US Army Corps of Engineers®

Murrells Inlet, South Carolina Maintenance Dredging of the Federal Navigation Channel

Supplemental Environmental Assessment

Prepared by:
U.S. Army Corps of Engineers
Charleston District
June 2023

Table of Contents

List of Figures

List of Tables

List of Appendices

ACRONYMS

APE	Area of Potential Effect
ArchSite	South Carolina's Archaeological Site File
BCE	Before Common Era
BMP	Best management practice
CAA	Clean Air Act
CE	Common Era
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CBRA	Coastal Barrier Resources Act
CZMA	Coastal Zone Management Act
CWA	Clean Water Act
DMMA	Dredged Material Management Area
EA	Environmental Assessment
EFH	Essential Fish Habitat
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
f. coliform	Fecal coliform
FMC	Fisheries Management Council
FMP	Fisheries Management Plan
FONSI	Finding of No Significant Impact
FWCA	Fish and Wildlife Coordination Act
GCB	Garden City Beach
HAPC	Habitat Area of Particular Concern
HBSP	Huntington Beach State Park
HUC	Hydrologic Unit Code
HTRW	Hazardous, Toxic, and Radioactive Waste
IPaC	Information for Planning and Consultation
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Services
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
PEFHA	Programmatic Essential Fish Habitat Assessment
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SAFMC	South Atlantic Fishery Management Council
SARBO	South Atlantic Regional Biological Opinion
TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service

CHAPTER 1 INTRODUCTION

1.1 Description of Document

This Environmental Assessment (EA) has been prepared by the U.S. Army Corps of Engineers, (USACE), Charleston District, in compliance with the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321- 4370f, and its implementing regulations, 40 C.F.R. §§ 1500-1508, and 33 C.F.R. Part 230, to evaluate the proposed maintenance dredging of material from the Murrells Inlet Federal navigation channel and the placement of that material on Garden City Beach (GCB) and Huntington Beach State Park (HBSP) and to update previous NEPA documentation for the project. Previous NEPA documents for the Project include a 1976 Final Environmental Impact Statement (EIS), a 2001 (supplemental) Environmental Assessment (EA) and Finding of No Significant Impact (FONSI), and a 2017 Supplemental EA/FONSI. Additional coordination with Federal and State resource agencies has occurred in conjunction with this EA. The analysis concluded that the impacts are considered insignificant, and the proposed action does not represent either a substantial change to the Project relevant to environmental concerns or present significant new circumstances or information relevant to environmental concerns; therefore a FONSI has also been prepared.

1.2 Project Authorization

The Murrells Inlet, South Carolina Project was authorized by Resolutions of the House Committee on Public Works on 10 November 1971 and the Senate Committee on Public Works on 18 November 1971, under the authority of Section 201 of the Flood Control Act of 1965 (P.L. 89-298). The Project includes a navigation channel, jetties, deposition basin, and a turning basin. Section 67 of the Water Resources Development Act of 1974 authorized emergency dredging operations necessary to maintain channel depths sufficient to permit free and safe movement of vessels until the authorized project was completed. Project construction was initiated in September 1977 and completed in August 1981.

Authority for the Project includes continued channel maintenance. The Final Report, Improvements for Murrell's Inlet, South Carolina (April 1978), Part VIII, recommended a program of periodic inspection to determine the necessity of maintenance dredging. As stated in the transcript for Hearings Before a Subcommittee of the Committee on Appropriations, 94th Congr., 2nd Sess., regarding Public Works for Water and Power Development and Energy Research Appropriations for Fiscal Year 1977, the "primary objective of the project is the establishment and maintenance of a navigation channel through the inlet." USACE policy, generally, is to maintain authorized navigation projects to full constructed channel dimensions when feasible and justified (ER 1130-2-520, 29 Nov 1996, 8-2.a.(5)). This iteration of maintenance dredging is funded by the Infrastructure Investment and Jobs Act, Division J, Title III of Public Law 117-58 (a/k/a Bipartisan Infrastructure Law) in conjunction with the Harbor Maintenance Trust Fund (Section 201 of WRDA 1986, 26 USC 9505). Previous iterations of maintenance dredging have been conducted in 1988, 2001, and 2017.

The authority to place beach-quality sand dredged in constructing and maintaining the navigation channel on adjacent beaches was part of the original authorization for the Murrell's

Inlet, SC project. The Senate and House Resolutions authorized the project "substantially in accordance with … House Document Numbered 92-137." House Document 92-137 expressly contemplated the use of suitable materials for beach nourishment (see Report of the District Engineer). The subsequent General Design Memorandum for the Murrell's Inlet, South Carolina, Navigation Project (December 1975) further elaborated on the use of suitable materials "for nourishment of the downdrift beach" (¶ 2) or in a beach disposal area located north of the inlet (¶ 78). See also Dredged Material Management Plan Preliminary Assessment for Murrell's Inlet, South Carolina (28 Mar 97).

1.3 Project Description and Location

The Murrell's Inlet navigation channel is located on the Atlantic coast in Georgetown County, South Carolina (SC), approximately 80 miles north of Charleston, SC and 12 miles south of Myrtle Beach, SC. (Figure 1).

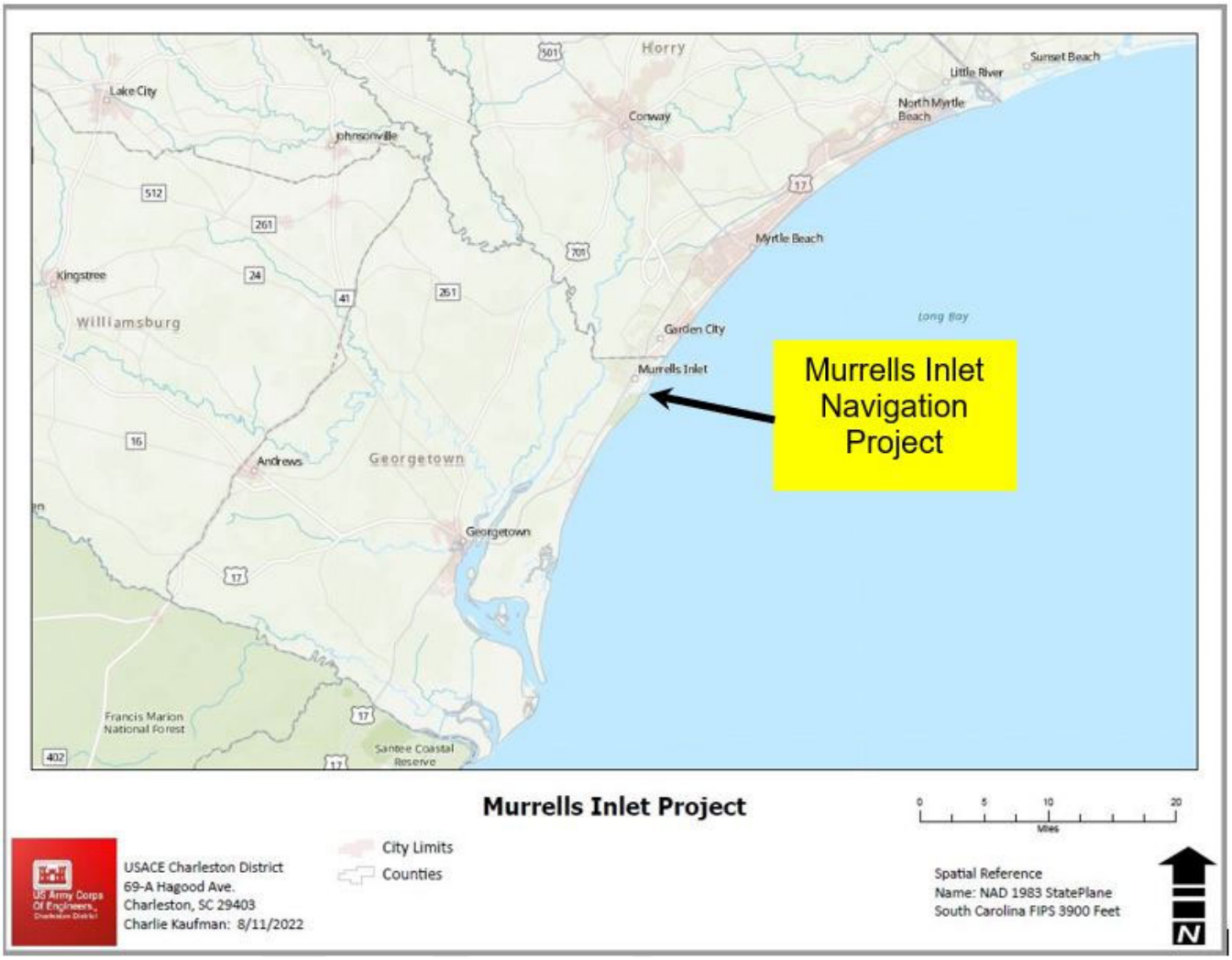

Figure 1. Murrells Inlet Location Map

The Project provides for an entrance channel twelve feet deep by 300 feet across the seaward bar, a length of 3,200 feet; a ten-foot deep by 90-foot inner channel to an old army crash boat dock where it terminates with a turning basin 300 feet long and 150 feet wide, an auxiliary Channel, which is 200 feet wide, 10 feet deep and approximately 1000 feet long, and a deposition basin, Figure 2. The Entrance Channel is stabilized by ocean jetties extending seaward 3,445 feet and 3,319 feet on the north and south sides of the Inlet, respectively. The north jetty was constructed with a weir section at the north end to allow for passage of littoral drift traveling essentially between the shoreline and the –4-foot contour. Inside the north jetty is a deposition basin that has the capacity to hold up to 600,000 cubic yards of material. Initial construction of the Project resulted in approximately 1,103,300 cubic yards being excavated.

The last cycle of maintenance dredging was conducted in 2017, when approximately 585,000 cubic yards of material was dredged from the entrance channel, portions of the inner channel and deposition basin and placed on GCB and HBSP. Maintenance dredging had been previously performed in 1988 and 2001. This environmental assessment updates previous NEPA analysis for continued operation and maintenance (O&M) of the Murrells Inlet Federal navigation channel.

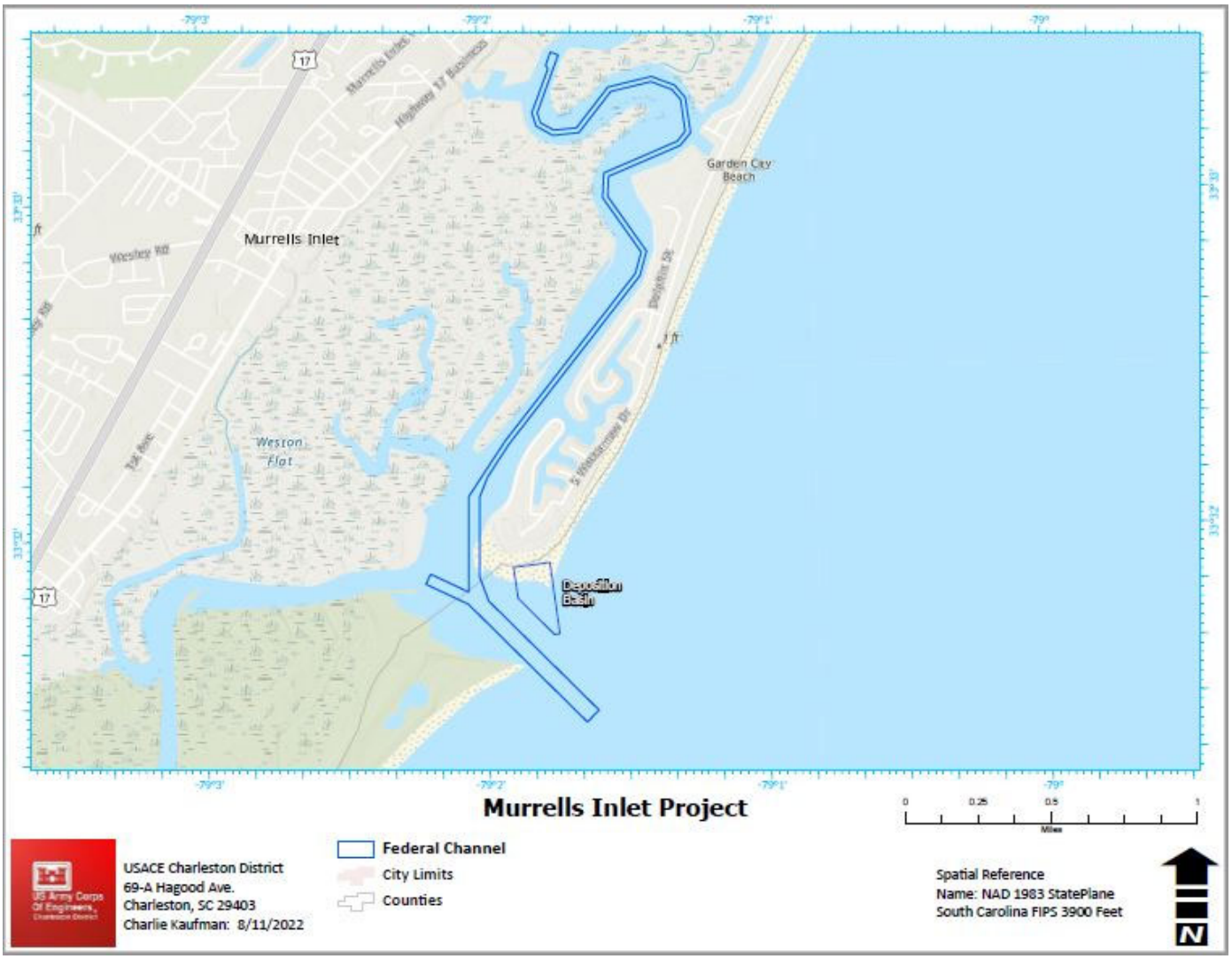

Figure 2. Murrells Inlet Federal Navigation Channel

1.4 Purpose and Need

The purpose of this iteration of maintenance dredging is to continue to provide safe navigation for existing and prospective vessel traffic by maintaining the congressionally authorized Federal navigation channel from the 12-foot contour in the open ocean to the village of Murrell's Inlet. Shoals tend to accumulate in areas within the channel, which impact navigation. When this shoaling occurs, vessels navigate outside the Federal channel to access deeper areas. Therefore, there is a need to conduct regular maintenance dredging of the auxiliary channel and a portion of the entrance channel along with portions of the inner channel and the deposition basin to improve access to and from Murrell's Inlet (Figure 3). The material will be placed on either Garden City Beach (GCB) or Huntington Beach State Park (HBSP).

Dredged material is placed in a manner to enhance coastal storm risk reduction for infrastructure on GCB. At the terminal west end of the south jetty on HBSP, dredged material is used to restore shorebird habitat and to provide protection for the jetty foundation. At HBSP, dredged material is also used for coastal storm risk reduction, enhancement of sea turtle nesting habitat, and habitat for seabeach amaranth and the wintering piping plover.

1.5 Scope of the Environmental Assessment

USACE has prepared this EA in compliance with NEPA and associated implementing regulations to supplement and update previous NEPA documentation. USACE considered the possible environmental effects of the proposed action and determined that potential effects to the environmental resources listed below were relevant to the decision to be made and, therefore, are addressed in detail in this EA.

- Water Quality
- Wetlands
- Terrestrial Biological Resources
- Aquatic Biological Resources
- Essential Fish Habitat
- Threatened and Endangered Species
- Coastal Barrier Resources System
- Visual Resources (Aesthetics)
- Historical and Cultural Resources
- Air and Noise
- Hazardous, Toxic, and Radioactive Waste
- Public Health and Safety
- Socioeconomics and Environmental Justice
- Natural Areas, Parks, and Recreation
- Climate Change

The following environmental resources were eliminated from detailed analysis because they were not considered relevant to the proposed action and alternatives:

- Soils

- Transportation
- Geological Resources

1.6 Related Environmental Reviews

The following environmental reviews have been completed as part of the overall Murrells Inlet navigation project:

- *Final Environmental Impact Statement for Murrell's Inlet Navigation Project* (USACE 1976). This EIS evaluated impacts associated with initial construction, including dredging an entrance channel through the offshore bar, dredging an inner channel, dredging a deposition basin, constructing a north jetty with a low weir section for sand bypassing, constructing a south jetty as well as a fishing walkway on top of the south jetty, and constructing sand dikes on both sides of the inlet to the jetties to the existing dune line. The EIS also evaluated impacts associated with O&M of the project, including maintenance dredging on an approximate 3-year cycle. It was anticipated on such a cycle that the entrance channel would be self-maintained due to the effect of the jetties.

