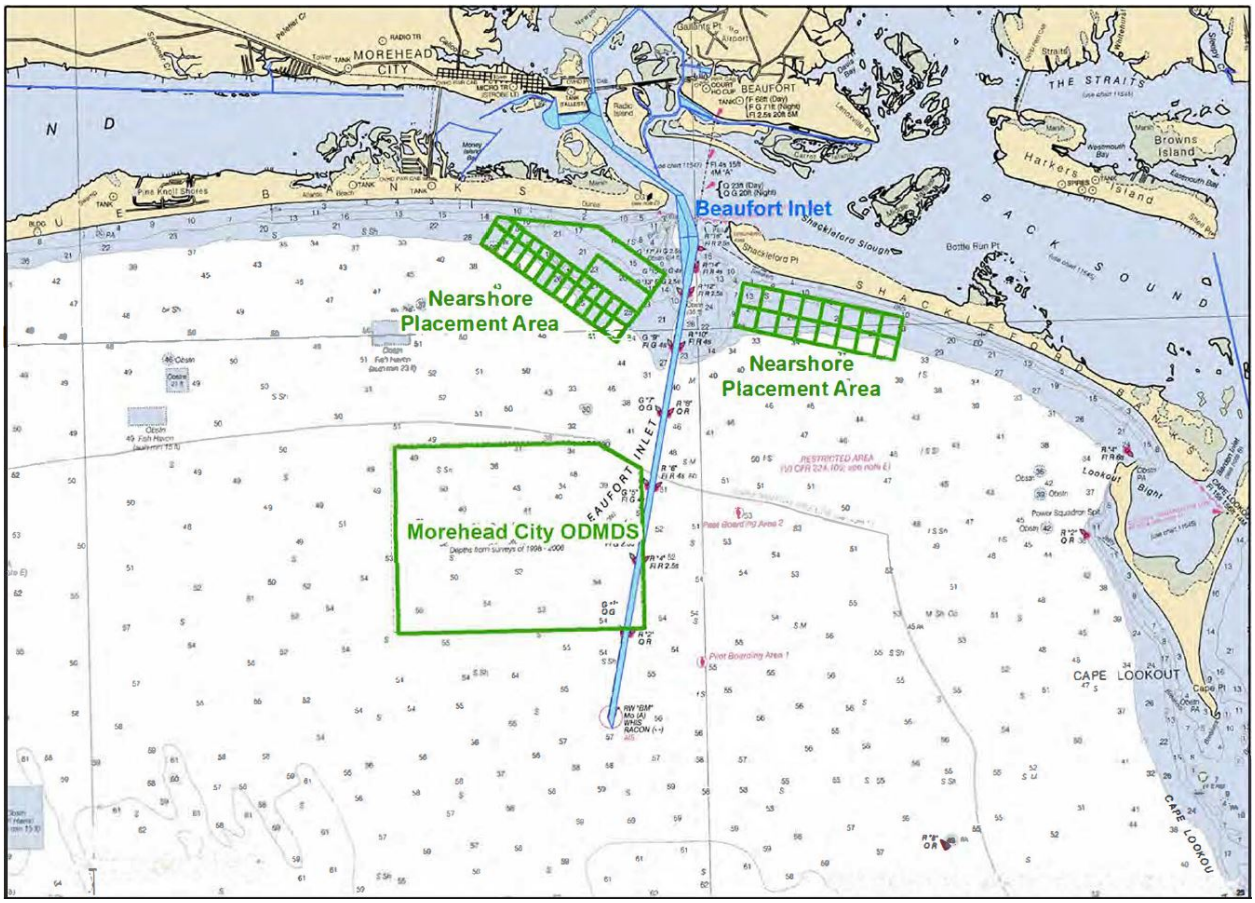
FEBRUARY 2020

US Army Corps of Engineers ®
Wilmington District

MOREHEAD CITY
OCEAN DREDGED MATERIAL DISPOSAL SITE

SITE MANAGEMENT AND MONITORING PLAN



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SITE MANAGEMENT AND MONITORING PLAN
FOR THE
MOREHEAD CITY OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS)
FEBRUARY 2020

INTRODUCTION

Under the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), it is the responsibility of the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) to manage and monitor Ocean Dredged Material Disposal Sites (ODMDS). The goal of this management is to ensure that ocean dredged material placement activities will not unreasonably degrade the marine environment or endanger human health or economic potential. The MPRSA, the Water Resources Development Act of 1992 (WRDA), and a Memorandum of Agreement between EPA and USACE require the development of a Site Management and Monitoring Plan (SMMP) to specifically address the placement of dredged material at the Morehead City ODMDS. Following an opportunity for public review and comment (Appendix A), the SMMP provisions contained in this plan will become requirements for all placement activities at the site. All MPRSA Section 103 ocean disposal permits (Appendix B) or evaluations shall be conditioned as necessary to assure consistency with the SMMP.

This SMMP has been prepared in accordance with the Guidance Document for Development of Site Management Plans for Ocean Dredged Material Disposal Sites (EPA and USACE 1996). This document provides a framework for the development of site management and monitoring plans required by MPRSA and WRDA. The SMMP may be modified if it is determined that changes are warranted as a result of information obtained during the monitoring process. The SMMP will be reviewed and revised as needed or every ten years, whichever time period is shorter.

A Morehead City ODMDS SMMP was prepared in October 1997 and subsequently revised in February 2010. This SMMP updates the February 2010 SMMP, focusing on areas where site use, conditions, and evolving ocean policy indicate a need for revision.

SCOPE OF THE SMMP

ODMDS management involves a broad range of activities including regulating the schedule of use, the quantity, and the physical/chemical characteristics of dredged materials placed at the site. It also involves establishing placement controls, conditions, and requirements to avoid and minimize potential impacts to the marine environment. Finally, ODMDS management involves monitoring the site environs to verify that unanticipated or significant adverse effects are not occurring from past or continued use of the site and that permit conditions are met (Appendix B).

The SMMP shall include, but not be limited to:

- A baseline assessment of conditions at the site;
- A program for monitoring the site;

- Special management conditions or practices to be implemented at each site that are necessary for the protection of the environment;
- Consideration of the quantity and physical/chemical characteristics of dredged materials to be placed at the site;
- Consideration of the anticipated use of the site over the long-term;
- A schedule for review and revision of the plan.

OBJECTIVES OF SITE MANAGEMENT

There are three primary objectives in the management of the Morehead City ODMDS:

- Protection of the marine environment, living resources, and human health and welfare;
- Documentation of placement activities at the ODMDS and provision of information that is useful in managing the dredged materials placement activities;
- Provide for beneficial use of dredged material whenever practical.

The purpose of the SMMP is to provide guidelines in making management decisions necessary to fulfill mandated responsibilities to protect the marine environment as discussed previously. Risk-free decision-making is an impractical goal; however, an appropriate SMMP can reduce uncertainty.

MOREHEAD CITY OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS)

The Morehead City ODMDS (Figures 1 and 2) was designated by EPA pursuant to MPRSA Section 102(c) as suitable for the ocean placement of dredged material. The final rule was promulgated by EPA on 14 August 1987 (F.R. Vol. 52 No. 157), effective 14 September 1987. The boundary coordinates for the Morehead City ODMDS are:

(Assumed to be NAD 27 Geographic)		(NAD 83 State Plane-Feet)	
34° 38’30” N	76° 45’00” W	N 332180	E 2676711
34° 38’30” N	76° 41’42” W	N 332560	E 2693251
34° 38’09” N	76° 41’00” W	N 330519	E 2696808
34° 36’00” N	76° 41’00” W	N 317482	E 2697112
34° 36’00” N	76° 45’00” W	N 317091	E 2677142

Site Characteristics

The ODMDS is located just beyond three nautical miles offshore (beyond three nautical miles from the baseline of the territorial sea) of Morehead City, North Carolina. The Morehead City ODMDS has an area of about 8.0 square nautical miles. Depths within the ODMDS range from about -30 to -55 feet local mean lower low water (MLLW) based on a composite of bathymetric surveys that include data from 1995 to 2018. Depths are shallowest in the northern and northeastern (inshore) portions and gradually deepen to the south (offshore). Approximately 60% of the ODMDS is deeper than -50 feet MLLW. The bathymetry is essentially flat except for some mounding of dredged material in the northern half of the ODMDS, and especially towards

its northeastern extent, due to previous dredged material discharges and the influence of the Beaufort Inlet ebb tide delta (Figure 3).

Baseline Assessment of Conditions

Baseline conditions of the Morehead City ODMDS are principally reported in the site designation Environmental Impact Statement (EIS) (EPA and USACE 1985). The baseline data contained in the EIS was obtained solely from the available scientific literature.

Information Obtained Since Site Designation

Site evaluations and monitoring since the site designation has produced supplemental information in the following areas:

Bathymetry. Bathymetric surveys have generally been conducted on portions of the ODMDS before and after each use since the site designation. These surveys have focused on the portions of the ODMDS actually used for dredged material placement. The most recent bathymetric survey of the entire Morehead City ODMDS was completed in May 2018 and is featured as Figure 3. Bathymetric surveys indicate that appreciable relict material placement mounds are present within the northern half of the ODMDS, and especially towards the northeastern corner. These beach-quality materials are available for beach nourishment.

