possible wetland losses as a result of the project.

9.2 Findings

Based on the determinations made in this Section 404(b)(1) Evaluation, the finding is made that, with the conditions enumerated in both the BA for this project and the proposed dredged material environmental effects evaluation, the proposed discharges comply with the Section 404(b)(1) guidelines.

10 REFERENCES

Doudoroff, P. 1957. Water quality requirements of fishes and effects of toxic substances. Pp. 403–430. In: M.E. Brown (ed.), *The Physiology of Fishes. Volume II, Behavior*. Academic Press Inc., New York, NY.

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USACE. 2017. MPRSA Section 103 Evaluation of Dredged Material Proposed for Ocean Disposal. Wilmington Harbor Federal Navigation Project. Wilmington, North Carolina. June 2017.