- *Final Environmental Assessment for Operation & Maintenance Dredging of the Murrell's Inlet Entrance and Auxiliary Channels and New Information Relating to Placement of Material on Garden City Beach and Huntington Beach State Park Georgetown County, South Carolina.* (USACE 2001). This EA evaluated impacts associated with excavating as much as 260,000 cubic yards of material from the Federal Channel (including from the Auxiliary Channel and the portion of the Entrance Channel to be dredged) and 420,000 cubic yards from the deposition basin and the placement of the material at either Huntington Beach State Park or Garden City Beach.

- *Supplemental Environmental Assessment for Maintenance Dredging of an Inner Shoal of the Murrells Inlet Federal Navigation Project.* (USACE 2017). This EA evaluated impacts associated with dredging approximately 25,000 cubic yards of material from a one and eight tenths acre reach of the Federal Channel near Marlin Quay Marina (Inner Shoal B) and the placement of the material at the previously used placement area within the intertidal zone of the Huntington Beach State Park.

CHAPTER 2 ALTERNATIVES

2.1 Alternative Analysis

Several conceptual alternatives were initially evaluated regarding maintenance of the Federal navigation channel. Alternatives were evaluated based on compliance with environmental laws and regulations, compliance with executive orders, level of environmental impacts including impacts to climate, land use, water resources and aquatic habitat, terrestrial resources and wildlife, air quality and noise, cultural resources, endangered species, hazardous toxic and radioactive waste, and socioeconomics, cost effectiveness, engineering feasibility, and the ability of the alternative to meet the purpose and need of the project. Alternative disposal options to the authorized beach placement were also evaluated to determine whether they met *the Federal standard* (see 33 CFR Parts 335-338) – the Federal standard is the dredged material disposal alternative or alternatives identified by the Corps which represent the least costly alternatives consistent with sound engineering practices and meeting the environmental standards established by the 404(b)(1) evaluation process or ocean dumping criteria. Alternative disposal plans to the proposed action included: upland storage and dewatering, and use of a dredged material management area; there was also a “No-Action” alternative to maintenance dredging and disposal. Alternatives must be technically feasible (engineering), cost effective, compliant with applicable environmental laws, regulations, and executive orders, and be environmentally acceptable to be carried forward. Only one of these plans, the Proposed Action, was found to meet the criteria outlined above. Both the upland storage and dewatering and the dredged material management areas alternatives were eliminated on technical feasibility and cost-effective grounds, and a resulting failure to meet the Federal standard; these alternatives would also not achieve the intent of the original project to place suitable materials on eroded or eroding adjacent beaches. A No Action Alternative, while it would not meet the purpose and need for the action, is also evaluated to provide a baseline for environmental impacts, as required by NEPA.

2.2 Proposed Action

The upcoming Murrells Inlet O&M dredging project will dredge sandy material from the entrance channel, the deposition basin, the auxiliary channel, and portions of the inner channel (shoals A, B and C). The southern tip of GCB has accreted into the federal channel. Dredging of the entrance channel will remove the accreted sediment and restore the authorized federal navigation channel. A total of 500,000 to 750,000 cubic yards is expected to be dredged. Maintenance dredging will be by means of a hydraulic cutterhead dredge that will transport the sand through a pipeline to be discharged as a slurry and placed directly on the front beach at GCB, at the terminal west end of the south jetty on HBSP, and on the front beach at HBSP (see Figure 3). During construction, temporary training dikes of sand will be used to contain the discharge and control the fill placement. Fill sections will be graded by land-based equipment, such as bulldozers, articulated front-end loaders, and other equipment as necessary to achieve the desired placement profile. Staging areas will be located upland and in previously disturbed areas, such as vacant lots. It is anticipated that construction will begin in the summer of 2023 and will require approximately 4 months for completion. This schedule could change due to funding constraints, contractual issues, inclement weather, equipment failure, or other unforeseen difficulties.

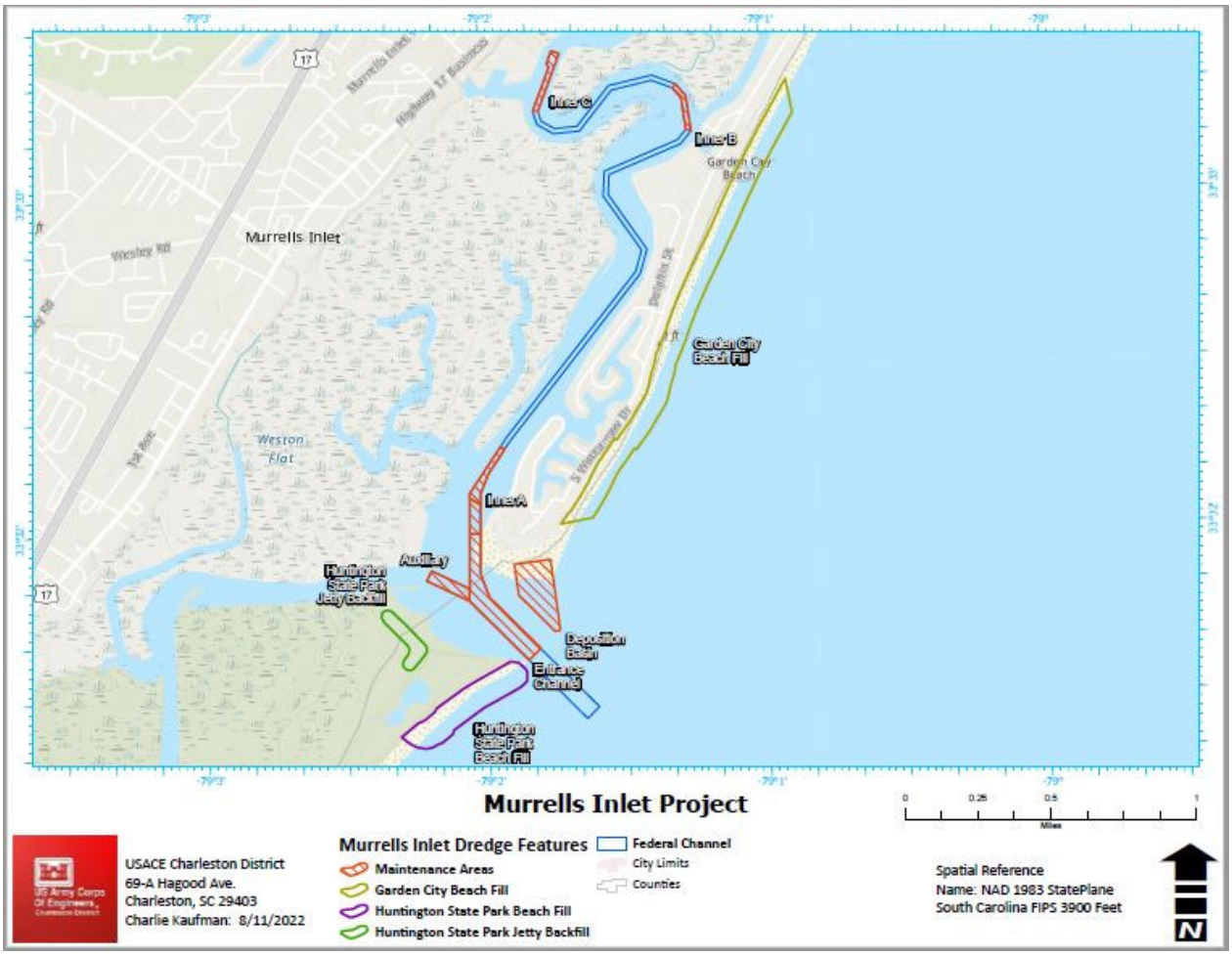

Figure 3. Murrells Inlet Maintenance and Placement Areas

2.3 No Action Alternative

A No Action Alternative is required under NEPA. The No Action Alternative is the most probable future condition if no action is taken. Under the No Action Alternative, the Corps would not conduct maintenance dredging and passage through the Murrell's Inlet Federal Navigation Channel will continue to be restricted as deposition will continue, further impeding vessel traffic. Vessels would need to continue to navigate to deeper waters, as feasible and eventually become impassable to larger vessels. Additionally, the structural integrity of the south jetty would continue to erode and potentially fail.

2.4 Alternatives Considered but Eliminated

Upland Storage and Dewatering

This alternative entails pumping the dredged material into geotubes, placing the geotubes adjacent to one of the Murrells Inlet receiving waters, and allowing the return water to reenter the Inlet. The geotubes would then be transported to a permanent confined facility, such as a landfill. This alternative is not technically feasible in that there was no available space to place the geotubes for dewatering and would result in unjustified additional cost. Therefore, USACE has eliminated this alternative from consideration. This alternative would not meet the Federal

standard as a least cost option, nor would it meet the original project intent to place suitable materials on eroded or eroding adjacent beaches.

Dredged Material Management Area (DMMA)

This alternative would require transport, via pipeline of all the excavated material to an enclosed upland facility for storage. There are no upland disposal facilities within close proximity to the project that may be used. Therefore, USACE has eliminated this alternative from consideration on technical infeasibility and cost-effective grounds. This alternative would not meet the Federal standard as a least cost option, nor would it meet the original project intent to place suitable materials on eroded or eroding adjacent beaches.

The Proposed Action and the No Action Alternative are the only Alternatives that will be evaluated as part of this EA.

CHAPTER 3 EXISTING CONDITIONS

3.1 Water Quality

The proposed project lies within the Little River Watershed. The waters within Murrells Inlet are classified as Shellfish Harvesting (SFH) Waters by the South Carolina Department of Health and Environmental Control (SCDHEC 2005). The SFH rating applies to tidal saltwater protected for shellfish harvesting and is considered suitable for recreation, crabbing, and fishing. It is also considered 'suitable for the survival and propagation of a balanced indigenous aquatic community of marine fauna and flora.'

In 2005, SCDHEC developed a Total Maximum Daily Load (TMDL) with respect to fecal coliform bacteria loading in Murrells Inlet. This TMDL was developed in 2005 as a result of some of the water quality monitoring stations within Murrells Inlet failing to meet established water quality standards for the presence of fecal coliform resulting in much of Murrells Inlet being included on the state's 303(d) impaired waters list. The 2005 TMDL identified nonpoint source pollution loading from primarily urban runoff, domestic animal, and wildlife wastes as the primary sources of fecal coliform. Water quality in the Murrells Inlet are currently not meeting water quality standards for safe shellfish harvesting because of the elevated levels of fecal coliform.

SCDHEC has placed segments of Murrells Inlet (Hydrologic Unit Code [HUC] 03040208308) on its 2018 303(d) list due to fecal coliform impairments (SCDHEC 2020).

To determine the composition of dredged material, sediment sampling was conducted in 1970, 1997, and 2000, and 2016. In 2015, seven sediment samples were collected from the project area, specifically within the shoals and entrance channel. Sediments were analyzed for the following parameters:

- Metals
- Total Organic Carbon (TOC)
- Percent Solids
- Grain size
- Specific Gravity
- Atterberg Limits
- Polybrominated diphenyl ethers (PBDEs)
- Pesticides
- Polychlorinated biphenyls (PCBs)
- PCB Congeners
- Butyltins, including Tributyltin
- Dioxins/Furans
- Polynuclear aromatic hydrocarbons (PAHs)

Results were similar to previous sampling and no contamination concerns were identified. The deposition basin, entrance channel, and Inner Shoal A samples were essentially pure sand, whereas the samples in the upper shoals (B and C) are around 78% sand. Subsequently, a Section 401 Water Quality Certification was issued for disposal of dredged material associated with the project by the South Carolina Department of Health and Environmental Control

(SCDHEC) on April 18, 2017. Based on the previous results, consistently high sand content, and no change in land use, or other sources that may result in contamination additional sampling was determined unnecessary

3.2 Terrestrial Biological Resources

There are several kinds of habitats within the project area including tidal marsh, sand and/or mudflats, and open water. Due to the diversity of habitat in and adjacent to the project area, a variety of wildlife species are expected to occur. Species present may include raccoon, otter, marsh rice rat, opossum, and marsh rabbit, as well as a variety of reptiles/amphibians (e.g., frogs, toads, lizards, snakes, turtles, alligator).

Murrells Inlet is utilized by waterfowl and shorebirds particularly during the winter months. More than 300 species of birds have been recorded within Huntington Beach State Park (South Carolina State Parks 2022).

Review of the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) database (https://ecos.fws.gov/ipac/) resulted in identification of the following 37 migratory birds of conservation concern that have the potential to present within the project area: American kestrel, American oystercatcher, bachman's sparrow, bald eagle, blue guillemot, black scoter, black skimmer, black-legged kittiwake, brown pelican, brown-headed nuthatch, chimney swift, common eider, common loon, dovekie, gull-billed tern, lesser yellowlegs, long-tailed duck, marbled godwit, painted bunting, prairie warbler, prothonotary warbler, purple sandpiper, razorbill, red-breasted merganser, red-headed woodpecker, red-throated loon, ring-billed gull, royal tern, ruddy turnstone, rusty blackbird, short-billed dowitcher, surf scoter, swallow-tailed kite, white-winged, scoter, willet, Wilson's plover, and wood thrush (USFWS 2022). In addition, a known bald eagle nest occurs within the state park, approximately two miles from the project area.

3.3 Aquatic Biological Resources

The subtidal nearshore habitat and the intertidal and beach habitat of Murrells Inlet, Garden City Beach, and Huntington Beach State Park support diverse communities of benthos (bottom-dwelling organisms), invertebrates, planktons (drifting organisms in the water column), fish, birds, marine mammals, and aquatic plants as described below.

3.3.1 Benthos

Aquatic organisms that live in close association with the bottom, or substrate, of a body of water, are collectively called benthos. The benthic environment includes a number of communities correlated largely with substratum type. The benthic fauna is divided into two groups: epifauna, living on the substratum; and infauna, living within the substratum. Infaunal communities are dominated by a great diversity of burrowing and tube dwelling crustaceans (e.g., amphipods), polychaete worms, and by burrowing bivalve mollusks. Some infaunal invertebrates, especially among the crustaceans, are capable of a high degree of lateral mobility, but the majority is essentially sedentary. The infauna is, with rare exception, comprised of filter and detritus feeding invertebrates. The epifauna and flora of sandy bottoms such as those in the project area tend to be much lower in diversity, and most inhabitants are microscopic. These surfaces are unsuitable for attachment by sessile invertebrates. In

addition, sand bottoms such as those found in the estuary are depositional and the continual rain of sediment quickly buries attached animals. Thus, these substrata support diatoms, other unicellular algae, protistans, and attached multicellular algae. Invertebrates primarily include motile deposit feeders, such as polychaete worms, sea cucumbers, and sand dollars. Some fish and crabs also graze on the bottom. Attached organisms are restricted largely to the occasional bit of shell or small rock lying at the surface. The development of oyster reefs on muddy intertidal bottoms, for example, is dependent on the presence of bits of shell or rock for initial larval attachment (Howie and Bishop 2021).

3.3.2 Plankton Community

Plankton are organisms that cannot swim or move on their own but rely on tides and currents. The plankton community within the project area is mainly composed of unicellular algae, larval stages of many fish and invertebrates and the adult stages of several microscopic invertebrates. Adult stages of several macro invertebrates such as jellyfish (*Chrysaora, Cyanea, Stomolophus, and Rhopilema*) and comb jellies (*Mnemiopsis*) that are carried by current and tides are also an important part of the plankton community.