Sediment Characterizations. The grain size characteristics of sediments in the vicinity of the Morehead City ODMDS were surveyed in 1979, 1984, 1986 (EPA and USACE 1985), 2011 (EPA 2012), and 2020. Results of the 2020 survey are not available as of the writing of this SMMP update. As a part of the USACE Wilmington District's Bogue Banks Feasibility Study, vibracore borings were taken in ocean locations off of Bogue Banks. Sediment grain size data in the vicinity of the Morehead City ODMDS is summarized in Appendix C. These surveys indicated that the sediments in the ODMDS vicinity are predominately sands containing varying amounts of silts and clays. The quantity of shell present in the sediments varies from a trace to 25%. Hard bottom or reef-rock materials have not been reported in these sediment characterizations. Dredged materials are placed in the Morehead City ODMDS according to their grain size. Specifically, beach-quality material (sediments that are ≥90% sand) is placed in the northern half of the ODMDS and is made available to local entities for purposes of beach nourishment. Non-beach-quality material (<90% sand) is placed in the southern half of the ODMDS.

Benthic Communities. Benthic communities approximately two miles inshore of the Morehead City ODMDS were sampled by Peterson et al. (1999) as part of nearshore placement monitoring. The USACE also collected sediment and macroinvertebrate samples in the vicinity of the Beaufort Inlet ebb tide delta (USACE 2010).

For work conducted by Peterson et al., sample stations were arranged in a grid of three transects with three stations on each transect, at the 19-, 26, and 36-foot isobaths. Taxa in order of abundance included polychaetes, annelids, bivalve mollusks, amphipod crustaceans, echinoderms, and nematodes. The total density of infaunal invertebrates ranged from 5-14 per 76 cm^2 and total densities of larger epifaunal invertebrates ranged from 3 to 43 individuals per 10 m^2. This community of invertebrates sampled is thought to be representative of those occupying this environment over a broad geographic area.

USACE sampling identified a total of 7,053 organisms representing 260 taxa from 95 samples. Polychaetes were the most numerous organisms, representing 43.9 percent of the total assemblage, followed by malacostracans (primarily amphipods) at 25.7 %, bivalves (10.5 %) and gastropods (10.0 %). The number of taxa per station ranged from 1 to 57. Station densities ranged from 9.1 organisms/m2 to 4,609 organisms/m2. (Were these findings from the 2010 USACE sediment collection?) If so, please include the citation of this sampling collection.

During a joint USACE-EPA trends survey of the ODMDS (EPA 2012), macroinfaunal data were collected from stations inside the site as well as the surrounding area. Data from that study showed that polychaetes were the most numerous organisms representing 46.2% of the total assemblage, followed in abundance by gastropods (18.3%), bivalves (11.4%), and malacostracans (9.3%). Polychaetes represented 50.1% of the total number of taxa followed by malacostracans (18.2%), bivalves (8.2%), and gastropods (5.5%). Data were summarized for those stations within previous disposal zones, for those stations outside the influence of any disposals, as well as for all stations.

The dominant taxon collected from all stations was the gastropod *Caecum pulchellum,* representing 10.1% of the total number of individuals. The next dominant taxon was the Phylum Nemertea (7.7%), followed by the polychaete, *Goniada littorea* (6.7%). The dominant taxa for stations inside the Disposal Zones were Nemertea (LPIL), followed by the gastropod *Caecum pulchellum,* and the polychaete *Owenia fusiformis.* Stations outside the Disposal Zones were dominated by the gastropod *Caecum pulchellum,* followed by the bivalve *Parvilucina crenella,* Nemertea (LPIL), and the polychaete, *Goniada littorea*.

Data on hard bottom locations in North Carolina waters (i.e., within three nautical miles of shore) have been collected from those in the scientific community, SCUBA divers and dive shops, and recreational and commercial fishermen by Moser and Taylor (1995). No hard bottom habitat has been reported in the vicinity of the Morehead City ODMDS.

HISTORIC USE OF THE MOREHEAD CITY ODMDS

Placement of dredged materials in the ocean has been associated with the Morehead City Harbor Federal Navigation Project (FNP) for decades. Federal dredging projects in Morehead City Harbor began in 1910. Continued use of the federally maintained channel at Morehead City Harbor depends upon regular maintenance dredging. Only one non-federal maintenance dredging and ocean dredged material disposal permit (pursuant to Section 103 MPRSA, Appendix B) has been issued in the Morehead City Harbor area, and is associated with the State-maintained navigation infrastructure of the North Carolina State Ports.

Harbor improvements can be divided into dredging within inner harbor and Beaufort Inlet ocean bar channels. Dredging in the inner harbor areas has been performed with a hydraulic cutterhead dredge, or with a bucket and barge. Dredged material placement occurs in diked upland sites, on nearby beaches, in nearshore placement areas, or in the Morehead City ODMDS. The ocean bar channel dredging has been accomplished using a hopper dredge with placement on nearby beaches, in nearshore placement areas, or in the Morehead City ODMDS. The ocean bar channels specifically include Range A, the Cutoff, and Range B (Figure 4). In 1910, the Morehead City Harbor ocean bar channel was deepened to 20 feet at a width of 300 feet. Improvements to the channel were made in 1936 and 1978 when the ocean bar channel

was deepened to 30 feet and then 42 feet, respectively. Channel widths for these 1936 and 1978 improvements increased to 400 feet and then 450 feet, respectively. In 1994, the ocean bar channel was dredged to its present dimensions of 47 feet deep with widths ranging between 450 and 600 feet. In 2017, the USACE, Wilmington District, established a navigation corridor within the westward sections of the Cutoff and Range A. The entire corridor area is not maintained, but allows for the channel to be maintained to its authorized dimensions while taking advantage of naturally-occurring deep water. The exact location of the channel may shift over time as natural deep water shifts. This affords a potential reduction in dredging frequency and the amount of dredged material required to be removed during maintenance dredging.

The placement of dredged materials in the ocean off Beaufort Inlet since 1995 is documented in Table 1. Since 1987 (the date of site designation), ocean placement of dredged materials from the Morehead City Harbor FNP channels have been placed within the Morehead City ODMDS. From 1995 to present, beach-quality sediments (sediments that are ≥90% sand) dredged during the maintenance of Morehead City Harbor FNP channels have also been placed in the Morehead City nearshore placement areas or, more infrequently, directly on Bogue Banks beaches (nearshore placement areas are discussed further in sections to follow). Accordingly, the quantity of dredged material being transported to the ODMDS for ocean placement has declined as compared to pre-1995 volumes.

The Morehead City ODMDS is periodically used as a borrow area for Bogue Banks beach nourishment. Sand from the northern portions of the ODMDS is made available to be dredged by local municipalities and subsequently discharged as beach fill (Figure 5). Continued use of beach-quality dredged material from the Morehead City ODMDS is possible; however, available resources and/or practicality may preclude beach fill use of ODMDS sandy material. For example, use of ODMDS sandy material is not possible where distances separating the ODMDS and beach placement areas are too great.

Table 1. Summary of ocean dredged material placement records for the Morehead City Harbor Federal Navigation Project, 1995-2018 (Nearshore placement first took place in 1995).

CALENDAR YEAR	NUMBER OF HOPPER LOADS (% OF TOTAL)					ESTIMATED VOLUME (CU YDS)*						
	ODMDS		NEARSHORE		TOTAL	ODMDS		NEARSHORE		TOTAL	DREDGES USED	DREDGING DATES
1995	193	79%	51	21%	244	635,709	79%	172,472	21%	808,181	Eagle 1	1/5/95 - 2/14/95
1996	0	0%	328	100%	328	0	0%	656,646	100%	656,646	Padre Island	3/22/96 - 4/30/96
1997	476	62%	296	38%	772	1,143,400	59%	781,700	41%	1,925,100	Manhattan Island, Sugar Island, Northerly Island, Padre Island	11/3/97 - 12/29/97 4/25/97 - 5/8/97
1998a	209	41%	295	59%	505	270,400	27%	725,600	73%	996,000	Sugar Island, Padre Island, Northerly Island	1/1/98 - 2/16/98
1998b	161	100%	0	0%	262	209,990	100%	0	0%	209,990	Manhattan Island, Sugar Island, Northerly Island, Padre Island	11/26/98 - 12/31/98
1999	391	65%	208	35%	599	759,330	64%	425,760	36%	1,185,090	Sugar Island, Northerly Island, Padre Island	1/1/99 - 3/09/99
2000	98	17%	475	83%	573	149,595	16%	786,115	84%	935,710	Sugar Island, Northerly Island, Dodge Island	1/2/00 - 3/11/00
2001	259	100%	0	0%	259	718,655	100%	0	0%	718,655	Bayport	2/05/01 - 3/10/01
2002	0	0%	175	100%	175	0	0%	560313	100%	560,313	Wheeler, McFarland	1/18/02 - 2/21/02
2003	111	25%	337	75%	448	282,994	25%	858,298	75%	1,141,292	Padre Island, Manhattan Island	1/9/03 - 3/2/2003
2004	ocean placement did not occur											
2005	24	23%	81	77%	105	63,236	22%	220,419	78%	283,655	Bayport	2/24/05 - 3/19/05
2006	147	33%	305	67%	452	468,958	32%	993,926	68%	1,462,884	Eagle 1	1/23/06 - 3/11/06
2007 † ‡	194	52%	182	48%	376	536,610	55%	433,203	45%	969813	BE Lindholm, RN Weeks	1/15/07 - 3/26/07
2008‡	132	57%	101	43%	233	406,437	58%	295,283	42%	701,720	Bayport	1/25/08 - 3/2/08
2009	ocean placement did not occur											
2010 / 2011 † ‡	-	-	-	-	-	0	0%	1,406,650	100%	1,406,650	Savannah	11/21/10 - 4/7/11
2012	ocean placement did not occur											

CALENDAR YEAR	NUMBER OF HOPPER LOADS (% OF TOTAL)					ESTIMATED VOLUME (CU YDS)*						
	ODMDS		NEARSHORE		TOTAL	ODMDS		NEARSHORE		TOTAL	DREDGES USED	DREDGING DATES
2013	44	100%	-	-	-	274,683	57%	472,710	43%	199,455	Terrapin Island, Savannah	1/18/13 - 1/28/13 6/12/13 - 8/10/13
2014 ‡	-	-	-	-	-	0	0%	792,648	100%	792,648	McCaskill	4/12/14 - 5/22/14
2015 † ‡	-	-	-	-	-	243,293	21%	890,447	79%	1,133,740	Savannah	5/17/15 - 12/13/15
2016 ‡	-	-	-	-	-	710,824	100%	0	0%	710,824	Paula Lee	7/25/16 - 12/20/16
2017 ‡	-	-	-	-	-	0	0%	735,531	100%	735,531	Illinois	3/24/17 - 5/15/17
2018 ‡	-	-	-	-	-	404,000	100%	0	0%	404,000	McFarland	3/9/18 - 4/15/18
TOTAL	**2,439**	**50%**	**2,834**	**53%**	**5,331**	**7,278,114**	**44%**	**11,207,721**	**56%**	**17,937,897**		

* Estimated volumes are derived from vessel load records provided by the dredging contractor for ocean placement verification. They are not based on channel surveys or contact pay yardages. Prior to 1999, the volumes were computed using an average load volume for the hopper rather than a reported specific load volume.

Notes: † For 2007, 2010, and 2015, direct beach placement on Bogue Banks beaches occurred. For this table, the beach placement is shown and computed as 'NEARSHORE'.

‡ Estimated volumes for 2007-2008, 2010/2011, and 2014-2018 were derived from contract records, not ocean placement reporting or pay yardages.

- Data unavailable

ANTICIPATED SITE USE

It is anticipated that there will be a continued need for the Morehead City ODMDS. It is expected that the ODMDS will be used for non-beach-quality materials dredged during maintenance of the Morehead City Harbor inner harbor and outer ocean bar channels and occasionally for beach-quality sand when the situation warrants use of the ODMDS. The ODMDS will also be used when adverse weather conditions make use of the shallow water nearshore placement areas hazardous to hopper dredges, or when otherwise necessary to accommodate Morehead City Harbor dredging and material placement needs. The anticipated ODMDS use will be less than historic (pre-1995) use as requirements, regulations, and municipalities in the greater Morehead City area increasingly demand that beach-quality materials are returned to nearby active littoral systems or to beaches. The Morehead City ODMDS can expect to receive between about 200,000 and 600,000 cubic yards of dredged material per year. This projection is based on dredging records, currently available dredged material placement options, and recent USACE Wilmington District sediment evaluations.

Morehead City Harbor Dredged Material Management

Access from the Atlantic Ocean to the Port of Morehead City and Radio Island is through Beaufort Inlet, which is between Bogue Banks and Shackleford Banks. Ships use federally-maintained channels to reach the Port of Morehead City and the west side of Radio Island, where a portion of North Carolina State Ports Authority (NCSPA) facilities in the area are located. The Port terminal is located only four miles from the open ocean and the channel is easily navigable. In addition to the USACE, two government agencies perform dredging to maintain Morehead City inner harbor navigation. The NCSPA maintains harbor facilities adjacent to the federally-maintained navigation channel. These areas include berthing areas along the face of the Morehead City NCSPA wharves and facilities along Radio Island. The United States Coast Guard (USCG) maintains Station Fort Macon within Bogue Sound, near Beaufort Inlet at the entrance to Morehead City Harbor. The continued viability of the Port of Morehead City depends upon maintenance dredging. Dredging is required to maintain the navigable efficiency and safety of Morehead City Harbor and provide economic benefits to the Port of Morehead City and the region.

Morehead City Harbor Federal Navigation Project Channels

The federally-maintained channels of the Morehead City Harbor FNP are authorized to between 35 feet (+ 2 feet allowable overdepth) and 47 feet (+2 feet allowable overdepth) deep and vary in width from 450 to 800 feet (Figure 4). Including allowable overdepth: depth of Range A is 49 feet; depth of the Cutoff, Range B, and Range C is 47 feet; depth of the Northwest Leg, West Leg, and East Leg is 37 feet. All depths are measured as mean lower low water (MLLW).

As stated earlier, in 2017, the USACE, Wilmington District established a navigation corridor within the westward sections of the Cutoff and Range A. The entire corridor area is not maintained, but allows for the channel to be maintained to its authorized dimensions while taking advantage of naturally-occurring deep water. The exact location of the channel would move over time as natural deep water shifts. This affords a potential reduction in dredging frequency and the amount of dredged material required to be removed during maintenance dredging.

Currently, maintenance of Morehead City Harbor's inner harbor involves dredging in the inner harbor channels approximately every two years by hydraulic pipeline. Outer harbor maintenance dredging typically occurs annually by hopper dredge. Inner and outer harbor dredged materials are placed in the Brandt Island Upland Diked Disposal Area (Figure 4), in the EPA-designated Morehead City ODMDS (Figure 2), in nearshore placement areas (Figure 2), or directly on area beaches (Figure 2). Placement areas are dependent on the physical (grain size) and chemical characteristics of dredged materials. The Morehead City Harbor nearshore placement areas are located to the east and west of Beaufort Inlet, in water depths of at least 25 feet. Use of the nearshore placement areas is regulated under the Clean Water Act of 1977. The goal of the nearshore placement areas is to retain sand dredged from the Morehead City Harbor FNP and nearby channels within the Beaufort Inlet ebb tide delta.

Brandt Island is a 96-acre area located just south of the Morehead City State Port. The area is owned by the NCSPA and has been used as a dredged material placement area since about 1955. Brandt Island had been used as a sand recycling facility in the past, after dewatering and where applicable. The USACE, Wilmington District, and NCSPA previously constructed an interior dike dividing Brandt Island into two cells. One cell (approximately 8 acres in area) provided a limited capacity placement cell for fine-grained, non-beach-quality dredged materials (>10% silts and clays). The other cell was reserved for sand recycling and beach-quality material (<10% silts and clays). Every 8 to 10 years material within Brandt Island was pumped out and placed on Bogue Banks beaches. In fiscal years (FY) 1986, 1994, and 2005, approximately 3.9 million, 2.5 million, and 2.9 million cubic yards of dredged materials, respectively, were pumped out of Brandt Island and placed on Bogue Banks from Fort Macon State Park (eastern extent) to Atlantic Beach (western extent). The last Brandt Island pumpout, which was in 2005, was problematic in that it included placement of an unacceptable amount of fine-grained material onto the beach. This placement of fine-grained material on the beach, along with recent USACE geotechnical investigations, indicates that the Brandt Island disposal area and portions of the inner harbor contain material unfit for beach placement. Since 2005, only fine-grained dredged material has been disposed of in Brandt Island and there are no plans for future pumpouts from Brandt Island to any beaches.

Brandt Island is currently being operated in a one-cell configuration with only fine-grained material from the Inner Harbor being placed of there. It is expected that the existing Brandt Island disposal area will reach capacity in 2029. At present, Morehead City inner harbor dredged materials are placed in Brandt Island about every other year. Additionally, the USCG Station Fort Macon typically places materials dredged from its facilities in Brandt Island (about every 6 years).

Because of the recurring quantities of fine-grained materials to be dredged from the Inner Harbor and the limited capacity of Brandt Island, a requirement for direct ocean placement of the inner harbor dredged materials in the Morehead City ODMDS is foreseeable.

Direct ocean placement of beach-quality sand from the inner harbor on Bogue Banks beaches occurred in FY 2004, FY 2007, FY 2011, FY 2014, and FY 2017. In these instances, dredging was limited to the portions of the inner harbor that contained beach-quality dredged material (≥90% sand).

USCG Station Fort Macon

The United States Coast Guard (USCG) Station Fort Macon is located adjacent to the Morehead City Harbor FNP, within Bogue Sound and near Beaufort Inlet (Figure 4). The Station's entrance channels and basins must be periodically dredged to maintain adequate depth.

The Station's boat basin is used as a permanent docking facility for four cutters (Maple, Smilax, Nathan Bruckenthal, and Richard Snyder), and is the home of the USCG's Fort Macon Marine Safety Team. The USCG Station Fort Macon has many missions, including the safeguarding of navigational interests (government, commercial, and private), protecting North Carolina's coastline from pollution and marine accidents, and enforcement of federal laws and responsibilities under the Homeland Security Act. While maintenance of USCG Station Fort Macon is not included as part of the Morehead City Harbor FNP, its maintenance and continued function is important to the Port of Morehead City and surrounding areas.

The USCG Station basin is dredged to -25 feet MLLW (local Beaufort datum), plus two additional feet of allowable overdepth. The basin was last dredged in 2019, when approximately 84,000 cubic yards of sediment were dredged and placed in Brandt Island. The amount of material typically dredged from the Station's basin is less than 90,000 cubic yards per dredging event. Sediments in the USCG Station Fort Macon vicinity generally consist of sands, silts, and clays, occurring in various mixtures. The sediments are generally unconsolidated and relatively soft.

North Carolina State Ports Authority (NCSPA) Maintenance and Projects

The NCSPA maintains harbor facilities that are adjacent to the federally maintained navigation channel. These areas include berthing areas along the face of the Port of Morehead City's wharfs, and facilities along Radio Island. Maintenance of these facilities is required to realize the benefits of having a channel connect the Port to the open ocean. Maintenance of these areas is usually performed at the same time that the maintenance of the Federal channels is accomplished. In addition, the NCSPA is pursuing Port-related industrial development on Radio Island. The adjacent deep-water Federal navigation channel, the short distance to the open Atlantic Ocean, and existing rail and road access contribute to the benefits of this site for Port development.