3.3.3 Nekton

Nekton collectively refers to aquatic organisms capable of controlling their location through active moment and do not rely on the water current or tide for movement. Fish are the principal nektonic species although some crustaceans such as portunid crabs, penaeid shrimp and some mollusks, such as the squid spend at least a portion of their life as nekton. A number of fish species are considered to be estuarine dependent and utilize the coastal estuaries for at least a portion of their life cycle. Fish species commonly observed in the project area include spotted seatrout (*Cynoscion nebulosus*), weakfish (*Cynoscion regalis*), bluefish (*Pomatomus saltatrix*), red drum (*Sciaenops ocellata*), black drum (*Pogonias cromis*), spot (*Leiostomus xanthurus*), croaker (*Micropoganius undulatus*), sheepshead (*Archosargus probatocephalus*), menhaden (*Brevoortia tyrannus*), gizzard shad (*Dorosoma cepedianum*), mullet (*Mugil cephalus*), flounder (*Paralichthys sp.*), silversides (*Atherinidae*), and sea catfish (*Ariidae*).

3.3.4 Commercial Shellfish

Three commercial shellfish leases/culture areas and one state shellfish area (S358) are within the project area. These leases are issued and overseen by the South Carolina Department of Natural Resources (SCDNR). Two commercial shellfish leases/culture areas (C-370 and C-371) appear to extend into the project area, however, the federal channel itself is closed for shellfish harvesting. Additionally, the proposed placement areas are near shellfish culture areaC-365.

3.4 Essential Fish Habitat

The 1996 Congressional amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (16 U.S.C. 1802(10)) set forth requirements for the National Marine Fisheries Service (NMFS), regional fishery management councils (FMC), and other Federal agencies to identify and protect important marine and anadromous fish habitat. These amendments established procedures for the identification of Essential Fish Habitat (EFH) and a

requirement for interagency coordination to further the conservation of federally managed fisheries.

EFH is defined in the act as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The definition for EFH may include habitat for an individual species or an assemblage of species, whichever is appropriate within each Fisheries Management Plan (FMP).

The project area encompasses approximately 104 acres, including several EFH habitat types; intertidal and sub tidal nearshore coastal marine bottoms, coastal inlets, estuarine emergent wetlands, estuarine unconsolidated bottoms, and estuarine and marine water column.

Table 1 lists the species for which the South Atlantic Fishery Management Council (SAFMC) manages or has developed fishery management plans and that may occur in the study area. Murrells Inlet is a coastal inlet and therefore meets the criteria for EFH-Habitat Areas of Particular Concern (HAPC) for both penaeid shrimp and the snapper-grouper management complex (NMFS 2022).

Table 1. FMPs and Managed Species for the South Atlantic that may occur in the Project Area

Fishery Management Plan (FMP)	COMMON NAME	SCIENTIFIC NAME	LIFESTAGE(S)
Penaeid Shrimp	White shrimp	*Litopenaeus setiferus*	Larvae, Juvenile
	Brown shrimp	*Farfantepenaeus aztecus*	Larvae, Juvenile
Snapper Grouper Complex	Jack crevalle	*Caranx hippos*	All
	Gag grouper	*Mycteroperca microlepis*	All
	Black sea bass	*Centropristis striata*	All
	Mutton snapper	*Lutjanus analis*	All
	Red snapper	*Lutjanus campechanus*	All
	Lane snapper	*Lutjanus synagris*	All
	Gray snapper	*Lutjanus griseus*	All
	Yellowtail snapper	*Ocyurus chrysurus*	All
	Spadefish	*Chaetodipterus faber*	All
	White grunt	*Haemulon plumieri*	All
	Sheepshead	*Archosargus probatocephalus*	All
	Hogfish	*Lachnolaimus maximus*	All
Coastal Migratory Pelagics	King mackerel	*Scomberomorus cavalla*	All
	Spanish Mackerel	*Scomberomorus maculatus*	All
Mid-Atlantic FMP species which occur in South Atlantic	Bluefish	*Pomatomus saltatrix*	Larvae, Eggs, Adult, Juvenile
	Summer flounder	*Paralichthys dentatus*	Larvae, Juvenile, Adult
Federally Implemented Fishery Plan	Sand tiger shark	*Carcharias taurus*	Neonate/Juvenile, Adult
	Spinner shark	*Carcharhinus brevipinna*	Juvenile/Adult
	Sandbar shark	*Centropristis striata*	Juvenile/Adult
	Scalloped hammerhead shark	*Lutjanus analis*	Juvenile/Adult
	Tiger shark	*Galeocerdo cuvier*	Juvenile/Adult, Neonate
	Blacktip shark (Atlantic Stock)	*Carcharhinus limbatus*	Juvenile/Adult

Blacknose shark (Atlantic Stock)	*Carcharhinus acronotus*	Juvenile/Adult
Smoothhound shark (Atlantic Stock)	*Ocyurus chrysurus*	All
Atlantic Sharpnose shark	*Rhisoprionodon terraenovae*	Adult
Bonnethead shark (Atlantic Stock	*Sphyrna tiburo*	Juvenile/Adult

3.5 Threatened and Endangered Species

The Endangered Species Act of 1973, as amended (ESA) (16 United States Code [USC] §§ 1531-1543) was passed to conserve the ecosystems upon which endangered and threatened species depend, and to conserve and recover those species. An endangered species is defined by the ESA as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is likely to become endangered within the foreseeable future throughout all or a significant part of its range. Critical habitats, essential to the conservation of listed species, also can be designated under the ESA. The ESA establishes programs to conserve and recover endangered and threatened species and makes their conservation a priority for Federal agencies. Section 7 of the ESA requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and NMFS Protected Resources Division (PRD) when their proposed actions may affect endangered or threatened species or their critical habitats.

Table 2 contains a list of species that have been listed by either the U.S. Fish and Wildlife Service or NMFS PRD as occurring or possibly occurring in Georgetown County.

Table 2. USFWS and NOAA Fisheries Listed Species in Georgetown County

CATEGORY	COMMON NAME	SCIENTIFIC NAME	STATUS	PRESENT?
Birds	American wood stork	*Mycteria americana*	T	Yes
	Eastern black rail	*Laterallus jamaicensis jamaicensis*	T	Yes
	Piping plover	*Charadrius melodus*	T, CH	Yes
	Red-cockaded woodpecker	*Picoides borealis*	E	No
	Red knot	*Calidris canutus rufa*	T, PCH	Yes
Fish	Atlantic sturgeon*	*Acipenser oxyrinchus**	E, CH	Yes
	Shortnose sturgeon*	*Acipenser brevirostrum**	E	Yes
Mammals	Northern-long-eared bat	*Myotis septentrionalis*	T	No
	Fin whale*	*Balaenoptera physalus**	E	No
	Humpback whale*	*Megaptera novaengliae**	E	No
	Right whale*	*Balaena glacialis**	E, CH	No
	Sei whale*	*Balaenoptera borealis**	E	No
	Sperm whale*	*Physeter macrocephalus**	E	No
	West Indian manatee	*Trichechus manatus*	T	Yes
Plants	Pondberry	*Lindera melissifolia*	E	No
	Seabeach amaranth	*Amaranthus pumilus*	T	Yes
Reptiles	Green sea turtle**	*Chelonia mydas***	T	Yes
	Kemp's ridley sea turtle**	*Lepidochelys kempii***	E	Yes
	Leatherback sea turtle**	*Dermochelys coriacea***	E	Yes
	Loggerhead sea turtle**	*Caretta caretta***	T, CH	Yes

NOTES:

* Species under the jurisdiction of NOAA Fisheries, all others are under USFWS only.

** The U.S. Fish and Wildlife Service (FWS) and NMFS PRD share jurisdiction of this species, with NMFS PRD having jurisdiction when in the marine environment and USFWS having jurisdiction when in the terrestrial environment.

E - Federally Endangered, T - Federally Threatened, CH - Critical Habitat, PCH - Proposed Critical Habitat

Designated critical habitat for piping plover is present within the project's footprint, and critical habitat for rufa red knot has been proposed within the project's footprint. No other critical habitat has been designated or proposed within the project area for any other species.

3.5.1 American Wood Stork

Wood storks are birds of freshwater and estuarine wetlands. They feed in freshwater marshes, narrow tidal creeks, or flooded tidal pools with water depths of around 4–12 inches. There is an active American wood stork colony on Huntington Beach State Park approximately 2 miles from the area of the project. The placement area at the terminal west end of the south jetty at HBSP may occasionally be used as a feeding area by wood storks; however, during there is other foraging habitat in the area, specifically HBSP.

3.5.2 Eastern Black Rail

Eastern black rail habitat can be tidally or non-tidally influenced, and range in salinity from salt to brackish to fresh. In the northeastern United States, the eastern black rail can typically be found in salt and brackish marshes with dense cover but can also be found in upland areas of these marshes. Further south along the Atlantic coast, eastern black rail habitat includes impounded and unimpounded salt and brackish marshes. Eastern black rails are known to nest in salt marshes and impoundments within Georgetown County; however, the likelihood of nesting in the project area is unknown. Eastern black rail nesting primarily occurs from May to August. Nests are laid above the high tide line in areas that are only inundated during extreme lunar or wind tides.

3.5.3 Piping Plover

Piping plovers are small, stocky shorebirds that resemble sandpipers. Piping plovers typically nest in sand depressions on un-vegetated portions of the beach above the high tide line on sand flats at the ends of sand spits and barrier islands, gently sloping foredunes, blowout areas behind primary dunes, sparsely vegetated dunes, and washover areas cut into or between dunes.

3.5.4 Rufa Red Knot

The red knot (Calidrus canutus rufa) is a migratory shorebird that has recently been listed under the ESA. The red knot is a regular visitor along the South Carolina coast during both the spring and fall migrations. Flocks of over 1000 birds have been observed in the spring with lesser numbers being observed in the fall. The red knot also uses the South Carolina coast as a wintering area. In the general project area, red knots are most abundant during the spring, northward migration

The USFWS has proposed 25 areas along the South Carolina (SC) coast as critical habitat for red knots. Two of these areas (Unit SC-1 and Unit SC-2) are on Garden City Beach and HBSP.

3.5.5 Sturgeon

Atlantic and shortnose sturgeon inhabits coastal, estuarine, and riverine environments on the Atlantic coast. Both species spawn in freshwater. SCDNR reports that in South Carolina, sturgeon inhabit The Waccamaw-Pee Dee River Basin. Shortnose sturgeon rarely in habit coastal ocean waters and tend to stay closer to the freshwater/saltwater divide, therefore it is unlikely that the shortnose sturgeon occurs in the project area. Atlantic sturgeon migrate to the

Atlantic ocean as sub-adults and return to the rivers to spawn. There are no known occurrences of either sturgeon in the project area.

3.5.6 West Indian Manatee

Manatees inhabit both salt and fresh water and can be found in shallow (usually <20 feet), slow-moving rivers, estuaries, saltwater bays, canals, and coastal areas (USFWS, 2001) throughout their range. In South Carolina, manatees occupy fresh, brackish and marine habitats and move freely between salinity extremes. Manatees will move up rivers until the water is too shallow for passage or is blocked by a dam. Manatees are thermally stressed at water temperatures below 18ºC (64.4ºF) (Garrott et al., 1995). For this reason, manatees are only seen in South Carolina in the summer months and there is no Critical Habitat in South Carolina for the West Indian manatee. Counties in South Carolina in which the manatee is known or believed to occur include: Beaufort, Berkeley, Charleston, Colleton, Dorchester, Georgetown, Horry, and Jasper.

3.5.7 Seabeach Amaranth

Seabeach amaranth is an annual plant found on the dunes of Atlantic Ocean beaches. Upon germination, the species forms a small unbranched sprig, but soon begins to branch profusely into a clump, which often reaches 30 cm in diameter and consists of five to 20 branches. Occasionally, a clump may get as large as a meter or more across, with 100 or more branches. The species is an effective sand binder, building dunes where it grows. (http://www.fws.gov/nces/plant/seabamaranth.html) . Seabeach amaranth occurs on barrier island beaches, where its primary habitat consists of overwash flats at accreting ends of islands and lower foredunes and upper strands of non-eroding beaches. The species appears to need extensive areas of barrier island beaches and inlets, functioning in a relatively natural and dynamic manner.

Huntington Beach State Park staff propagate seabeach amaranth on the front beach areas of the park. Seabeach amaranth has historically been present on the southern spit of Garden City Beach; however, a survey was conducted in September 2022 and no plants were found.

3.5.8 Sea Turtles

There are four species of sea turtles on the Atlantic Coast, Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), and green sea turtle (*Chelonia mydas)*. These four species of sea turtles are protected by the Convention on International Trade in Endangered Species (CITES). They are also listed as endangered or vulnerable in the Red Data Book by the International Union for the Conservation of Nature (IUCN). The Kemp's ridley and leatherback were listed as endangered by the U. S. Endangered Species Act in 1973. The green turtle and the loggerhead were added to the list as threatened in 1978.

Green turtles are found in all temperate and tropical waters around the world and stay mainly near the coastline and around islands. Green turtles are found in shallow flats and seagrass meadows during the day and return to scattered rock ledges, oyster beds, and coral reefs during the evening (FFWCC 2010). In the U.S. Atlantic waters, green turtles are found from Texas to Massachusetts, the U.S. Virgin Islands, and Puerto Rico. Green turtles are generally found over shallow flats, seagrasses, and algae areas inside bays and inlets. Resting areas include rocky bottoms, oyster, worm, and coral reefs. Post-hatchling pelagic-stage turtles may be omnivorous. Adult turtles are herbivores and consume algae and seagrasses.

Loggerhead sea turtles are found in temperate and subtropical waters of the world. They feed in coastal bays, estuaries, and in shallow water along the continental shelves of the Atlantic, Pacific, and Indian Oceans. Loggerhead turtles occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian oceans and are widely distributed within their range. They can be found hundreds of miles offshore or inshore in bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers (Conant et al. 2009). Loggerheads primarily feed on mollusks, crustaceans, fish, and other marine animals. Feeding areas often include coral reefs, rocky areas, and shipwrecks. Adult loggerheads may migrate considerable distances between foraging areas and nesting beaches. Loggerheads reach sexual maturity at about 35 years of age. Loggerheads move into South Carolina inshore waters to nest on beaches from May through August. They are known to nest along the beaches within the project area.

Leatherbacks, the most widely distributed of the sea turtles, are found throughout the Atlantic, Pacific, and Indian oceans, including areas near Alaska and Labrador. Leatherback turtles are highly migratory and pelagic and can be found at depths more than 3,000 feet. Because of their ability to regulate their body temperature, they can be found in deeper water than other species of sea turtles and can be active in water below 40 F. Leatherbacks primarily feed on jellyfish, but also consume sea urchins, squid, crustaceans, tunicates, fish, blue-green algae, and floating seaweed. In the Gulf of Mexico, leatherbacks are frequently associated with cabbage head *Stomolophus* and *Aurelia* jellyfish. The distribution and food habits of post-hatchling and juvenile leatherbacks are unknown, although they may be pelagic and associate with Sargassum weed.

Kemp's ridley turtles inhabit shallow nearshore and inshore waters of the northern Gulf of Mexico, particularly in Texas and Louisiana. During winter, turtles in the northern Gulf may travel to deeper water (NMFS and USFWS 1992). Kemp's ridleys are often found in waterbodies associated with salt marshes. Kemp's ridley nesting is essentially limited to the beaches of the western Gulf of Mexico, primarily in Tamaulipas, Mexico. In the US, nesting occurs primarily in Texas (especially Padre Island National Seashore), and occasionally in Florida, Alabama, Georgia, South Carolina and North Carolina (NMSF and USFWS 2013a). Neonatal Kemp's ridleys feed on Sargassum and infauna or other epipelagic species. Post-pelagic diets include various items such as mollusks, sea horses, cownose rays, jellyfish, crabs, tunicates and fish. Live bottom (sessile invertebrates attached to hard substrate) has been identified as a preferred habitat of neritic juveniles in the coastal wates of western Florida (NMFS and USFWS 2013a). Hatchlings may become entrained in Gulf of Mexico eddies and dispersed by oceanic surface currents, then enter coastal shallow water habitats when they reach about 20 cm in length.

3.6 Coastal Zone Resources

The Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. §1451 to §1466) was established as a national policy to preserve, protect, develop, and where possible, restore or enhance, the resources of the Nation's coastal zone for current and future generations. The South Carolina Coastal Management Program was established per the CZMA and was authorized in 1977 under SC's Coastal Tidelands and Wetlands Act. The proposed action is within South Carolina's designated Coastal Zone Management Area.