MANAGEMENT CONCERNS OR ISSUES

Morehead City Harbor Dredged Material Management Plan (DMMP)

The USACE, Wilmington District completed a Dredged Material Management Plan (DMMP) for the Morehead City Harbor FNP in 2017. The purpose of the DMMP is to provide for economically and environmentally sound management of dredged material generated by maintenance of the Morehead City Harbor FNP for at least a 20-year period (FY 2018 through FY 2037). The DMMP was prepared in accordance with USACE Engineer Regulation ER 1105-2-100 Section 3-2, b.(8). The DMMP included appropriate analyses pursuant to the National Environmental Policy Act (NEPA) and other applicable laws and regulations, and underwent public and agency review. This SMMP considers and includes information presented in the

DMMP, including the availability of the Nearshore East Placement Area to accept maintenance dredged materials. The Nearshore East Placement Area, like the Nearshore West Placement Area, was designed to keep material within the active littoral system without dramatically increasing the amount of annual maintenance dredging in the channel or the cost of the maintenance dredging (Figure 4).

Nearshore Placement

Since 1995, beach-quality sediments dredged during maintenance dredging of the Morehead City navigation channels have been routinely placed in the Nearshore West Placement Area off Bogue Banks, to the west of Beaufort Inlet (Figure 4 – Where is this Nearshore West Placement Area on Figure 4?). With finalization of the Morehead City Harbor FNP DMMP in 2017, a Nearshore East Placement Area was created to the east of Beaufort Inlet to allow for an additional beach-quality sediment option in the area. The intention of both nearshore placement areas is to keep material within the active littoral system without dramatically increasing the amount of annual maintenance dredging in the channel or the cost of the maintenance dredging. Placement of the dredged material in shallower water increases littoral system activity. However, it also increases concerns regarding hopper dredge operating conditions. A hopper dredge with a draft of nearly 20 feet or more is vulnerable to grounding in a nearshore placement operation as compared to the ODMDS, particularly if any ocean swell is present. It is unlikely that routine hopper operations can place material farther inshore than the 25-foot contour. The placement of sand in the Morehead City ODMDS removes the dredged material from the active littoral system, a loss which may become permanent if the sand is not used for future placement on beaches or placed in nearshore areas.

Direct Beach Placement

There are no active Federal coastal storm risk management (CSRM) projects on Bogue Banks. However, the beach communities of Atlantic Beach, Pine Knoll Shores, Indian Beach, Salter Path, and Emerald Isle have experienced severe storm damage and erosion problems, particularly as a result of Hurricanes Fran in 1996, Floyd in 1999, Isabel in 2003, Ophelia in 2005, Irene in 2011, and Florence in 2018. Beach-quality material was most recently dredged from the beach-quality sand zone of ODMDS (Figure 5) by Carteret County in 2019 to replace beach material lost during Hurricane Florence, but also occurred in 2004, 2007, and 2013 following Hurricanes Isabel, Ophelia, and Irene, respectively. Damage and erosion from named storms in the Morehead City area have resulted in considerable impacts to homes and natural protective berms and dune systems. Dune and berm losses increase the susceptibility of beaches and nearby infrastructure to future storm damage.

Timing of Placement

There are no seasonal restrictions on the placement of dredged materials within the Morehead City ODMDS. However, seasonal restrictions and seasonal special requirements apply to particular dredging activities at particular locations (e.g. environmental dredging windows to accommodate threatened or endangered species).

Navigation Channel Alignment

If the alignment of the Morehead City Harbor FNP's Range A channel is extended seaward, it crosses the eastern border of the ODMDS. In order to provide safe navigation, dredged

material placement does not occur within approximately 1,000 feet of the current limits of channel dredging. This area where the navigation channel intersects the ODMDS is shown on Figure 6. Placement of dredged material in this area would be allowed only after a review by the USACE, Wilmington District, in consultation with EPA Region 4, and only if a determination is made that the proposed disposal will specifically not interfere with navigation.

OCEAN DREDGED MATERIAL SITE MANAGEMENT

All ocean placement at the Morehead City ODMDS must be conducted in accordance with the Ocean Dumping Regulations and Criteria (40 CFR Parts 220-229), whether conducted as a permitted activity or as a Federal activity. The following are Morehead City ODMDS management requirements and all permits or evaluation concurrences shall be conditioned to include these requirements:

Types of Dredged Materials

Material Evaluation. Only dredged materials that have been evaluated in accordance with EPA's Ocean Dumping Regulations and Criteria and found to be in compliance with those criteria will be transported for placement in the Morehead City ODMDS.

Guidance for evaluation of dredged materials under the Section 103 MPRSA program is provided in the *Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual, February 1991* and the *Southeast Regional Implementation Manual (SERIM) for Requirements and Procedures for Evaluation of the Ocean Disposal of Dredged Material in Southeastern U.S. Atlantic and Gulf Coast Waters, May 2008*. The determination of dredged material suitability for ocean disposal must be documented in a MPRSA Section 103 evaluation and approved by EPA, Region 4, prior to ODMDS placement.

Dredged materials will be reevaluated for suitability for ocean placement in accordance with current USACE/EPA guidance at intervals not to exceed three years. Reevaluation and testing procedures will be coordinated with the USACE, Wilmington District, and EPA Region 4, before any sampling or testing.

Dredged Material Suitable for Beneficial Uses. "Beneficial uses" refers to the concept that dredged material may be placed in a way that is economically and environmentally acceptable, and accrues benefits to the natural and human-built environment.

Beach-quality dredged materials (≥90% sand)) dredged from Morehead City Harbor FNP channels should be placed on nearby beaches or within the active littoral system (nearshore) when it is economically feasible and environmentally acceptable to do so. ODMDS capacity and mounding factors are favorably affected by not placing beach-quality sands in the ODMDS. Bogue Banks beaches are also favorably affected by direct placement, when possible. Other beneficial uses of dredged materials are also encouraged pending appropriate consideration and environmental review.

As discussed previously, dredged material was excavated from the Morehead City ODMDS by Carteret County for sand replenishment of the Bogue Banks beaches in 2004, 2007, 2013, and 2019 (Post-Isabel, -Ophelia, -Irene, and -Florence Sand Replenishment Projects). Between 1.5 and 2 million cubic yards of historically placed Morehead City Harbor FNP dredged materials

were removed from the northeast corner of the Morehead City ODMDS during these events by hopper dredges and then pumped onto the Bogue Banks' beaches. Separating material types in the ODMDS (beach-quality sand and fine-grained materials) provided quality sandy material to Carteret County and allowed unimpeded access for the beach replenishment. If beach-quality sands are dredged during future maintenance of Morehead City Harbor FNP channels and placed in the Morehead City ODMDS, placement of those materials will be directed to the northern half of the ODMDS where access and potential opportunities for recycling and beach nourishment are facilitated. Accordingly, the northern half of the Morehead City ODMDS has been and will continue to be restricted to dredged material that is beach-quality sand (Figure 5). Fine-grained materials will continue to be placed in the southern half (specifically towards the southwest corner).

The sediment characteristics described in Appendix C confirmed the channel areas where fine-grained materials occur and must be managed during placement. Continued ocean placement of these dredged materials is likely, as other placement options, including beneficial uses of dredged material, are either not available or not feasible. As discussed previously, only materials evaluated and found in compliance with the EPA's Ocean Dumping Regulations and Criteria may be transported to the ocean for placement. In order to minimize interference with potential use of beach-quality sand for beach replenishment, the fine-grained sediments dredged from Morehead City Harbor FNP channels will be placed in the southwest corner of the Morehead City ODMDS as shown on Figure 5. As discussed in Appendix C, the fine-grained sediments are consistently dredged from the inner harbor and outermost portion of the ocean bar channel (Range A).

Dredged Materials With Debris. If significant quantities of debris (i.e., natural [wood] or man-made) are present in the dredged materials, then debris management will be conducted. Significant quantities of debris are considered to be those that would materially interfere with fishing in areas near the Morehead City ODMDS or interfere with re-use of dredged material from within the ODMDS (i.e., beach nourishment borrow material). Debris management may involve the following:

- Removal of the debris from the dredged material before transportation to the ODMDS;
- Placement of debris-free dredged material in the ODMDS in a location (e.g., farthest distance possible from borrow areas or known fishing areas) such that interference with in situ debris is unlikely.

Placement Quantities. Quantities of dredged materials placed within the ODMDS will be limited to those amounts that do not produce unacceptable adverse effects to human health and welfare and the marine environment or human uses of that environment (as defined in EPA's Ocean Dumping Regulations and Criteria). The placement quantity management objective for the Morehead City ODMDS is to regulate placement quantities such that depths in the ODMDS following placement do not interfere with navigation. The placement depth limitation will be -30 feet MLLW. Current average depths in the ODMDS are approximately -45 to -50 feet MLLW (Figure 3).

SITE MONITORING

Goals of Site Monitoring

Site monitoring is conducted to ensure the environmental integrity of an ocean dredged material disposal site and to verify compliance with site designation criteria, any special site management conditions, and permit conditions (Appendix B) or federal authorization requirements. Monitoring should provide useful and pertinent information to support site management decisions. The main purpose of ODMDS monitoring is to determine whether site management practices, including placement operations, need to be changed to avoid unacceptable impacts or to provide benefits to resource conditions. Site monitoring is not a standalone activity. It is based on the site designation process, the characteristics of the dredged materials, and compliance with authorized activities.

To use site monitoring as an effective tool, site managers need to define in quantitative terms thresholds for unacceptable impacts and desired beneficial effects of dredged material placement. Exceeding or not exceeding the thresholds triggers specific management actions. A tiered strategy for a monitoring program is desirable. With a tiered approach, an unacceptable result may trigger further and often more complex monitoring. Continuous monitoring of all physical, chemical, and biological parameters and resources in and around the ODMDS is not necessary. A monitoring program should be structured to address specific questions (hypotheses) and measure key indicators and endpoints, particularly those defined during site designation or specific project issues that arise. For the Morehead City ODMDS, the site designation environmental impact statement identified navigation, fishing (shrimping), and beach-quality sands as resources of concern.

The objectives of the site monitoring plan for the Morehead City ODMDS are to provide information to:

- Determine if the placement activities are in compliance with site use restrictions and permit conditions;
- Determine the short and long-term fate of dredged materials placed at the site using models such as the STFATE (Appendix D);
- Determine the effect of the dredged material placement on uses of the marine environment within and outside the ODMDS.

Monitoring Methods and Rationale

Monitoring strategies for the Morehead City ODMDS and thresholds for management actions are presented in Table 2 and discussed in the following paragraphs. These methods provide information to address specific and current management issues at the site, including: mounding (and site capacity); dumps occurring outside the ODMDS boundary; and movement or fate of material. As indicated in Table 2, information obtained during monitoring may indicate the need for additional monitoring at a higher, more complex, level. If more intensive monitoring is required, this monitoring plan must be revised and additional thresholds for action established.

Table 2. Morehead City ODMDS Monitoring Strategies and Thresholds for Action.

STRATEGY	THRESHOLD	MANAGEMENT OPTIONS	
Monitoring Strategy	**Predefined Threshold For Action**	**Threshold Not Exceeded**	**Threshold Exceeded**
Site Bathymetry	Mound Height > -30' MLLW	* Continue monitoring after each placement activity (project completion)	* Move placement points within site * Limit quantity of material * Remove material shallower than -30' MLLW * Cease use of specific area of site * Notify mariners of mound location and height
	Mound height approaching -30' MLLW	* Continue monitoring after each placement activity (project completion)	* Move placement points within site * Continue use of area, but increase frequency of monitoring * Limit dredged material quantities placed at site.
Site Bathymetry – Sequential Survey Analysis	Sequential surveys indicate significant erosion of placement mounds.	* Continue monitoring after each placement activity (project completion) * Continue monitoring at a reduced level * Stop monitoring	* Move placement points within site * Increase monitoring level to assess impacts of material movement * Reduce quantities placed at site
Sediment Sampling and Grain Size Characterizations	Monitoring information indicates a transport of fine-grained material from the fine-grained placement zone towards the beach-quality sand placement zone.	* Continue monitoring at a reduced level * Stop monitoring	* Increase level of monitoring * Implement a change in ODMDS use to minimize the potential for transport or change in beach-quality sand zone material due to ODMDS use.
ODMDS Use Records	Placement records required by SMMP are not submitted or are incomplete	* Continue monitoring at same level	* Restrict site use until requirements are met * Dump occurred outside ODMDS boundary: Notify EPA-Region 4 and State of NC. Investigate why off-site dump(s) occurred. Remove material from off-site dump(s) if a hazard to navigation or the environment
	Review of records indicates a dump occurred at a location other than as directed	* Continue monitoring at same level	* Dump occurred in ODMDS but not in target area: Direct placement to occur as specified.
Evaluation of Direction and Magnitude of Material Movement Using Numerical Models	Evaluations indicate the potential to move back to navigation channel or to adjacent areas	* Continue monitoring at a reduced level * Stop monitoring * Continue monitoring at same level	* Increase level of monitoring * Collect additional information needed to refine predictions * Change operational considerations (i.e., location and method of placement)

Site Bathymetry

Pre- and post-placement single transducer bathymetric surveys of the areas of active placement (plus 1,000 feet beyond in all directions) will be conducted for each ODMDS placement activity totaling 50,000 cubic yards or more. Positioning using global positioning system (GPS) - enabled equipment will be required. Survey line spacing will be 100 feet (maximum). The vertical datum shall be MLLW (Beaufort Datum) and the universal transverse Mercator (UTM), North American datum (NAD) 1983.

The survey data will be made available as a coordinate data file in an electronic format specified by the USACE, Wilmington District, and EPA Region 4. Pre- and post-placement surveys will be evaluated using surface modeling techniques. Consecutive surveys will be compared to establish apparent net direction of sediment movement. Estimates will be made of the quantities and types of materials retained in the ODMDS. The ocean disposal verification database will be used to associate dredging project information with bathymetric features observed.

Placement Site Use Records

All dredged material placement activities at the Morehead City ODMDS will be conducted under an approved verification plan. The USACE, Wilmington District will maintain a database of site use. The documented site use information along with other information collected during monitoring will be used to direct future ocean placement and monitoring activities.

Reporting and Data Formatting

Project Initiation and Violation Reporting

The USACE, Wilmington District or other site user shall notify EPA Region 4 fifteen (15) days prior to the beginning of a dredging cycle or project planning to use the ODMDS. The user, if not the USACE, is also required to notify the USACE, Wilmington District and the EPA Region 4 within 24 hours if a violation of the permit and/or contract conditions related to MPRSA Section 103 or SMMP requirements occur during placement operations.

Placement Monitoring Data

It is expected that placement monitoring will be conducted utilizing the Dredge Quality Management (DQM) system for Civil Works projects (http://dqm.usace.army.mil/Specifications/Index.aspx), although other monitoring systems are acceptable. Placement monitoring data shall be provided to EPA Region 4 electronically on a weekly basis (within one week of disposal event). Data shall be provided per the EPA Region 4 XML format and delivered as an attachment to an email to DisposalData.R4@epa.gov. The XML format is available from EPA Region 4. The following trip information shall be electronically recorded for each placement cycle:

- Load number;
- Placement vessel name and type;
- Tow vessel name (if applicable);
- Captain of placement or tow vessel;
- Estimated volume of load;
- Description of material disposed;

- Source of material;
- And date, time and location of start at initiation, and completion, of disposal event.

Post-Placement Summary Reports

A Post-Placement Summary Report shall be provided to the EPA Region 4 within 90 days after project completion. These reports should include:

- Dredging project title;
- Permit number and expiration date (if applicable);
- Contract number;
- Name of contractor conducting the work;
- Name and type of vessel(s) placing material in the ODMDS;
- Placement timeframes for each vessel;
- Material volume placed at the ODMDS (as paid *in situ* volume, total paid and un paid *in situ* volume, and gross volume reported by dredging contractor);
- Number of loads to ODMDS;
- Type of material placed at the ODMDS;
- Identification by load number of any misplaced material;
- Dates of pre- and post-placement bathymetric surveys of the ODMDS;
- And a narrative discussing any violation(s) of the 103 concurrence and/or permit (if applicable).

The narrative should include a description of the violation, indicate the time it occurred and when it was reported to the EPA and USACE, discuss the circumstances surrounding the violation, and identify specific measures taken to prevent reoccurrence. The Post-Placement Summary Report should be accompanied by the bathymetry survey results (plot and X, Y, Z ASCII data file), a summary scatter plot of all disposal start locations, and a summary table of the trip information required in *Disposal Monitoring Data*. These reports can be accessed by USACE personnel at the DQM Website: http://dqm-portal.usace.army.mil.

Environmental Monitoring

Placement effects monitoring shall be coordinated with, and be provided to, appropriate Federal and state agencies, as appropriate. Reports will be posted to EPA's website at: https://www.epa.gov/ocean-dumping or alternative EPA website.

MODIFICATION OF THE MOREHEAD CITY ODMDS SMMP

Should the results of the monitoring surveys or valid reports from other sources indicate that continued use of the ODMDS would lead to unacceptable effects, then the ODMDS management will be modified to mitigate for the adverse effects. The SMMP will be reviewed and updated at least every 10 years. The SMMP will be reviewed and updated as necessary if site use changes significantly. For example, the SMMP will be reviewed if the quantity or type of dredged material placed at the site changes significantly or if conditions at the site indicate a need for revision. The plan should be updated in conjunction with activities authorizing use of the site.

IMPLEMENTATION OF THE MOREHEAD CITY ODMDS SMMP

This plan shall be effective from date of signature for a period not to exceed 10 years. The EPA Region 4 and the USACE, Wilmington District, shall share responsibility for implementation of the SMMP. Site users may be required to undertake monitoring activities as a condition of their Section 103 permit (Appendix B). The USACE, Wilmington District, shall be responsible for implementation of the SMMP for Federal maintenance and new work navigation projects.

REFERENCES

Moser, M. L. and T. B. Taylor. 1995. Hard Bottom Habitat in North Carolina State Waters: A Survey of Available Data. Report to the North Carolina Division of Coastal Management, Ocean Resources Task Force.

Peterson, C. H., H.C. Summerson, H.S. Lenihan, J. Grabowski, S.P. Powers, and Jr. G.W. Sarfit. 1999. Beaufort Inlet benthic resources survey. UNC-CH, Morehead City, NC, Final Report to the US Army Corps of Engineers.

U.S. Army Corps of Engineers (USACE). 2010. Benthic Characterization Survey and Grain Size Analysis of the Beaufort Inlet Ebb Tide Delta, Morehead City, Carteret County, North Carolina – Final Report. Boynton Beach, Florida: Tetra Tech EC, Inc.

U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (EPA). 1985. Final Environmental Impact Statement (FEIS) Morehead City Harbor, Ocean Dredged Material Disposal Site (ODMDS) Site Designation, January 1985.

U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (EPA). 1986. Wilmington Harbor – Morehead City Harbor, Ocean Dredged Material Disposal Sites (ODMDS), 1986 Monitoring Survey Report. August 1986.

U.S. Environmental Protection Agency (EPA). 2012. Morehead City ODMDS Status and Trends. August 2012.