3.7 Coastal Barrier Resources System (CBRS)

The Coastal Barrier Resources Act (CBRA) of 1982 (19 U.S.C. §3501 *et. Seq.*), as amended by the Coastal Barrier Improvement Act (CBIA) of 1990 limits Federally-subsidized development within CBRA Units to minimize the loss of human life by discouraging development in high risk areas and to protect undeveloped coastal barriers along the Atlantic and Gulf Coasts, including islands, spits, tombolo's, and bay barriers that are subject to wind, waves, and tides such as estuaries and nearshore waters. There is one CBRA Unit, Huntington Beach Unit SC-03, within the study area and most of the dredging for this project is located within the unit along with the disposal locations at Huntington South Jetty and Huntington (front) Beach, Figure 4.

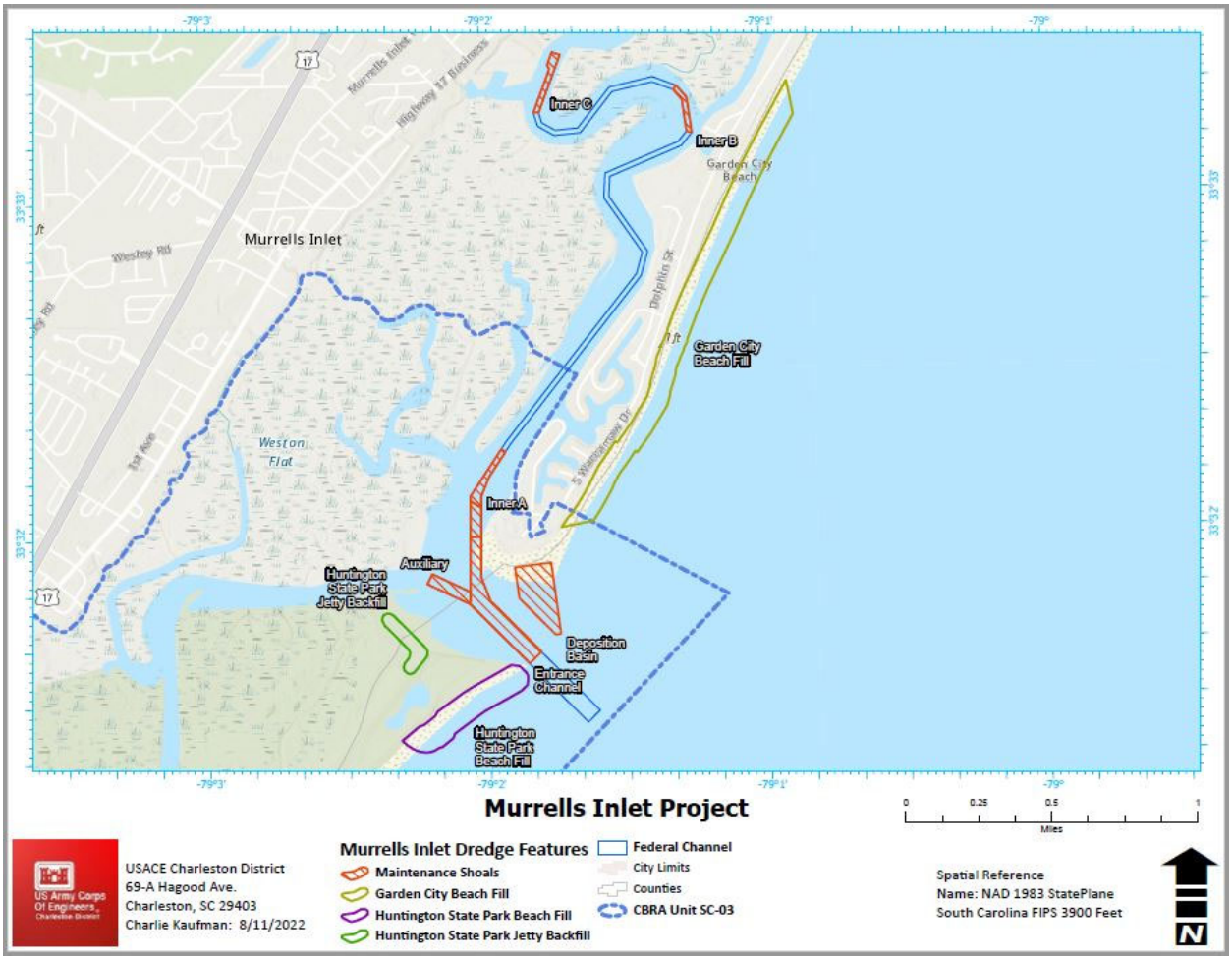

Figure 4. Coastal Barrier Resources Act Unit SC-03

3.8 Cultural Resources

The management of cultural resources is regulated under Federal laws such as the National Historic Preservation Act (NHPA) of 1966 (54 U.S.C. §300101 *et seq.*), the Archaeological and Historic Preservation Act of 1974 (54 U.S.C. §§312501- 312508), the American Indian Religious Freedom Act of 1978 (42 U.S.C. §§1996 and 1996a), the Archeological Resource Protection Act of 1979 (16 U.S.C. §§470aa-470mm), NEPA (42 U.S.C. §4321 *et seq.*), the Native American

Graves Protection and Repatriation Act of 1990 (25 U.S.C. §3001 *et seq.*), the Abandoned Shipwreck Act of 1987 (43 U.S.C. §§2101-2106), and the Sunken Military Craft Act of 2004 (10 U.S.C. § 113 *et seq.*).

Cultural resources considered in this study are those defined by the NHPA as properties listed, or eligible for listing, on the National Register of Historic Places (NRHP) and are referred to as historic properties. Historic properties include buildings, structures, sites, districts, objects, cultural items, Indian sacred sites, archaeological artifact collections, and archaeological resources (36 CFR 800.16(l)(1)). Cultural resources also include resources with unknown NRHP eligibility status.

Archaeological and Historical Setting

This undertaking is located in an area that is a natural channel through a sandy beachline featuring tidal flows between the Atlantic Ocean and lagoons. An influx of sand into the inlet creates an environment of shallow shifting-sand shoals. The archival research presented here is taken from a Chicora Foundation, Inc. investigation conducted in the area of this undertaking (Chicora 2006).

Prehistoric cultural resources in this coastal area range from the Paleoindian Period (12,000 – 8,000 BCE) through the Archaic Period (8,000 – 2,000 BCE), Woodland Period (2,000 BCE – 1,000 CE, and Mississippian Period 1,000 – 1,640 CE. The Paleoindian period is usually associated with the earliest securely documented period of human occupation in the New World and was characterized by low population density and band level societies of both nomadic hunters and foragers. The Paleoindian Period slowly transitioned into the Archaic Period in response to climate change. A diverse material culture resulted from the change to flora and fauna, while populations increased, and settlements intensified. The Woodland Period saw some continuation of the Archaic Period lifestyle, especially regarding hunting and fishing subsistence patterns, but the introduction of fired clay pottery marked a significant transition. Subsistence patterns begin to rely more heavily on shellfish, and occurrences of shell ring settlement systems become more common later in the Woodland Period. Shell middens are common during this period. Changes in the culture focused on craft specialization and elaborate mortuary behaviors.

The Mississippian period saw the development of a more elaborate level of culture, including complex social organization, agriculture, temple mound construction, and ceremonial centers. The introduction of European diseases marked the end of the Mississippian Period and beginning of the Historic Period around 1,640 CE. The coastal areas were highly sought after by European settlers due to the important of water for trade purposes. Tidal rice culture began in the 1730s and dominated the land and economy through large plantations that exploited slave labor. These highly profitable rice plantations continued through the 19th century, and Georgetown County is recorded as having the highest percentage of slaves in South Carolina, making up 88% of the county's population. The Civil War devastated the local economy, and subsequent crop failures in the mid- to late-1800s effectively ended the reign of a plantation-based economy.

Inventory of Resources in the Study Area

Cultural resource surveys (historic research, remote sensing, and dive investigations) have been conducted in South Carolina's inland and offshore waters, but only a few have been

conducted in the general vicinity of the current project area. One known investigation within the Area of Potential Effect (APE) included aspects of prospecting for and identifying submerged prehistoric sites within the current survey areas.

Gulf South Research Institute performed an exploratory magnetic survey of Murrell's Inlet (Gulf South 1978). The survey employed the use of a magnetometer. The report notes that two historically documented vessels were thought to be lost at or in the inlet, but their exact locations could not be determined through their investigation. One magnetic anomaly was identified within Murrell's Inlet, which could represent a potentially significant cultural resource such as a shipwreck. It was recommended that a 50-foot buffer be implemented to avoid impacts to the anomaly. If a buffer could not be implemented, then the site would need to be evaluated and delineated through additional investigations to include additional remote surveys and diver inspections.

A search of South Carolina's Archaeological Site File (ArchSite) was performed to identify and previously documented sites in this portion of Georgetown County, South Carolina, in or adjacent to the Project Area. This review showed no known terrestrial or submerged cultural resources in the form of prehistoric sites or shipwrecks recorded in the APE. ArchSite indicates the presence of the Murrell's Inlet Historic District in the APE. Figure 5 shows the historic district boundary, which is publicly available information. The Murrell's Inlet Historic District was listed in the National Register of Historic Places (NRHP) in November 1980 (SCDAH N.D.). The district contains a number of historic structures that contribute to its NRHP status, which demonstrate the transition of this area from 19th century rice plantations to a 20th century resort community. The historic district is also well documented from a survey sponsored by the Georgetown County Visitors Bureau and South Carolina's Department of Archives and History (New South 2006). The undertaking, as proposed, has no adverse effect on the historic district and any of its contributing structures.

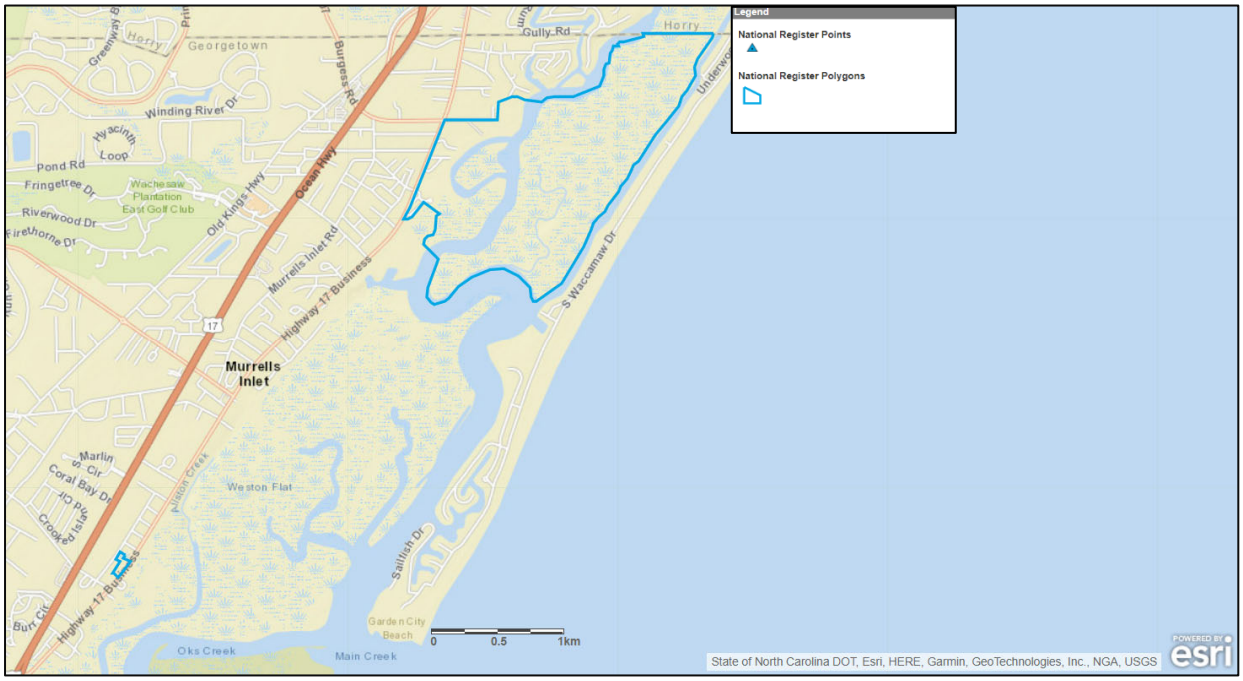

Figure 5. Arch Site results for the undertaking's APE indicating the publicly available boundary for the Murrell's Inlet Historic District.

A search of the National Oceanic and Atmospheric Administration's (NOAA) Wrecks and Obstructions Database did not reveal the presence of any documented wrecks or obstructions in the APE. One documented wreck is shown nearly one mile from the entrance channel (Figure 6). Little information is available for this wreck, as there is no history on when it was sunk and its possible association with a vessel name. It is listed as always being submerged and is considered dangerous. The undertaking, as proposed, will have no effect on this wreck.

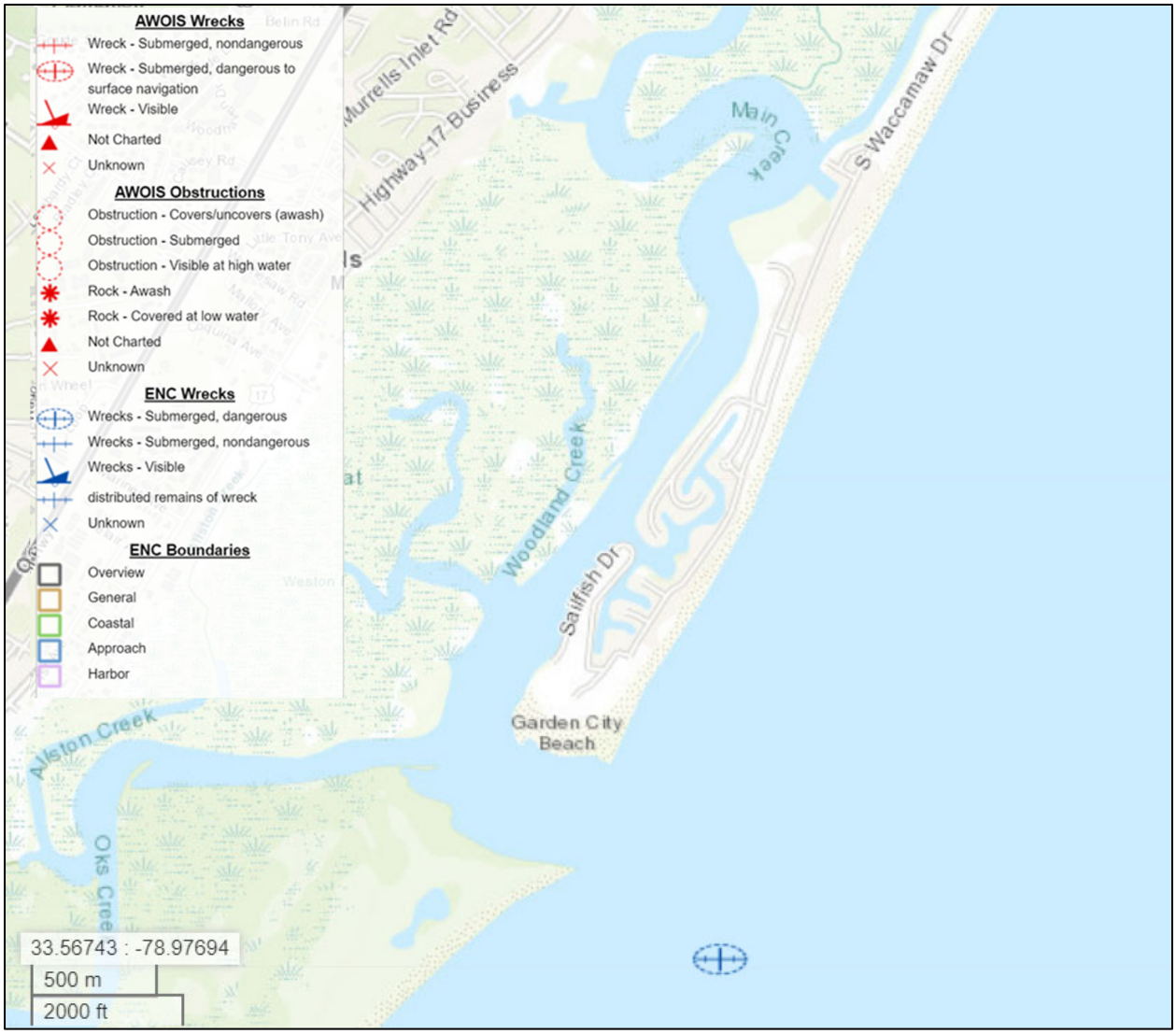

Figure 6. NOAA's Wrecks and Obstructions Database results for Murrell's Inlet with one obstruction noted near the entrance channel.

3.9 Visual Resources (Aesthetics)

Visual resources compose the visible character of a place and include both natural and humanmade attributes. Visual resources influence how an observer experiences a particular location and distinguishes it from other locations.

The project area is located within the viewshed of Garden City Beach and Huntington Beach State Park. The project area contains many pleasing attributes including the open water, beaches, and undeveloped marsh. The majority of the beach within GCB is developed with single, residential homes. HBSB remains undeveloped, which provides a natural setting and visually appealing backdrop.

3.10 Air and Noise

The Clean Air Act (CAA), as amended, requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The CAA established two types of national ambient air quality standards, primary and secondary. Primary standards are levels established by the EPA to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards are levels established to protect the public welfare, including protection from decreased visibility and damage to animals, crops, vegetation, and buildings.

The EPA Office of Air Quality Planning and Standards has set NAAQS for six principal pollutants which are called “criteria” pollutants. Those pollutants are Carbon Monoxide, Lead, Nitrogen Oxides, Particulate Matter (PM_{10} and $PM_{2.5}$), Ozone and Sulfur Dioxide. All air pollutants are listed as in attainment for Georgetown County (EPA 2015).

Environmental noise is a conglomeration of distant and nearby noise sources. Types of nearby noise sources observed within the project area include naturally occurring noises (wind on the beach, wave action in the surf zone, buzzing of insects, bird calls) and those from man-made sources (marine vessel engines, etc.).

3.11 Hazardous, Toxic, and Radioactive Waste (HTRW)

Hazardous waste is defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as any substance which may present a significant danger to public health and/or environment if released.

There are currently no known HTRW producers adjacent to the project site or any entity that discharges toxic effluent nearby. Since the area has been dredged multiple times, there is minimal risk of encountering HTRW.

3.12 Socioeconomics and Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people regardless of income, race, color, national origin, Tribal affiliation, or disability in agency decision-making and other Federal activities that affect human health and the environment. Section 112(b)(1) of WRDA 2020 requires that “In the formulation of water development resources projects, the Secretary shall comply with any existing Executive Order regarding environmental justice in effect as of the date of enactment of this Act to address any disproportionate and adverse human health or environmental effects on minority communities, low-income communities, and Indian Tribes.” The Executive Order (EO) in place at the time of the enactment of WRDA 2020 was EO 12898 (1994), Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which directs each federal agency to assess whether disproportionately high and adverse effects would be imposed on minority or low-income areas

by federal actions.. Subsequent EOs include: EO 14008 (January 2021), Tackling the Climate Crisis at Home and Abroad, which in Section 219 directs federal agencies to "[develop] programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities"; and, EO 14096 (April 21, 2023), Executive Order on Revitalizing Our Nation's Commitment to Environmental Justice for All, which directs federal agencies to pursue the protection of environmental justice communities (including underserved and disadvantaged communities) "from disproportionate and adverse human health and environmental effects (including risks) and hazards," and to "provide opportunities for the meaningful engagement of persons and communities with environmental justice concerns who are potentially affected by Federal activities."

The 2020 U.S. Census Data reports that the population of Murrell's Inlet is approximately 9,740. The ratio of male to female was approximately 49% male to 51% female with 86% of the population reported as white, 9.5% black, 3.3% Hispanic or Latino, and 1.5% Asian (USCB 2022). There were 4,280 households with a median household income of $60,487. Of the occupied housing units, 81.7% were owner occupied. Approximately 7.9% of the people in Murrell's Inlet are below the poverty level. Low income and minority populations are located inland of the project area, specifically within Georgetown County, South Carolina.

Using the newly developed Climate and Economic Justice Screening Tool, only one of the two census tracts that encompass the project area are identified as disadvantaged. Census Tract 45043920502 is identified as disadvantaged in the health burden category. Census tract 45043920501 is not identified as disadvantaged (CEQ 2022).

Communities are identified as disadvantaged in the health burden category if at or above the 90th percentile for asthma, diabetes, or heart disease, or at or above the 90th percentile for low life expectancy, above the 65th percentile for low income, and 80% or more of adults 15 or older are not enrolled in higher education.

3.13 Climate Change

The climate in this region of South Carolina consists of long hot summers and cool winters. Summers are warm and humid (average July high and low temperatures are 92°F and 71°F, respectively), and winters are relatively mild (average January high and low temperatures are 58°F and 35°F, respectively). In general, the state has warmed by one-half to one degree (F) over the last century and the sea is rising about one to one-and-a-half inches every decade (USEPA 2016). Precipitation occurs chiefly as rainfall and averages about 49.5 inches per year with approximately one-third of that total occurring during the months of June, July, and August. It is expected that in the coming decades changing climate in South Carolina will lead to an increase in the number of unpleasantly hot days, an increase in heat related illness, an increase in inland flooding, a decrease in crop yields, and harm to livestock (USEPA 2016). Sea level rise is the biggest climate change concern in Murrells Inlet. Due to sea level rise, there is an increased risk of coastal storm surge and potential damages to resources located within Murrells Inlet. Huntington Beach State Park was identified as a Priority Environmental Area in the South Atlantic Coastal Study (USACE 2022). HBSP is at medium to high risk from storm surge and sea level rise and potential loss of natural habitats for numerous species, including sea turtles.

3.14 Natural Areas, Parks, and Recreation

Several parks, including Huntington Beach State Park occurs within or near the project area. Huntington Beach State Park was recently ranked by Southern Living Magazine as the 3rd best state park in the south (Rogers 2022). Huntington Beach State Park includes 2,300 acres of land, including three miles of beach and is known as one of the best birding spots along the east coast. There is also a public beach access area that provides direct access to Garden City Beach.

Murrells Public Boat Landing, located less than ½ mile from the federal channel, is a three-lane public boat launch that provides direct boat access to Murrells Inlet and the use of the federal navigation channel.

Murrells Inlet is an intensively used estuary as it offers opportunities for recreational shellfish harvesting, recreational fishing, recreational boating, and wildlife viewing. Historical data from South Carolina Department of Natural Resources estimates that 98% of all spots (red fish), 30% of all flounder, and 23% of all red snapper taken in South Carolina waters are caught within the vicinity of Murrells Inlet (Salvino and Wachsman 2013). Additionally, the Murrells Inlet area has three designated State Shellfish Grounds covering 26.8 acres and two designed Recreational Shellfish Grounds covering 11.4 acres.

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

4.1 Water Quality

No Action Alternative

Under the No Action Alternative, the proposed maintenance dredging would not occur; therefore, no direct or indirect project related impacts to water quality would result.

Proposed Action Alternative

There will be a minor, temporary increase in turbidity levels in the project area during dredging and placement activities. Due to the sandy nature of the sediments proposed for dredging, turbidity plumes will be minimal and restricted primarily to the dredging and disposal areas. No adverse effects are expected. A Section 401 Water Quality Certification was issued for disposal of dredged material associated with the project by the South Carolina Department of Health and Environmental Control (SCDHEC) on April 18, 2017. The dredging and disposal methods have not changed, and no new disposal locations have been added since 2017. In an email dated August 26, 2022, SCDHEC concurred with the Corps' conclusion that the 2017 401 Water Quality Certification is still valid (Appendix F). Standard best management practices will be implemented to minimize migration of sediments on and off the placement areas during and after construction.

4.2 Terrestrial Biological Resources

No Action Alternative

Under the No Action Alternative, the proposed dredging would not occur; therefore, no direct or indirect project related impacts on terrestrial resources would result.

Proposed Action Alternative

The dredging and placement of sand at GCB and HBSP may have a temporary, minor effects on waterfowl, shorebirds or other animals that nest or inhabit the project area. There could be temporary displacement of shorebirds during disposal of dredged material at the beach placement areas. Migratory songbirds may also be impacted during the construction of containment berms/dikes and placement of dredged material in the upland placement areas. The USACE will include its standard migratory bird protection measures in the project plans and specifications and will require the Contractor to abide by those requirements. In addition, construction activities at HBSP will not occur during the active nesting and foraging season, March 15th through July 31st, to minimize impacts to shorebirds. No long-term significant impacts are expected to occur. In the long-term, the project will enhance and protect shorebird nesting habitat through the placement of sand along the beaches and the additional protection. Additionally, there is ample habitat adjacent to and in close proximity to the project area to provide refuge during project implementation.

The tidal marsh areas that lie behind Huntington (front) Beach and south of the Huntington Beach South Jetty will be protected by the temporary construction of a small protective berm during construction. After construction is completed, the temporary berm will be removed.

Some of the beach quality sand placed at the beaches will be allowed to naturally enhance the dry berm, intertidal, and subtidal zones. Organisms inhabiting this beach fill zone may be

covered as material is pumped onto the beach and into the intertidal zone. Because animals from high-energy beaches are motile and adapted to shifting sediments, rapid recovery of the fauna on these beach areas following the deposition of dredged materials is likely. There is adequate habitat nearby that would not be impacted that will provide habitat for any displaced animals. Previous studies have shown that the recovery time for benthos ranged from approximately two to six months when there is a good match between the fill material and the natural beach sediment. In the case of the proposed project, the fill material would not be substantially different than native material, therefore, it is expected that recover time would be similar to the two-to-six-month estimate

The sand/mud flat just north of the Huntington Beach South Jetty will be covered as that area is rebuilt. However, as the newly built area reaches its natural state, similar sand/mud flats will reappear and will be re-colonized. Further, this will provide protection for the tidal marsh located south of the south jetty.

4.3 Aquatic Biological Resources

No Action Alternative

Under the No Action Alternative, the proposed dredging would not occur; therefore, no direct or indirect project related impacts on aquatic resources would result.

Proposed Action Alternative

Dredging activities would involve disturbance of the bottom substrate and the subsequent removal of benthic communities; however, studies have shown a relatively short recovery time for infaunal communities following dredging (Wilber and Clark 2007). Once dredging activities cease, pelagic larval recruits would initially inhabit the impact areas and the adjacent unimpacted areas would provide a gradual recruitment of less opportunistic species. It is expected that benthic communities would be re-established within approximately one to two years after dredging activities cease (Vivan et. al. 2009).

Some of the planktonic organisms entrained by the dredging operations will suffer injury or mortality. Turbidity resulting from the dredging activity may reduce primary productivity by phytoplankton as light penetration into the water column is reduced. Both potential effects on plankton are expected to be minor and temporary as they would coincide in significance with the short duration of dredging and the extremely small percentage of fine-grained material in the dredged sediments. Additionally, there is ample habitat outside of the project area that will remain available during project implementation.

Dredging will take approximately four months to complete for each dredging cycle. Disturbances would be minor within a very localized area around the dredging area, of which nekton can avoid given their mobility. Therefore, dredging is not anticipated to adversely impact fish in the area.

To minimize impacts to the commercial shellfish harvesting area along Huntington Beach State Park, a temporary berm will be constructed to contain the slurry during construction. The federal channel itself is closed for shellfish harvesting, therefore, the dredging operation would have no impacts to the commercial shellfish leases/culture areas, C-370 and C-371, that are adjacent to the dredging areas.

4.4 Essential Fish Habitat

No Action Alternative

Under the No Action Alternative, the proposed dredging would not occur; therefore, no direct or indirect project related impacts on EFH would result.

Proposed Action Alternative

Dredging of the Federal channel and deposition basin, and beach placement activities could have negative effects on non-vegetated benthic communities through removal, direct burial, increased turbidity, or changes in the sand grain size or beach profiles. Dredging and placement activities would result in elevated turbidity levels and suspended solids in the project area when compared to the existing conditions; however, significant increases in turbidity are not expected to occur outside the immediate construction areas and turbidity levels and suspended sediments would be expected to return to background levels once construction ceases.

Dredging activities would involve disturbance of the bottom substrate and the subsequent removal of benthic communities; however, studies have shown a relatively short recovery time for infaunal communities following dredging (Wilber and Clark 2007). Once dredging activities cease, pelagic larval recruits would initially inhabit the impact areas and the adjacent unimpacted areas would provide a gradual recruitment of less opportunistic species. It is expected that benthic communities would be re-established within approximately one to two years after dredging activities cease (Vivan et. al. 2009).

Beach placement activities may have negative effects on intertidal macrofauna through direct burial, or changes in the sand grain size or beach profile. During maintenance dredging activities, benthic communities would be covered by dredged material; however, effects to benthic infauna would be considered relatively minor both spatially and temporally. Infaunal organisms in particular have very high reproductive potential and adjacent unimpacted areas would provide a source for recruitment. Avoiding beach placement activities during periods of peak larval recruitment, and matching grain size distributions between fill and native beach sediments could also minimize adverse effects to benthic communities (Wilbur et al., 2009). Prior to each maintenance dredging event, grain size testing of the shoals and project area will be conducted to determine suitability of the material for beneficial use placement efforts.

Dredging of the Federal channel and dredged material placement will not adversely affect any of the area's valuable tidal marshes. The tidal marsh areas located behind Huntington (front) Beach and south of the Huntington Beach south jetty will be protected by the temporary construction of a training berm during project activities. After construction is complete, the temporary berm will be removed. USACE intends to comply with the applicable conservation recommendations and best management practices included in the *Programmatic Essential Fish Habitat Consultation for USACE Activities and Projects Regularly Undertaken in South Carolina* (Appendix D). Therefore, impacts to EFH associated with the Murrells Inlet maintenance dredging and beneficial use placement are expected to be temporary and will not result in significant effects on managed species.

4.5 Threatened and Endangered Species

Suitable habitat is present within the project area for the following federally listed species: American wood stork, Eastern black rail, piping plover, seabeach amaranth, West Indian manatee, and all four sea turtles (green sea turtle, leatherback sea turtle, Kemp's ridley sea turtle, and loggerhead sea turtle).

No Action Alternative

Under the No Action Alternative, the proposed dredging would not occur; therefore, no direct or indirect project related impacts to listed species would result.

Proposed Action Alternative

The proposed action may impact the below species under either USFWS or NMFS jurisdiction. The action is covered activity under the 2020 South Atlantic Regional Biological Opinion (SARBO) and was included in the Annual SARBO Projects Risk Assessment that was produced by the USACE South Atlantic Division. The project will adhere to all applicable Project design criteria, therefore no further consultation with NMFS under ESA is required.

American wood stork

There is an active American wood stork colony on Huntington Beach State Park approximately 2 miles from the area of the project. Most of the work occurs in the deeper waters of Murrells Inlet and on the front beaches of Garden City and Huntington Beach State Park where there are no feeding areas. The placement area at the terminal west end of the south jetty at HBSP may occasionally be used as a feeding area by wood storks; however, during the project other foraging habitat in the area can be used. Feeding in the area of the south jetty will be able to resume upon completion of the project. Based on the above, it has been determined that maintenance dredging of the Murrells Inlet federal navigation channel may affect but is not likely to adversely affect the American wood stork.

Eastern black rail

It is unknown if eastern black rails occur in the immediate project area, however, should it occur, its habitat would be the salt marsh in the areas around Murrells Inlet away from the deeper waters where dredging will occur and away from the placement areas on the front beach and at the terminal west end of the south jetty. Based on the above, it has been determined that maintenance dredging of the Murrells Inlet federal navigation project may affect but is not likely to adversely affect the eastern black rail.