U.S. Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers (USACE). 1991. Evaluation of Dredged Material Proposed for Ocean Disposal-Testing Manual (Green Book). EPA- 503/8-91-001. February 1991. https://www.epa.gov/sites/production/files/2015-10/documents/green_book.pdf

U.S. Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers (USACE). 1991. Guidance Document for Development of Site Management Plans for Ocean Dredged Material Disposal Sites. February 1996. https://www.epa.gov/sites/production/files/2015-09/documents/1996_smmp_guidance.pdf

U.S. Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers (USACE). 2008. Regional Implementation Manual - Requirements and Procedures for Evaluation of the Ocean Disposal of Dredged Material in Southeastern U.S. Atlantic and Gulf Coast Waters (SERIM). August 2008. https://www.epa.gov/sites/production/files/2016-05/documents/r4_serim_final_august_2008.pdf

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FIGURES

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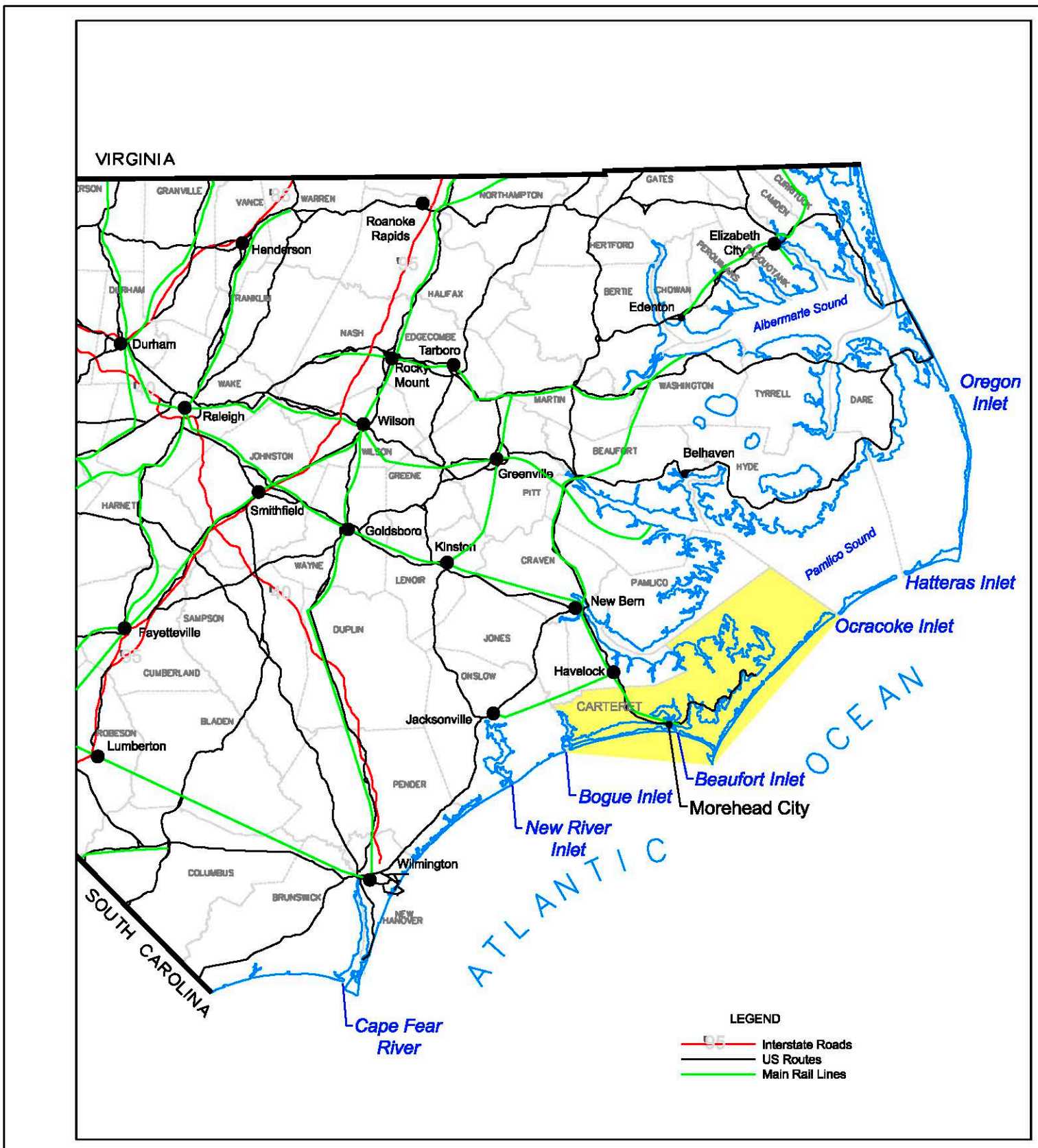

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Figure 1. Morehead City Harbor general location.

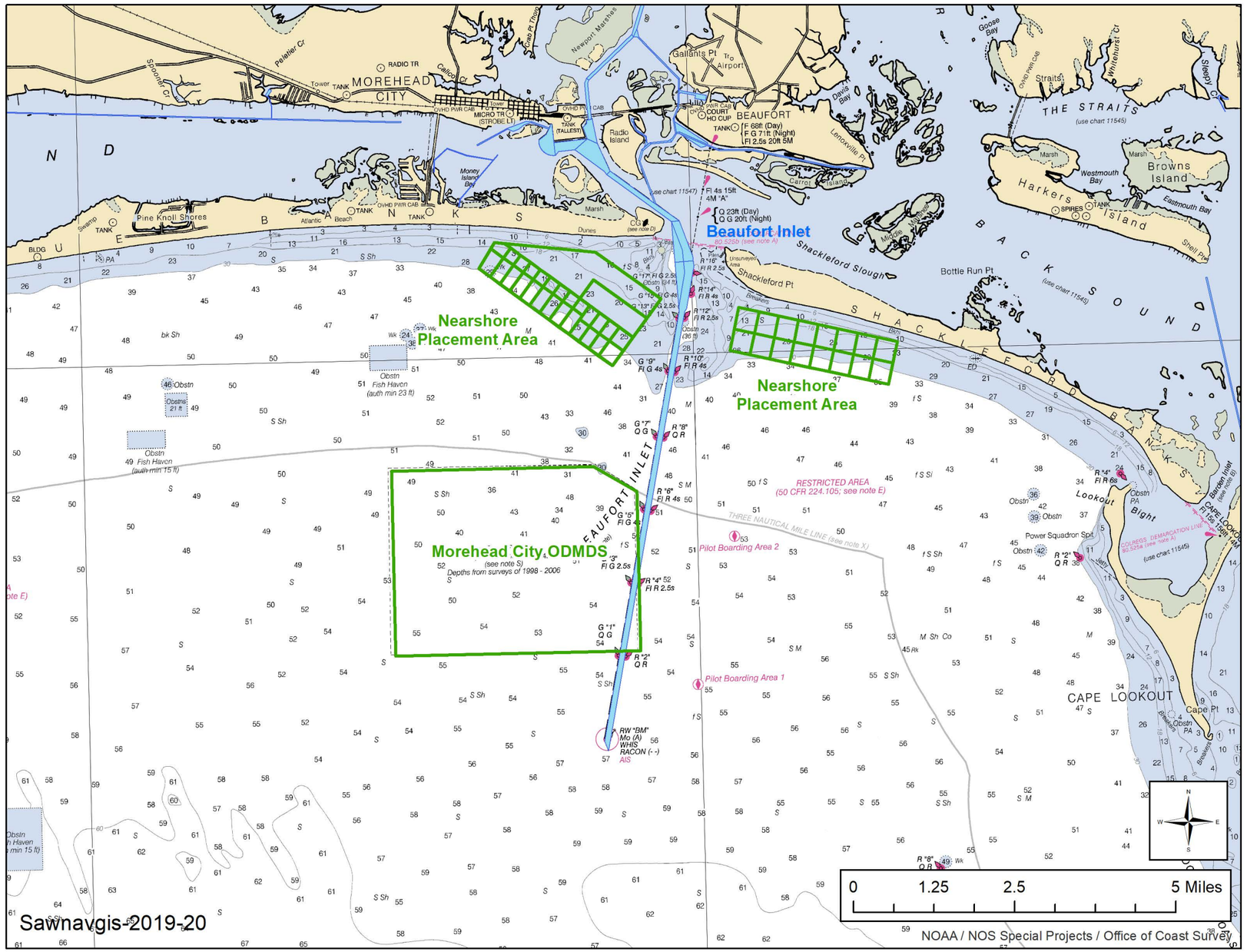

Figure 2. Morehead City Ocean Dredged Material Disposal Site and Nearshore Placement Areas.