Piping Plover

Direct loss of nests from the placement of the dredged material should not occur, as the species is not known to nest in the project area. Piping plover foraging distribution on the beach may be altered as beach food resources may be affected by placement of material along the project area. Such disruptions will be temporary and of minor significance since the birds can easily fly to other loafing and foraging locations. To minimize impacts during foraging season, project construction activities will be limited to August 1st through March 15th on the HBSP side of Murrells Inlet. Since part of the southern tip of GCB will be converted from dry land to open water, there will be a loss of approximately 3.5 acres of piping plover critical habitat in this area. However, placement of material at the terminal west end of the south jetty at HBSP will result in

creation of additional habitat in this area that will offset the loss at GCB. The placement of dredged material into the intertidal zone along the front beach of HBSP will provide additional foraging habitat for the wintering piping plover in this area. Additionally, since the grain size is suitable for placement on these areas, it is unlikely that the benthic community structure will significantly differ between pre and post construction activities. Previous studies of beach nourishment projects have shown a short-term impact to the beach and surf zone infaunal community with a recovery within six months (SCDNR, 2009). Based on the above, it has been determined that maintenance dredging of the Murrells Inlet federal navigation project may affect, is likely to adversely affect the piping plover and piping plover critical habitat.

Rufa red knot

Direct loss of nests from the placement of the dredged material will not occur since the species does not nest in the project area. Red knot foraging distribution on the beach may be altered as beach food resources may be affected by placement of material along the project area. Such disruptions will be temporary and of minor significance since the birds can easily fly to other loafing and foraging locations. To minimize impacts during foraging season, project construction activities will be limited to August 1st through March 15th on the HBSP side of Murrells Inlet. Additionally, since the grain size is suitable for placement on these areas, it is unlikely that the benthic community structure will significantly differ between pre and post construction activities. Previous studies of beach nourishment projects have shown a short-term impact to the beach and surf zone infaunal community with a recovery within six months (SCDNR, 2009). As previously mentioned, approximately 3.5 acres of dry land will be converted to open water, therefore, there will be a loss of rufa red knot proposed critical habitat in this area. However, placement of material at the terminal west end of the south jetty at HBSP will result in creation of additional habitat in this area that will offset the loss at Garden City Beach. The placement of dredged material into the intertidal zone along the front beach of GCB and HBSP will provide additional foraging habitat for the red knots in this area. Based on the above, it has been determined that maintenance dredging of the Murrells Inlet federal navigation project may affect, but is likely to adversely affect the rufa red knot and the proposed rufa red knot critical habitat.

Seabeach amaranth

While the extent of the in-situ seed bank that remains is unknown, a portion, if not all, of the seed bank that supplies the sand spit on Garden City Beach will be removed and disposed of on either Garden City Beach or HBSP. Since the disposal of the dredged material on beaches seems to maintain desirable habitat for the species, the seeds transported to Garden City Beach or HBSP may germinate and thrive in the newly deposited material. If this is the case, the proposed project will be beneficial to the long-term survival potential of the species in Murrells Inlet area.

Even though a portion of the sand spit on GCB will be removed, it will most likely continue its accretion/migration into Murrells Inlet for the foreseeable future. As the sand spit accretes, habitat for sea beach amaranth will again be created up until such time as maintenance dredging becomes necessary. This accreted area will likely be repopulated by seabeach amaranth seeds that either remain in the sand spit after the dredging is completed, wash in from material being placed on GCB north of the jetty or from the seed bank material scraped up and stockpiled prior to dredging. While the extent of the seed bank that remains is unknown, there is no reason to believe that it is not sufficient to repopulate the area between maintenance dredging events. Based on the above, it has been determined that maintenance dredging of the Murrells Inlet federal navigation project may affect, is likely to adversely affect seabeach amaranth.West Indian manatee

Most of the proposed work is currently scheduled to occur during the time of year when manatees are visiting the area. During the warmer months, standard manatee conditions for in-water construction work will be followed to ensure that any manatees in the vicinity are not harmed or harassed. In addition, since the proposed work is to be performed with a hydraulic cutterhead pipeline dredge and since manatees are uncommon in the vicinity of Murrells Inlet, no impacts to the manatee are anticipated. Based on the above, it has been determined that maintenance dredging of the Murrells Inlet federal navigation project may affect, but is not likely to adversely affect the West Indian manatee.

Sea turtles

Sea turtle nesting is known to occur on both GCB and HBSP. The Murrells Inlet maintenance dredging project may occur during sea turtle nesting season. If the project occurs during sea turtle nesting season, the placement of sand on the beach could adversely affect any existing sea turtle nests and sea turtles attempting to nest. If the work occurs during sea turtle nesting season, the Corps is proposing the following measures to minimize effects to nesting sea turtles,:

- Daily nesting surveys will be conducted starting either May 1 or 65 days prior to the start of construction, whichever is later. These surveys will be performed between sunrise and 9:00 A.M. and will continue until the end of the project, or September 30, whichever is earlier. Any nests found in the area that will be impacted by construction activities will be moved to a safe location. The nesting surveys and nest relocations will only be performed by people with a valid South Carolina DNR permit.

- The dredging contractor will provide nighttime monitoring along the beach where construction is taking place to ensure the safety of female turtles attempting to nest. Cease construction activities if a sea turtle is sighted on an area of beach scheduled for fill until the turtle returns to the ocean. A buffer zone around the female will be imposed in the event of an attempt to nest.

- Construction activities occurring during the period May 1 through October 31, use of heavy equipment will be limited to the area undergoing placement of material.

- Staging areas for equipment and supplies will be located off of the beach to the maximum extent possible.

- All on-beach lighting associated with the project will be limited to the minimum amount necessary around active construction areas to satisfy Occupational Safety and Health Administration (OSHA) requirements.

- The dredging contractor will use predator proof trash receptacles to minimize presence of species that prey upon hatchlings.

Immediately after completion of the project, the Corps of Engineers will perform tilling on the project's front beach area of GCB to a depth of at least 24 inches in order to reduce compaction associated with the newly placed sand. Visual surveys for escarpments along the project area will be made immediately after completion of the project and prior to May 1 for 3 subsequent years, if needed.

Adherence to the above precautions should minimize the effects to nesting loggerhead sea turtles and emerging loggerhead sea turtle hatchlings. The monitoring and relocation program will minimize potential adverse effects to nesting sea turtles. Completion of the project will

recreate lost habitat and protect existing turtle nesting habitat as well as the structures on the island. However, because of the possibility of missing a sea turtle nest during the nest monitoring program or inadvertently breaking eggs during relocation, there is a potential for temporary, minor localized adverse effects to turtles. Therefore, USACE has determined that maintenance dredging of the Murrells Inlet federal navigation project may affect, is likely to adversely affect the green sea turtleand loggerhead sea turtle. Neither Kemp's ridley sea turtle nor the leatherback sea turtle have been documented within the action area, therefore, it is unlikely that either of these species' nests within the action area. Therefore, it has been determined that the project, may affect is not likely to adversely affect the Kemp's ridley sea turtle and leatherback sea turtle.

Per Section 7 of the ESA, USACE prepared a Biological Assessment concerning the above potential impacts to listed species and entered into formal consultation with USFWS on November 22, 2022. USFWS issued a Biological Opinion (BO) and Conference on April 12, 2023 (Appendix C). All Terms and Conditions found within the BO will be adhered to.

4.6 Coastal Zone Resources

No Action Alternative

Under the No Action Alternative, the proposed dredging would not occur; therefore, no direct or indirect project related impacts on coastal zone resources would result. The placement areas will not receive additional material, nor will the jetty receive additional protection from erosion.

Proposed Action Alternative

The SCDHEC, Office of Ocean and Coastal Resource Management provided conditional certification that the project was consistent with the Coastal Zone Management Program by letter of November 15, 2016. A revised Coastal Zone Consistency was received on November 21, 2016, that included project specific conditions. The dredging and disposal methods have not changed and all conditions will be adhered to; therefore, the Corps of Engineers considers the previous consistency determination to still be valid. Concurrence from SCDHEC was received by email on July 13, 2022 (Appendix E).

4.7 Coastal Barrier Resources System

No Action Alternative

Under the No Action Alternative, the proposed dredging would not occur; therefore, no direct or indirect project related impacts on the coastal barrier unit would result. The placement areas will not receive additional material, nor will the jetty receive additional protection from erosion.

Proposed Action Alternative

Between 250,000 and 500,000 cubic yards of sediment would be removed from the Federal navigation channel within Unit SC-03 and placed on the front beach at Garden City Beach, which is outside of the units boundaries. Exception 16 U.S.C. 3505(a)(2) for the maintenance or construction of improvements of existing federal channels applies to this project. On September 25, 2022, USFWS concurred that the project meets this exception (Appendix B).

4.8 Cultural and Historic Resources

Federal agencies are required by Section 106 of the NHPA and by NEPA to consider the possible effects of their undertakings on historic properties. For cultural resources, the threshold for significant impacts includes any disturbance that cannot be mitigated and affects the integrity of a historic property (i.e., a cultural resource that is eligible for the National Register of Historic Places (NRHP]). The threshold also applies to any cultural resource that has not yet been evaluated for its eligibility to the NRHP or disturbs a resource that has importance to a traditional group under American Indian Religious Freedom Act, EO 13007, and Native American Graves Protection and Repatriation Act (NAGPRA).

No Action Alternative

Under the No Action Alternative, the proposed dredging and subsequent sediment placement would not occur; therefore, no direct or indirect project related impacts on cultural resources would occur.

Proposed Action Alternative

Analysis of potential impacts to cultural resources considers both direct and indirect impacts. Direct impacts may be the result of physically altering, damaging, or destroying all or part of a resource, altering characteristics of the surrounding environment by introducing visual or audible elements that are out of character for the period the resource represents, or neglecting the resource to the extent that it deteriorates or is destroyed. Indirect impacts are those that may occur as a result of the completed project, such as increased vessel traffic in the vicinity of the resource and the associated hydrologic changes associated with this increase.

The APE has been defined as the entrance channel, federal navigation channel, and surrounding shoreline. Actions anticipated within the APE would consist of dredging in the channel and placement of dredged material for beneficial use along shorelines. Impacts to cultural resources could result from activities which include soil disturbance, soil compaction, and rut formation. Soil disturbing activities have the potential to destroy stratigraphy and site integrity which could adversely affect a site's National Register of Historic Places eligibility. Soil compaction caused by placement of dredge pipes and dredged material have the potential to destroy site integrity resulting in adversely affecting the site's potential to yield specific data that addresses important research questions. Placing dredge pipe on top of archaeological sites could cause ruts to form, which can potentially cause artifacts to become exposed, erode soil, and cause overall damaging effects to the site's depositional integrity affecting its potential to yield significant data to build upon the region's history or prehistory.

Dredging of the federal navigation channel and placement of dredged material in previously approved sites will not negatively impact cultural resources. In accordance with the regulations pertaining to Section 106 of the NHPA, USACE made a determination of no adverse effect for the undertaking due to the buffer implemented for the magnetic anomaly within the inner channel and the distance from which the undertaking is from the only NRHP-listed resource in the area (Murrells Inlet Historic District). SHPO concurred with this determination in a letter dated September 8, 2022. Potential impacts will need to be considered and consultation resumed if inadvertent discoveries are found.

4.9 Visual Resources (Aesthetics)

No Action Alternative

Under the No Action Alternative, the proposed dredging would not occur; therefore, no direct or indirect project related impacts on visual resources would result.

Proposed Action Alternative

The presence of assorted dredging and construction equipment will create a minor, temporary impact to the natural beauty of the project area. This temporary change would be observed by anyone navigating the project area by commercial or recreational vessels during project operations. However, these impacts are temporary and will not affect the preservation of this coastal setting. Existing conditions will return to the area following completion of the project.

4.10 Air and Noise

No Action Alternative

Under the No Action Alternative, the proposed dredging would not occur; therefore, no direct or indirect project related impacts on air quality or noise would occur.

Proposed Action Alternative

There will be a minor change in air quality as a result of exhaust from the dredge and any associated equipment, vessels, and vehicles. The change will be minor and temporary in nature. Air quality will return to normal following completion of the project.

Ambient noise levels will increase as a result of the operations of the dredge and any associated equipment, vessels, and vehicles during project construction. The increase will be minor and temporary in nature. Noise levels will return to normal following completion of the project.

4.11 Hazardous, Toxic and Radioactive Waste

No Action Alternative

Under the No Action Alternative, the proposed dredging would not occur; therefore, no direct or indirect project related impacts on HTRW would result.

Proposed Action Alternative

The last maintenance dredging of the navigation channel occurred in 2017. Because of the type of material (sand) and the historical knowledge of this site, it is not expected that any hazardous, toxic or radiological waste will be encountered. Material that is predominately sand generally does not require any contaminant testing since contaminants adhere to organic particles, which are present in very low concentrations in this material. Additionally, pursuant to ER 1165-2-132, dredge materials and sediments beneath navigable waters proposed for dredging qualify as hazardous or toxic wastes only if they are within the boundaries of a site designated by the EPA or a state for a response action (either a removal action or remedial action) under CERCLA.

4.12 Socioeconomics and Environmental Justice

No Action Alternative

Under the No Action Alternative, the proposed dredging would not occur; therefore, the channel would continue to shoal in, and boat traffic would continue to find it difficult to traverse the inlet. This may result in negative impacts to the industrial and commercial base of the area and impact the local economy.

Proposed Action Alternative

Maintenance of the navigation channel would have a favorable economic impact on the area. Recreational and commercial vessels serving the area will help and possibly even expand the industrial and commercial base that currently exists in Murrell's Inlet. This will directly and indirectly have a beneficial effect on the local, state, and national economy. Indirect benefits may accrue in the area through increases in business activity, employment, property values, and tax revenues. Other benefits for the commercial fishing and tourism industry would also be expected to occur. Accordingly, it is not anticipated that there will be any disproportionately high human health or environmental impact on low income or minority populations.

4.13 Climate Change

No Action Alternative

Under the No Action Alternative, the proposed project would not occur and there would be no effect to climate change or sea level rise.

Proposed Action Alternative

Maintenance dredging of Murrells Inlet would have no impacts on sea level rise. The project will provide a benefit by improving resiliency to sea level rise by protecting the south jetty which helps reduce impacts from sea level rise. The proposed project may result in a negligible release of greenhouse gases into the atmosphere when compared to global greenhouse gas emissions. Greenhouse gas emissions have been shown to contribute to climate change. Greenhouse gas emissions associated with the Corps federal action may occur from the combustion of fossil fuels associated with the operation of dredging equipment. Greenhouse gas emissions from the Corps action have been weighed against national goals of energy independence, national security, and economic development and determined not contrary to the public interest.

4.13 Natural Areas, Parks, and Recreation

No Action Alternative

Under the No Action Alternative, the proposed project would not occur and there would be no effect to natural areas, parks, and recreation.

Proposed Action Alternative

While the proposed maintenance dredging and placement at GCB and HBSP may be an inconvenience to recreators and commercial fishers during construction, it is not expected to

have any long-term adverse effect on fishing activities in the area. The placement of material at both locations will have a long-term positive effect by protecting the area and continuing to provide recreational opportunities.

Maintaining the navigation channel will provide fishing vessels better access to and from Murrell's Inlet, which may improve commercial fishing. Recreational boaters will also benefit from maintaining the channel. The presence of the dredge and associated equipment could create temporary inconveniences for boats (recreational and commercial) navigating in the vicinity. However, since the dredge is either stationary or slow moving, it does not provide a swiftly moving target that must be avoided. The effects will be minor and temporary. The project area will benefit in the long-term through beach nourishment.

CHAPTER 5 CUMULATIVE IMPACTS

Cumulative impacts are defined in the regulations implementing NEPA as follows:

> Cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

40 C.F.R. § 1508.1(g)(3). The following paragraphs summarize the cumulative impacts expected from the proposed project.

5.1 Past, Present, and Reasonably Foreseeable Future Actions

Dredging of the Murrells Inlet navigation channel has occurred periodically since the project was completed in 1981 and it is expected that in the future, routing operation and maintenance dredging of the entrance channel, deposition, basin, and inner channel will occur.

In 2017, Georgetown County conducted maintenance dredging near the navigation channel and placed the material in an upland location. Georgetown County has proposed dredging the same area near the Marshwalk and boat ramp but is proposing to place the material offshore.

5.2 Resource Areas Evaluated for Cumulative Effects

Implementation of the proposed action would have no or negligible effects on Water Quality, Aquatic Resources, Terrestrial Resources, Cultural Resources, Visual Resources, Air Quality, Noise, Hazardous Waste, Socioeconomics, Environmental Justice, Climate Change, and Natural Areas, Parks, and Recreation. As such, these resources were not carried forward into the cumulative effects analysis. Implementation of the proposed action will have minor impacts to the resources further discussed below.

Essential Fish Habitat

The proposed action, when considered with past, present, and reasonably foreseeable future projects, would not result in significant impacts to EFH. USACE has completed a programmatic consultation that applies to the Murrells Inlet project. USACE intends to follow the conservation measures set forth in the *Programmatic Essential Fish Habitat Consultation for USACE Activities and Projects Regularly Undertaken in South Carolina* in order to avoid significant individual or cumulative adverse effects on EFH or living marine resources under the jurisdiction of NMFS. See appendix D for additional information.

Threatened and Endangered Species

The proposed action, when considered with past, present, and reasonably foreseeable future projects, would not result in significant impacts to listed species. While the proposed project may affect some listed species, the work will be performed in compliance with all applicable laws and will follow all minimization measures and conditions that are a result of ESA

consultation. Additionally, the project may help provide and protect habitat for the listed species. Individuals may be temporarily affected by the dredging and placement activities; however, the cumulative adverse impacts will be minor.

Given the size of the project, the overall minor and temporary nature of any adverse effects, and the beneficial use of the dredged material, there should be little adverse cumulative impact resulting from the proposed project.

CHAPTER 6 PUBLIC INVOLVEMENT AND COORDINATION

A draft of the EA and Finding of No Significant Impact (FONSI) was released to the public for a 30-day review and comment period on November 15, 2022. The draft EA was placed on the Charleston' District's external website. Additionally, notification letters were sent to the following tribes and agencies:

- **Tribes**
  - Absentee-Shawnee Tribe of Indians of Oklahoma
  - Alabama-Quassarte Tribal Town
  - Catawba Indian Nation
  - Cherokee Nation
  - Chickasaw Nation
  - Delaware Tribe of Indians
  - Eastern Band of the Cherokee Indians
  - Eastern Shawnee Tribe of Oklahoma
  - Kialegee Tribal Town
  - The Muscogee (Creek) Nation
  - Poarch Band of Creek Indians
  - Shawnee Tribe
  - Thlopthlocco Tribal Town
  - Tuscarora Nation
  - United Keetoowah Band of Cherokee Indians in Oklahoma
- **Federal Agencies**
  - Environmental Protection Agency
  - National Marine Fisheries Services
  - U.S. Fish and Wildlife Service
- **State Agencies**
  - SCDHEC Bureau of Air Quality
  - SCDHEC Bureau of Water
  - SCDHEC Ocean and Coastal Resources Management
  - South Carolina Department of Natural Resources (SCDNR)
  - South Carolina Department of Archives and History
  - South Carolina Department of Parks, Recreation, and Tourism

Seven comment letters were received regarding the November 2022 draft EA and FONSI. Comments are found in Appendix A. Comments were received from the Delaware Tribe, Eastern Shawnee Tribe, USFWS, NMFS, SCDNR, and SHPO. In general, tribes, federal and state agencies provided comments and concurrence regarding the resource impact analysis, permitting requirements, and environmental compliance.

CHAPTER 7 COMPLIANCE WITH OTHER ENVIRONMENTAL LAWS

Clean Air Act of 1972

The Clean Air Act (CAA) sets goals and standards for the qualify and purity of air. It requires the EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. Georgetown County is designated as in attainment for all principal pollutants. The short-term effects from construction equipment associated with the project would not result in permanent adverse effects to air quality in the study area. Air quality permits would not be required for this project.

Clean Water Act of 1972 – Section 401 and Section 404

The Clean Water Act (CWA) sets and maintains goals and standards for water quality and purity. A Section 401 Water Quality Certification was issued for disposal of dredged material associated with the project by the South Carolina Department of Health and Environmental Control (SCDHEC) on April 18, 2017. Since the dredging and disposal methods have not changed and no new disposal locations have been added, the Corps of Engineers considers the previous water quality certification to still be valid.

As required by Section 404(b)(1) of the CWA, an evaluation to assess the short- and long-term impacts associated with the dredged and fill materials resulting from this Project has been completed. The 404((b)(1) can be found in Appendix G.

Coastal Barrier Resources Act of 1982

The Coastal Barrier Resources Act (CBRA) provides for a Coastal Barrier Resources System of undeveloped coastal barriers along the Atlantic and Gulf Coasts, including islands, spits, tombolo's, and bay barriers that are subject to wind, waves, and tides such as estuaries and nearshore waters. Resources in the System are to be protected by restricting Federal expenditures that have the effect of encouraging development of coastal barriers. Most of the dredging for this project is located within Huntington Beach Unit SC-03, along with the disposal locations at Huntington South Jetty and Huntington (front) Beach, Figure 4.

The Coastal Barrier Resources Act (CBRA) exempts the maintenance or construction of improvements of existing Federal navigation channels and related structures (such as jetties), including the disposal of dredge materials related to maintenance or construction. O&M dredging of the existing Murrells Inlet project and disposal of beach quality sand on adjacent beaches falls squarely within this exemption. On September 25, 2022, USFWS concurred that the project meets this exception (Appendix B).

Coastal Management Zone Act of 1972

The Coastal Zone Management Act (CZMA) requires that "each federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs." Per the Coastal Tidelands and Wetlands Act (S.C. Code Ann. The

SCDHEC, Office of Ocean and Coastal Resource Management provided conditional certification that the project was consistent with the Coastal Zone Management Program by letter of November 15, 2016. A revised Coastal Zone Consistency was received on November 21, 2016. Since the dredging and disposal methods have not changed and no new disposal locations have been added, the Corps of Engineers considers the previous consistency determination to still be valid. Concurrence from SCDHEC was received by email on July 13, 2022 (Appendix E).

Endangered Species Act of 1973

The ESA is designed to protect and recover threatened and endangered species of fish, wildlife, and plants. Suitable habitat is present within the project area for the following federally listed species: American wood stork, Eastern black rail, piping plover, seabeach amaranth, West Indian manatee, and all four sea turtles (green sea turtle, leatherback sea turtle, Kemp's ridley sea turtle, and loggerhead sea turtle).

USACE has determined, and USFWS concurred, that the project may affect, but is not likely to adversely affect the American wood stork, Eastern black rail, , seabeach amaranth, the leatherback sea turtle, Kemp's ridley sea turtle, and West Indian manatee. It has been determined that maintenance dredging of the Murrells Inlet federal navigation project may affect, is likely to adversely affect the green sea turtle loggerhead sea turtle, rufa red knot, and piping plover, as well as critical habitat for piping plover and proposed critical habitat for rufa red knot.

Under Section 7 of the ESA, USACE has prepared a Biological Assessment concerning the above potential impacts to listed species and entered into formal consultation with USFWS on November 22, 2022. USFWS issued a Biological Opinion (BO) and Conference on April 12, 2023 (Appendix C). All Terms and Conditions found within the BO will be adhered to.

The action is covered activity under the 2020 South Atlantic Regional Biological Opinion (SARBO) and was included in the Annual SARBO Projects Risk Assessment that was produced by the USACE South Atlantic Division. The project will adhere to all applicable Project design criteria, therefore no further consultation with NMFS under ESA is required.

Environmental Justice

Section 112(b)(1) of WRDA 2020, Executive Order (EO) 12898 (1994), *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, EO 14008 (January 2021), *Tackling the Climate Crisis at Home and Abroad*, and EO 14096 (April 21, 2023), *Executive Order on Revitalizing Our Nation's Commitment to Environmental Justice for All*, all oblige federal agencies to consider whether their actions will have disproportionate and adverse human health and environmental effects on low income, minority, disadvantaged, or underserved communities.

Total minority populations (i.e., all non-white and Hispanic or Latino racial groups) combined comprise approximately 14 percent of the population in the project area. The project would have no disproportionate and adverse impacts on environmental justice communities.

Fish and Wildlife Coordination Act of 1934

The Fish and Wildlife Coordination Act (FWCA) provides authority for the USFWS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features and requires that federal agencies consult with USFWS, NMFS, and state resource agencies on the proposed project. This coordination is being conducted concurrent with the public review of the draft EA.

Floodplain Management (EO 11988)

To comply with Executive Order 11988, the policy of the USACE is to formulate projects that, to the extent possible, avoid or minimize adverse effects associated with the use of the floodplain and avoid inducing development in the floodplain unless there is no practicable alternative. Projects that involve beneficial use of dredged material and beach nourishment are inherently located in within the floodplain. USACE intends to prioritize beneficial use of dredged material wherever and whenever possible. For the proposed project, beach placement of dredged material helps alleviate problems associated with beach erosion, including the enhancement of habitat within the floodplain. For the reasons stated above, the project is in compliance with EO 11988, Floodplain Management.

Marine Mammal Protection Act of 1972

The Marine Mammal Protection Act (MMPA) prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. The MMPA defines "take" as "the act of hunting, killing, capture, and/or harassment of any marine mammal; or, the attempt at such." The MMPA defines harassment as "any act of pursuit, torment or annoyance which has the potential to either: a. injure a marine mammal in the wild, or b. disturb a marine mammal by causing disruption of behavioral patterns, which includes, but is not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."

The USACE does not anticipate the take of any marine mammal during any activities associated with the proposed project. To ensure the protection of any manatees or dolphins present in the project area, incorporation of safeguards used to avoid and/or protect these species will be implemented during dredging and placement operations. Therefore, this project will be in compliance with the Act.

Magnuson-Stevens Fishery Conservation and Management Act

This Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires preparation of an Essential Fish Habitat (EFH) Assessment and coordination with NMFS. In March 2023, USACE and NMFS completed the *Programmatic Essential Fish Habitat Consultation for USACE Activities and Projects Regularly Undertaken in South Carolina.* The proposed project is covered under the Programmatic EFH Consultation. On May 8, 2023, NMFS concurred with the determination that the proposed project is consistent with the Programmatic EFH Consultation, with justification, therefore, the project is in compliance with the MSFCMA.

Protection of Wetlands (EO 11990)

This Executive Order requires, among other things, that Federal agencies avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. No wetlands would be affected by the proposed project. This project is in compliance with the goals of this Executive Order.

Migratory Bird Treaty Act and EO 13186

The Migratory Bird Treaty Act (MBTA) of 1918 is the domestic law that affirms, or implements, the United States' commitment to four international conventions with Canada, Japan, Mexico, and Russia for the protection of shared migratory bird resources. The MBTA governs the taking, killing, possessing, transporting, and importing of migratory birds, their eggs, parts, and nests. EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) directs federal agencies to take certain actions to further implement the MBTA, including evaluating the effects of actions on migratory birds. Measures will be taken to minimize and avoid impacts to migratory birds, such as timing of activities. Migratory birds may benefit from the beneficial placement of material behind the south jetty, which will enhance and protect shore bird habitat. As such, the project as proposed would not negatively impact migratory birds.

National Wild and Scenic Rivers

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. A review of the Wild and Scenic River inventory list reveals that the proposed project would not affect a stream or portion of a stream that is included in the National Wild and Scenic Rivers system.

National Historic Preservation Act of 1966

Section 106 of the National Historic Preservation Act requires Federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. The proposed project has been reviewed for historic properties (cultural resources listed on or eligible for listing on, the National Register of Historic Places) pursuant to regulations implementing Section 106 of the National Historic Preservation Act (NHPA). In accordance with 36 C.F.R. §800.4(d)(1), it was determined that there would be no effect to historic properties and documentation of this determination has been coordinated with the South Carolina State Historic Preservation Office. Therefore, in accordance with 36 C.F.R. §800.4(d)(1)(i), USACE's responsibilities under Section 106 of the NHPA have been fulfilled.

The Corps pursued NHPA Section 106 and National Environmental Policy Act (NEPA) consultation and coordination for this undertaking with the South Carolina Department of Archives and History, State Historic Preservation Office (SHPO) in 2001 (SHPO Project No. 16-ED0118) and again in 2016 (SHPO Project No. 16-ED0078). SC SHPO concurred in a letter dated May 11, 2001 that no properties listed on the National Register of Historic Places (NRHP) or determined eligible for inclusion on the NRHP would be affected by the proposed undertaking. The 2016 coordination under NEPA focused on the review and comment on the

draft EA and FONSI for the Murrells Inlet Federal Navigation Project dredging of the inner shoal area. SC SHPO recommended consultation under Section 106 and to ensure that the State Underwater Archaeologist was involved in the review.

Consultation under Section 106 resumed in September 2022 with SC SHPO and 11 consulting Tribes, including Absentee-Shawnee Tribe of Oklahoma, Alabama-Quassarte Tribal Town, Catawba Indian Nation, Chickasaw Nation, Delaware Tribe of Indians, Eastern Band of Cherokee Indians, Eastern Shawnee Tribe of Oklahoma, Kialegee Tribal Town, Poarch Band of Creek Indians, Shawnee Tribe, and Thlopthlocco Tribal Town. SC SHPO responded in a letter dated September 8, 2022, to provide concurrence that no properties listed in or eligible for listing in the NRHP will be adversely affected by this project. Two tribal responses were received. The Catawba Indian Nation responded in a letter dated October 12, 2022, to state that they had no concerns for this undertaking (THPO#2022-46-7). The Eastern Shawnee Tribe of Oklahoma responded in a letter dated October 13, 2022, to provide concurrence of the determination of no adverse effect (EST Reference Number: 4492). Section 106 consultation is complete for this undertaking. Any inadvertent discoveries will be coordinated with the SC SHPO and Tribes if encountered.

CHAPTER 8 ENVIRONMENTAL COMMITMENTS

The USACE shall comply with the applicable conditions of the USFWS BO, the SARBO, Programmatic EFH Consultation, and applicable state certifications. The USACE and its contractors commit to avoiding, minimizing or mitigating for adverse effects during activities associated with the period maintenance dredging of Murrells Inlet by adhering to the below conditions:

Section 401 of the CWA Certification Conditions:

- The applicant must implement best management practices that will minimize erosion and migration of sediments on and off the project site during and after construction. These practices should include the use of appropriate grading and sloping techniques, mulches, silt fences, or other devices capable of preventing erosion, migration of sediments, and bank failure. All disturbed land surfaces and sloped areas affected by the project must be stabilized and sloped.

- All necessary measures must be taken to prevent oil, tar, trash, debris and other pollutants from entering the adjacent waters or wetlands.

- Once the project is initiated, it must be carried to completion in an expeditious manner in order to minimize the period of disturbance to the environment.

- Construction activities must avoid to the greatest extent practicable, encroachment into any wetland/riverbank areas not designated as impact areas.

- The excavated area must be sloped such that the rear is no deeper than the front and the front no deeper than the adjacent waterbody to maintain water circulation.

- All conservation measures outlined in the U.S. Fish and Wildlife Service's Biological Opinion must be adhered to.

Coastal Zone Consistency Concurrence Conditions:

- Appropriate measures will be taken to protect the integrity of migratory and beach-nesting birds of State concern, with particular emphasis, but not limited to Piping Plovers and Red Knots during the course of the project and while conducting post-construction practices on the beach and dune system regarding compaction testing and tilling, escarpment remediation, and any sand fencing/establishment of vegetation in relation to sea turtle conservation measures

- Special precautions should be taken to avoid and minimize disturbance to oyster resources from dredging equipment mobilization and operation, especially pipelines.

- To avoid negative impacts to marine species, all in-water equipment, including silt curtains, floating buoys, and vertical lines should be properly secured with materials that reduce the risk of entanglement. All in-water equipment should be designed to ensure there are no freely hanging loops or tangles at the surface or in the water column. All

lines and other inwater equipment should be monitored throughout the day and for the duration of project to ensure no entanglement of marine species.

- To lessen impacts on fish, wildlife and their habitats, dredged material from Inner Shoal B may only be placed along the eroding shoreline at the north end of Huntington State Beach Park (as proposed) and not on the marsh side of the island, where significant shellfish resources could be adversely affected by the resuspension of fine sediments.

- Prior to construction or maintenance, the USACE must specify quality control measures including:
    - A description of the means and limits by which the material quality will be assessed during and after construction.
    - A definition of material quality that would require removal or screening of material from the beach; and,
    - A reasonable timetable for removal of the material and restoration.