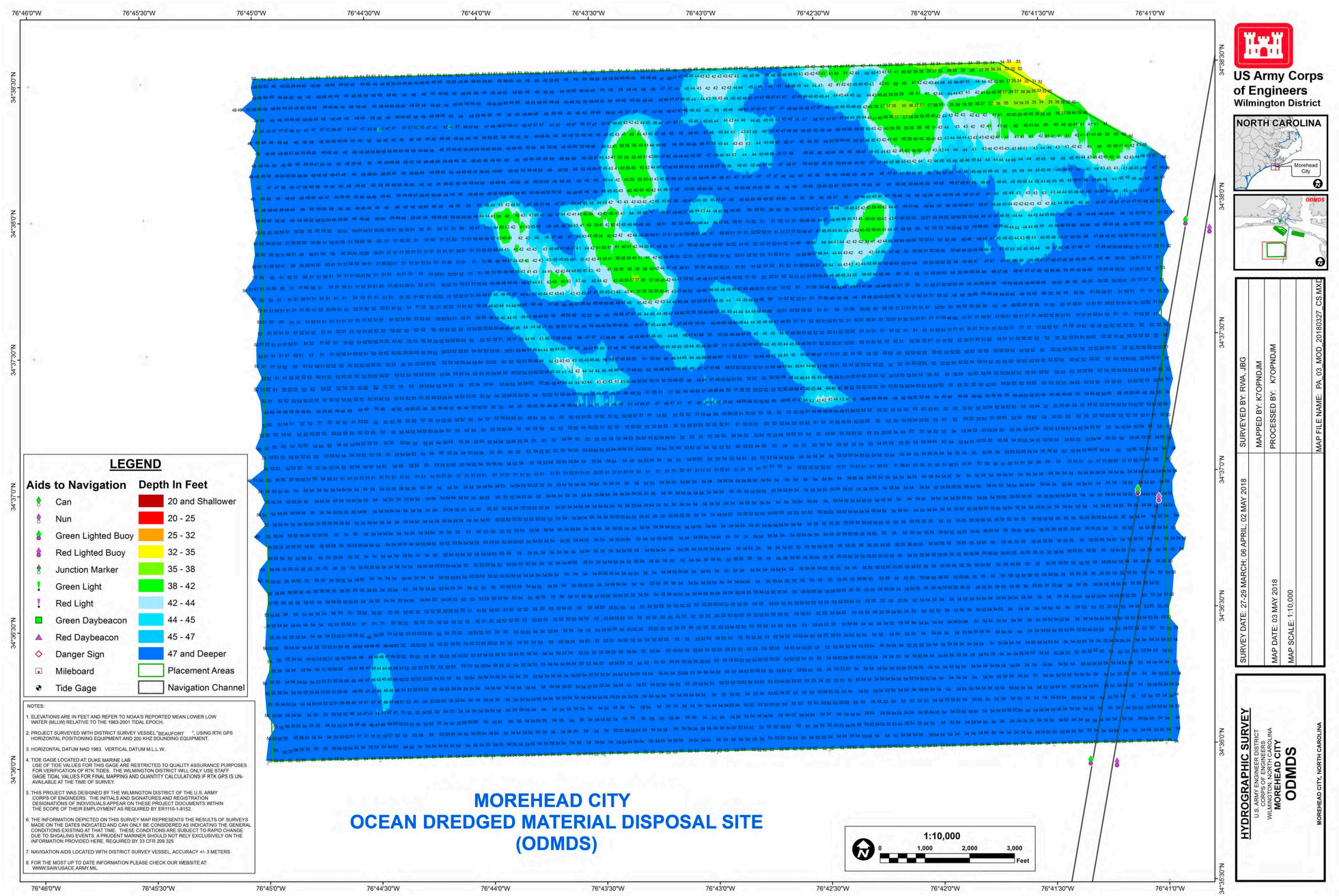

Figure 3. Morehead City Ocean Dredged Material Disposal Site Bathymetry (May 2018).

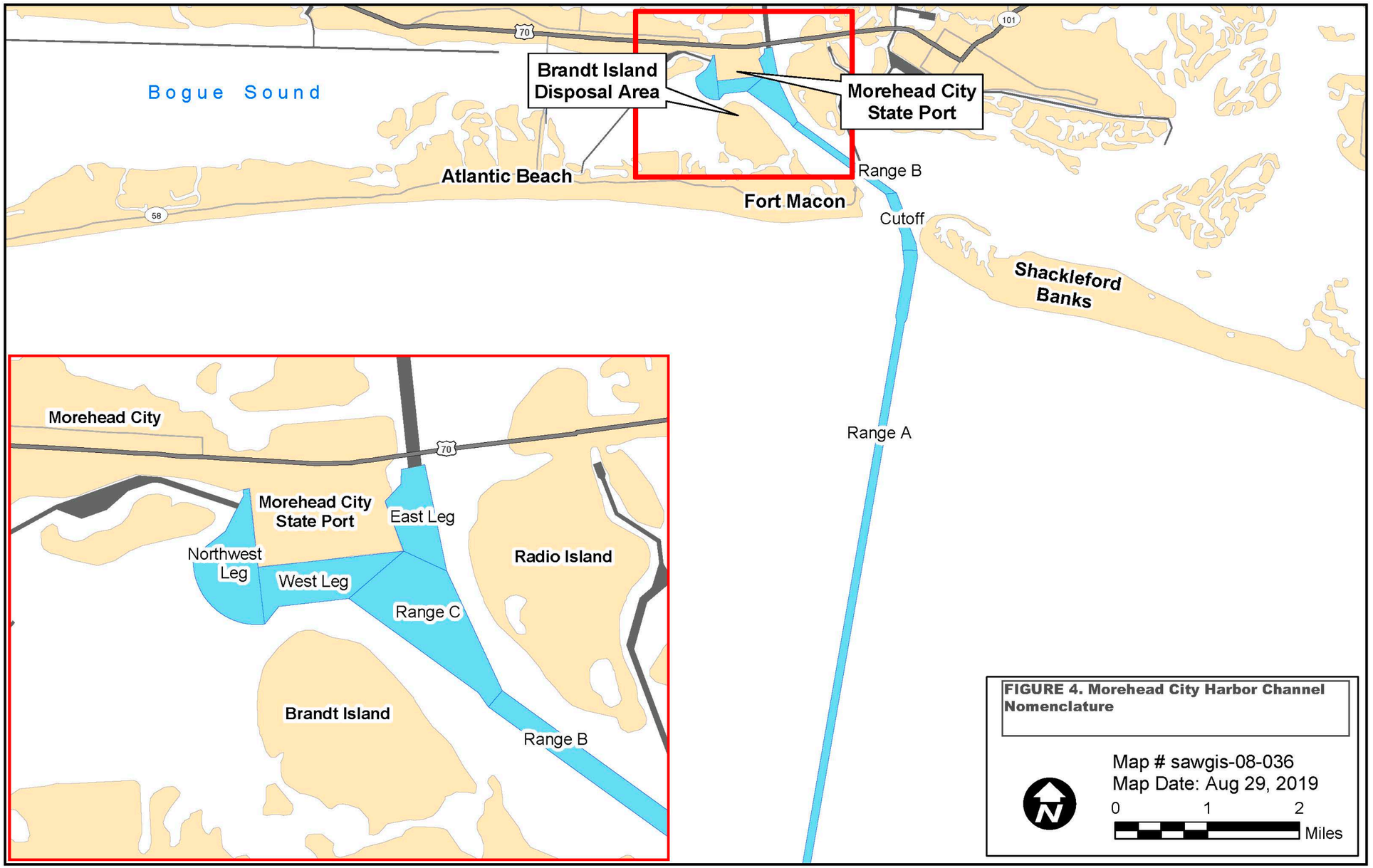

Figure 4. Morehead City Harbor Federal Navigation Project channel boundaries.

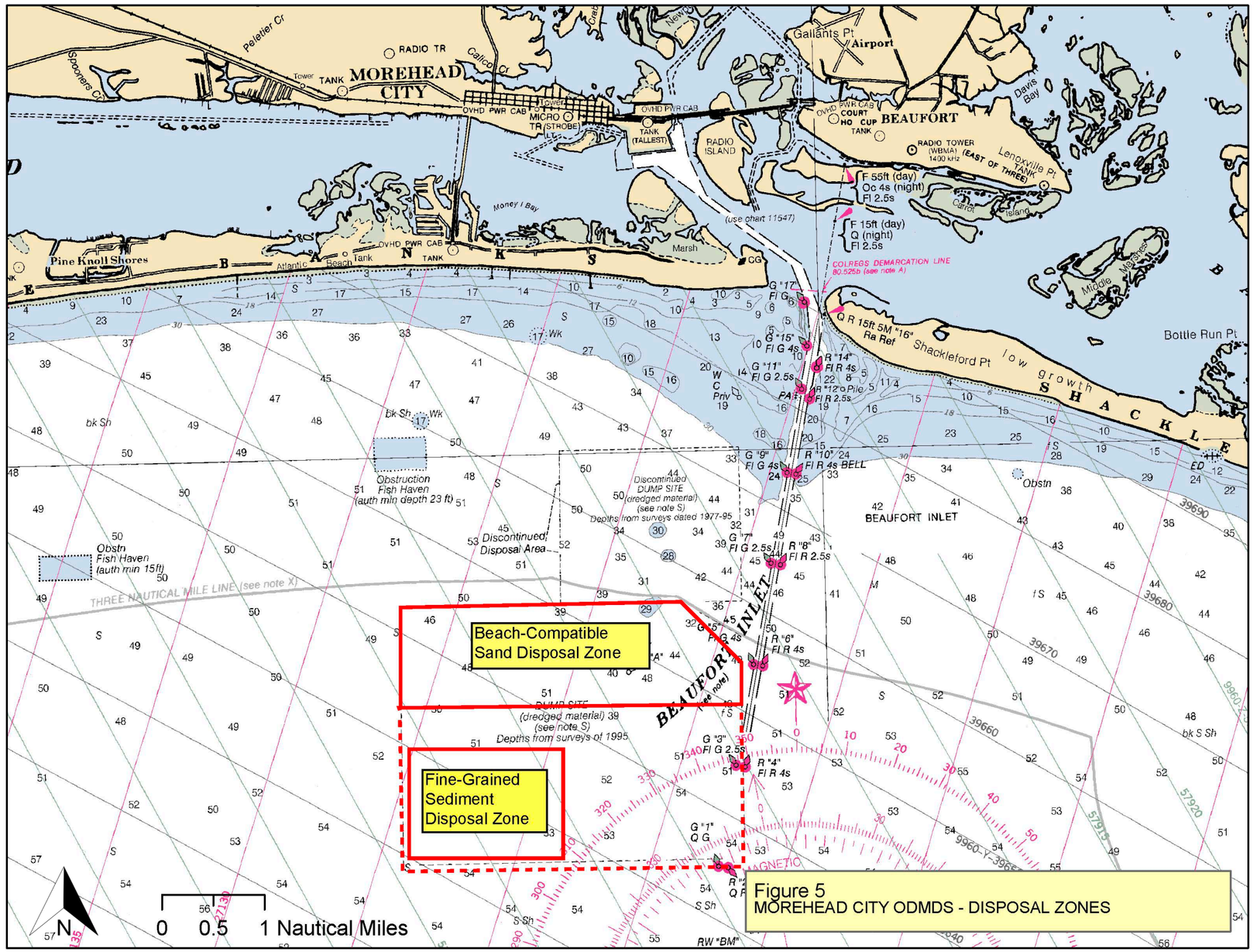

Figure 5. Morehead City Ocean Dredged Material Disposal Site placement zones.