- The beach compatibility and quality of the material placed upon the beach must be monitored during construction operations by persons who are qualified to assess the material. Monitors will report immediately to those persons with the authority to suspend or modify the work if a determination is made that unsuitable material is being placed on the beach.

- An assessment of fill material is recommended to be conducted within 30 days of project completion with at least 10 random samples taken and analyzed for sand grain size distribution, percent of shell composition and color. Any report detailing results of the analysis shall be submitted to the natural resource agencies within 60 days of construction.

- A post-construction survey (as-built) is required to be submitted to SCDHEC OCRM within 60 days of project completion.

<u>USFWS Biological and Conference Opinion Murrells Inlet, Terms and Conditions:</u>

- Project construction on the HBSP side of Murrells Inlet will be limited to August 1 through March 15. The beach profile grading at HBSP will be coordinated with SCDNR and HBSP prior to construction to encourage suitable bird nesting habitat.

- A conference call between representatives of the Corps, Corps' contractor, SCESFO, SCDNR, HBSP staff, shorebird surveyor(s), and the permitted sea turtle surveyors must be held prior to project construction. At least ten business days advance notice will be provided prior to conducting this meeting/call. The meeting/conference call will provide an opportunity for explanation and/or clarification of the protection measures.

- Beach compatible fill must be placed on the beach or in any associated dune system. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system. Such material must be predominately of carbonate, quartz or similar material with a particle size distribution ranging between 0.062mm and 4.76mm (classified as sand by either the Unified Soils or the Wentworth classification), must be similar in color and grain size

distribution (sand grain frequency, mean and median grain size and sorting coefficient) to the material in the historic beach sediment at the disposal site, and must not contain:

a. Greater than five percent, by weight, silt, clay or colloids passing the #230 sieve;
b. Greater than five percent, by weight, fine gravel retained on the #4 sieve (-2.25φ);
c. Coarse gravel, cobbles or material retained on the 3/4 inch sieve in a percentage or size greater than found on the native beach;
d. Construction debris, toxic material or other foreign matter; and
e. Material that will result in cementation of the beach.

If rocks or other non-specified materials appear on the surface of the filled beach in excess of 50% of background in any 10,000 square foot area, then surface rock should be removed from those areas. These areas must also be tested for subsurface rock percentage and remediated as required. If the natural beach exceeds any of the limiting parameters listed above, then the fill material must not exceed the naturally occurring level for that parameter on nearby native beaches.

These standards must not be exceeded in any 10,000 square foot section extending through the depth of the nourished beach. If the native beach exceeds any of the limiting parameters listed above, then the fill material must not exceed the naturally occurring level for that parameter on nearby native beaches.

- Daily early morning surveys for sea turtle nests will be required if construction overlaps with the sea turtle nesting season (May 1 – October 31). Nesting surveys must be conducted until the last nest relocated out of the project area is inventoried if work will begin before October 31. If nests are constructed in areas where they may be affected by construction activities, the nests must be relocated per the following requirements.

  a. Nesting surveys and nest relocation will only be conducted by personnel with prior experience and training in nesting survey and nest marking procedures. Surveyors must have a valid SCDNR permit. Nesting surveys must be conducted daily between sunrise and 9:00 AM.
  b. Only those nests that may be affected by sand placement activities will be relocated. Nests requiring relocation will be moved no later than 9:00 AM the morning following deposition to a nearby self-release beach site in a secure setting where artificial lighting will not interfere with hatchling orientation. Relocated nests will not be placed in organized groupings. Relocated nests will be randomly staggered along the length and width of the beach in settings that are not expected to experience daily inundation by high tides or known to routinely experience severe erosion and egg loss, or subject to artificial lighting. Nest relocations in association with construction activities must cease when construction activities no longer threaten nests.
  c. Nests deposited within areas where construction activities have ceased or will not occur for 75 days or nests laid in the nourished berm prior to tilling must be marked and left in situ unless other factors threaten the success of the nest. The turtle permit holder will install an on-beach marker at the nest site. No activity will occur within this area nor will any activities occur which could result in impacts to the nest. Nest sites will be inspected daily to assure nest markers remain in place and the nest has not been disturbed by the project activity.

- During the sea turtle nesting season, nighttime storage of construction equipment not in use must be off the beach to minimize disturbance to sea turtles. Staging areas for construction equipment must be located off the beach. Nighttime storage of construction equipment not in use must be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes placed on the beach must be located as far landward as possible without compromising the integrity of the dune system. Pipes placed parallel to the dune must be 5 to 10 feet away from the toe of the dune if the width of the beach allows. Temporary storage of pipes must be off the beach to the maximum extent possible. If the pipes are stored on the beach, they must be placed in a manner that will minimize the impact to nesting habitat and must not compromise the integrity of the dune systems.

- The Corps must hire nighttime monitors with sea turtle experience and a valid SCDNR permit to patrol the beach at night in the project area if nighttime construction activities and equipment occur during the nesting season. Monitors must patrol the length of the pipeline within the active nighttime construction area for nesting females May 1 – August 15. From July 1 - October 15, sea turtle monitors must check all nests on a nightly basis after 10 pm within 1,000 feet of the active nighttime project area that have been incubating for 45 days until three nights after the first sign of emergence or the inventory of the nest contents.

- Direct lighting of the beach and nearshore waters must be limited to the immediate construction area during nesting season and must comply with safety requirements. Lighting on all equipment must be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the water's surface and nesting beach while meeting all Coast Guard, Corps EM 385-1-1, and OSHA requirements. Light intensity of lighting equipment must be reduced to the minimum standard required by OSHA for General Construction areas, in order not to misdirect sea turtles. Shields must be affixed to the light housing and be large enough to block light from all on-beach lamps from being transmitted outside the construction area or to the adjacent sea turtle nesting beach.

- Predator-proof trash receptacles must be installed and maintained during construction at all beach access points used for the project construction to minimize the potential for attracting sea turtle nest predators. The contractors conducting the work must provide predator-proof trash receptacles for the construction workers. All contractors and their employees must be briefed on the importance of not littering and keeping the project area trash and debris free.

- During the sea turtle nesting season, the contractor must not extend the beach fill more than 500 feet (or other agreed upon length) along the shoreline between dusk and dawn and the following day until the daily nesting survey has been completed and the beach cleared for fill advancement. An exception to this may occur if there is permitted sea turtle surveyor present on-site.

- Immediately after completion of the project, USACE will perform tilling on the project's front beach area of Garden City Beach to a depth of at least 24 inches in order to reduce compaction associated with the newly placed sand.

- Visual surveys for escarpments along the project area will be made immediately after completing of the project and prior to May 1st for three subsequent years, if needed.

- The placement area must be surveyed for piping plovers and red knots by qualified individuals before project construction to document presence/absence of each species.

- Signage visible at all stages of the tide will be posted on the Huntington State Park side of Murrells Inlet after project construction. No Dogs Allowed signs will be posted along inlet areas accessible by boat. To prevent people from walking through and disturbing high tide roosts, all sparsely vegetated habitat above the spring high tide line will be posted with symbolic fencing to create rest areas for piping plovers and other shorebirds. [Huntington Beach State Park has agreed by letter of June 2, 2023 to be responsible for the installation and maintenance of fencing and signage.]

- The standard manatee conditions will be implemented from 15 April to 31 October. The Contractor will be instructed to take necessary precautions to avoid any contact with manatees. If manatees are sighted within 100 yards of the dredging area, all appropriate precautions will be implemented to insure protection of the manatee. The Contractor will stop, alter course, or maneuver as necessary to avoid operating moving equipment (including watercraft) any closer than 100 yards of the manatee. Operation of equipment closer than 50 feet to a manatee will necessitate immediate shutdown of that equipment.

Applicable Project Design Criteria per the NMFS 2020 SARBO:

- All personnel associated with the project (contractor) will be instructed about the potential presence of protected species and the appropriate protocols if they are encountered.

- All on-site personnel are responsible for observing water-related activities for the presence of ESA-listed species.

- All on-site project personnel will be informed of all ESA-listed species that may be present in the area and advised that there are civil and criminal penalties for harming, harassing, or killing ESA-listed species or marine mammals.

- All on-site project personnel will be briefed that the disposal of waste materials into the marine environment is prohibited. All crew will attempt to remove and properly dispose of all marine debris discovered during dredging operations, to the maximum extent possible.

- Sand placed on the beach or in the nearshore littoral areas will be placed in a manner that does not create mounds or berms that could prevent nesting sea turtles or hatchings from entering or exiting the beach from nearshore waters.

- All placement of material will not create an obstruction of species movement in the area (e.g., does not create a mound that would deter or prevent species from moving through the area).

- All vessels will preferentially follow deep-water routes (e.g. marked channels) to avoid potential groundings or damaging bottom resources whenever possible.

- If bares, scows, and other similar support equipment are used, they will be positioned away from areas with sensitive bottom resources such as hardbottom resources, to the maximum extent possible.

- If pipelines are used, they will be placed in areas away from bottom resources and of sufficient size or weight to prevent movement or anchored to prevent moved or the pipeline will be floated over sensitive areas.

- All work that may generate turbidity will be completed in a way that minimizes turbidity and sedimentation reaching non-mobile species to the maximum extent practicable. This may include selecting equipment types that minimize turbidity and positioning equipment away or downstream of non-mobile species.

- If turbidity curtains are used, barriers will be positioned in a way that does not block species' entry to or exit from designed critical habitat and does not entrap species within the construction area or block access for them to navigate around the construction area.

- Project personnel must take measures to monitor for entrapped species in areas contained by turbidity curtains and allow access for them to escape if spotted

- In-water lines (rope, chain, and cable) will be stiff, taut, non-looping. Examples of such lines are heavy metal chains or heavy cables that do not readily loop and tangle. Flexible in-water lines, such as nylon rope or any lines that could loop or tangle, will be enclosed in a plastic or rubber sleeve/tube to add rigidity and to prevent the line from looping or tangling. In all instances, no excess line is allowed in the water.

- All lines or cables will be immediately removed upon project completion.

- All in-water line and materials will be monitored regularly to ensure nothing has become entangled.

- Cables or lines with loops used to move pipelines or buoys will not be left in the water unattended.

- No geophysical surveys will occur at night or during periods of low visibility.

- The minimum number of geophysical sources possible will be used to obtain the necessary geophysical data and the acoustic source will be deactivated when not acquiring data or preparing to acquire data, except as necessary for testing.

- Only electromechanical sources will be used during geophysical surveys. Electromechanical sources will be limited to boomers, chirp sub-bottom profilers, side-scan sonars, and single beam, interferometric, or multibeam depth sounders.

- Survey equipment will be operated at the lowest power setting, narrowest beamwidth, and highest frequency possible to fulfill data needs and to effectively reduce exposure and received sound levels.

- Boomers and chirp sub-bottom profilers must be operated below 205 dB re 1 µPa (rms).
- Single beam depth sounders will be operated no lower than 24 kHz.
- Side-scan sonars, interferometric, and multibeam depth sounders will be operated above 160 kHz.
- No airguns or other deep-penetrating geophysical instruments are allowed under the 2020 SARBO.

Section 106 of the National Historic Preservation Act Concurrence

- The cultural resources survey revealed the presence of a magnetic anomaly and potential shipwreck in proximity to Inner Shoal B. A 50-foot buffer will be implemented to avoid this area.

CHAPTER 9 REFERENCES

Chicora Research, Inc. (Chicora). 2006. Cultural Resources Survey of the Litchfield Stables Tract, Georgetown County, South Carolina. Chicora Research Contribution 456.

Council of Environmental Quality (CEQ). 2022. Climate and Economic Justice Screening Tool. https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5 (accessed on August 15, 2022).

Garrott, R. A.,B.B. Ackerman, J.R. Cary, D.M. Heisey, J.E. Reynolds III, P.M. Rose, and J.R. Wilcox. 1995. Assessment of trends in sizes of manatee populations at several Florida aggregation sites. In Population Biology of the Florida Manatee, Information and Technology Report I,T, J.

Gulf South Research Institute. 1978. Exploratory Magnetic Survey of Murrell's Inlet, South Carolina, and Portions of the Main Creek Inner Channel, Georgetown County, South Carolina. Prepared for U.S. Army Corps of Engineers, Wilmington District. Baton Rouge, Louisiana.

Howie, A.H. and Bishop, M.J. 2021. Contemporary Oyster Reef Restoration: Responding to a Changing World. *Front. Ecol.Evol. 9: doi: 10.3389/fevo.2021.689915.*

National Marine Fisheries Service (NMFS), Office of Protected Species. 2020. South Atlantic Regional Biological Opinion for Dredging and Material Placement Activities in the Southeast United States. St. Petersburg, Florida.

NMFS. 2022. EFH Mapper. Retrieved from https://www.habitat.noaa.gov/protection/efh/efhmapper/index.html (Accessed August 16, 2022).

New South Associates, Inc. (New South). 2006. Historic Resources Survey of Georgetown County, South Carolina. Prepared for Georgetown County Visitors Bureau and South Carolina Department of Archives and History. Stone Mountain, Georgia.

Rogers, Carolina. The South's Best State Parks 2022. *Southern Living.* March 2022.

Salvino, R and Wachsman, Y. 2013. The Economic Impact of the 29576 Zip Code- Murrells Inlet/Garden City Beach, SC. Coastal Carolina University Center for Economic and Community Development. July 2013.

South Carolina Department of Health and Environmental Control (DHEC). 2020. *The State of South Carolina's 2018 Integrated Report 303(d) List of Impaired Waters.* https://scdhec.gov/sites/default/files/media/document/IR_Part_I_Final_Submittal_2018_1.pdf

South Carolina DHEC Bureau of Water. 2005. *Total Maximum Daily Loads for Fecal Coliform in Shellfish Waters of the Murrell's Inlet Estuary, South Carolina*. Technical Report Number: 025-05.

South Carolina Department of Archives and History (SCDAH). N.D.

National Register Properties in South Carolina, Murrells Inlet Historic District, Georgetown County (Murrells Inlet). http://www.nationalregister.sc.gov/georgetown/S10817722016/index.htm (Accessed July 14, 2022).

South Carolina Department of Natural Resources. 2009. Using Historical Data and Meta-analyses to Improve Monitoring and Management of Beach Nourishment in South Carolina: Final Report. Charleston, SC.

South Carolina Department of Parks, Recreation and Tourism. 2022. South Carolina State Parks. https://southcarolinaparks.com/huntington-beach/birding (accessed August 15, 2022).

U.S. Army Corps of Engineers (USACE). 2022. South Atlantic Coastal Study. https://www.sad.usace.army.mil/SACS/ (accessed September 23, 2022).

U.S. Census Bureau (USCB), Quick Facts. 2022. Retrieved from https://www.census.gov/quickfacts/murrellsinletcdpsouthcarolina. (accessed August 15, 2022).

U.S. Environmental Protection Agency (USEPA). 2015. *Non-attainment Areas for Criteria Pollutants (Green Book)*. http://www.epa.gov/oar/oaqps/greenbk/index.html. (accessed August 15, 2022).

U.S. EPA. 2016. What Climate Change Means for South Carolina. EPA 430-F-16-042. Available online: https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-sc.pdf (accessed August 15, 2022).

U.S. Fish Wildlife Service (USFWS). 2022. IPaC: Explore Location Services. https://ipac.ecosphere.fws.gov/location/index (Accessed August 5, 2022).

USFWS. 2001. Florida manatee recovery plan, (Trichechus manatus latirostris), Third Revision. U.S. Fish and Wildlife Service, Atlanta, GA. 144 pp. + appendices.

Vivan, Domenico, and Almeida. 2009. Effects of dredged material disposal on benthic macrofauna near Itajai Harbour (Santa Catarina, South Brazil). Ecological Engineering, 35: 1435-1443.

Wilber, D.H. and Clarke, D.G. 2007. Defining and assessing benthic recovery following dredging and dredged material disposal. *Proceedings XXYII World Dredging Congress 2007*. Orlando, Florida.

Wilber, D., Clarke, D., Ray D., and Van Dolah, R. 2009. Lessons learned from biological monitoring of beach nourishment projects. *Proceedings of the Western Dredging Associations' Twenty-Ninth Technical Conference (Tempe, Arizona).* pp. 262-924.