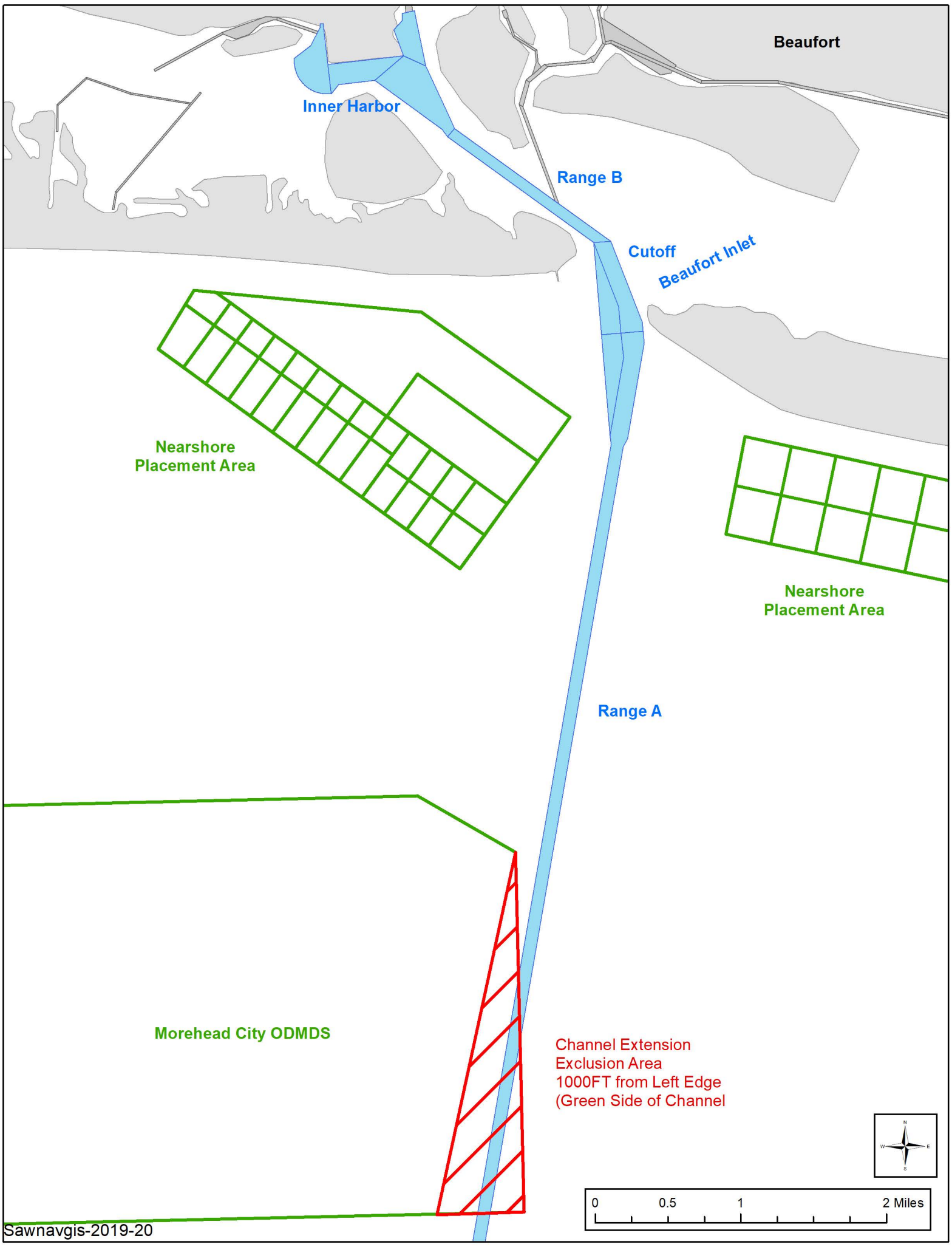

Figure 6. Morehead City Ocean Dredged Material Disposal Site channel extension exclusion area.

APPENDICES

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APPENDIX A

Public Involvement

Morehead City Ocean Dredged Material Disposal Site (ODMDS)

Site Monitoring and Management Plan (SMMP)

Draft Dated February 2020

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Public Involvement

U.S. EPA Region 4 / USACE, Wilmington District – Point Public Notice (JPN) and Notice of Availability (NOA) for Draft Morehead City ODMDS SMMP published Month, ## 2020. The JPN / NOA was provided to a USACE, Wilmington District standard mailing list of Morehead City Harbor stakeholders.

Copies of Draft Morehead City ODMDS SMMP were provided to the North Carolina Department of Administration, State Environmental Review Clearinghouse on Month, ## 2020.

Copies of Draft Morehead City ODMDS SMMP were provided to Federal stakeholder agencies on Month, ## 2020.

Draft Morehead City ODMDS SMMP was made available on the USACE, Wilmington District website (https://www.saw.usace.army.mil/Missions/Navigation/PublicNotices/) on Month, ## 2020.

Index of Comments Received

A.1. Commenting Entity 1

A.2. Commenting Entity 2…

APPENDIX B

Numerical Model (STFATE)

Input Parameters

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Numerical Model (STFATE)
Input Parameters
Morehead City ODMDS

STFATE (Short-Term FATE of dredged material disposal in open water) models the discharge of a single load of dredged material from a scow or hopper. STFATE computes a prediction of the deposition and water quality effects of dredged materials disposed of in open water. This numerical model is used for required evaluations of initial mixing and water column effects. STFATE is an outgrowth of the first comprehensive model for predicting the fate of dredged material developed by Koh and Chang (1993). STFATE models three disposal phases, convective descent, dynamic collapse, and passive transport dispersion. STFATE models conventional displacement (bottom dumping) where the vast majority of the dredged material released from a barge or hopper dredge descends rapidly to the bottom in a high density jet known as the convective descent phase. The dynamic collapse phase begins when the jet impacts the bottom. The more dense material immediately deposits, while the less dense particles are spread outward as a density flow when the vertical energy is transferred into horizontal momentum. Over time the less dense material also settles.

Input data for the model includes information regarding the following:
Disposal operation
Disposal site
Dredged material
Model coefficients
Input/output/execution controls

The STFATE input parameters are to be used in future evaluations of disposal operations. These parameters are based on information obtained during site designation studies as presented in the Morehead City ODMDS FEIS, previous applications of the disposal models, and default parameters. Additional project and site-specific information should be used in future STFATE applications to improve the predictive capability of the model.

The STFATE model input parameters include site description, ambient velocity data, disposal operation information, and coefficients. A 50 by 50 grid was chosen to provide the highest resolution. The grid spacing in the north/south and east/west directions was selected at 250 feet to keep the disposal plume within the grid during the model execution. As discussed above, an average depth of 52 feet is used and a two-point density profile is used. A depth averaged logarithmic velocity profile was selected using median values to the East. Disposal operation and execution parameters include disposal site boundaries and disposal location and model time step and duration. The duration is set to 14,400 seconds (4 hours) to meet the 4-hour dilution requirement. Project specific disposal operations data (i.e., vessel speed, dimensions and draft) will depend on the individual projects. Likewise, dredged material characteristics may vary based on specific sediment testing information. Model default values are specified where appropriate.

ADDAMS Model

Section 103 Regulatory Analysis for Ocean Water, Tier III, Short-Term Fate of Dredged Material from Split Hull Barge or Hopper/Toxicity Run

Average sediment characteristics of recent sediment 103 evaluations were used to calculate the Volumetric Fractions. Parameters described in the disposal site were obtained from the Morehead City ODMDS Site Designation EIS (EPA, 1985), COE Bathymetric data, Nautical Charts, and The North Carolina Coastal Ocean Observing System www.NCCOOS.org., Buoy 41035. Map 1 shows the location and configuration of the reference station. STFATE model input parameters utilized in the module were as follows:

Site Description

Parameter	Value	Units
Number of Grid Points (left to right)	50	n/a
Number of Grid Points (top to bottom)	50	n/a
Spacing Between Grid Points (left to right)	250	ft
Spacing Between Grid Points (top to bottom)	250	ft
Constant Water Depth	52	ft
Roughness Height at Bottom of Disposal Site	0.005[1]	ft
Slope of Bottom in X-Direction	0	Deg.
Slope of Bottom in Z-Direction	0	Deg.
Number of Points in Ambient Density Profile Point	2	n/a
Ambient Density at Depth = 0 ft	1.0325	g/cc
Ambient Density at Depth = 52 ft	1.0325	g/cc

Ambient Velocity Data

Parameter	Value	Units
Water Depth	52	ft
Velocity Profile for Constant Depth	2-Point	n/a
X-Direction Velocity (3 feet)	0.29	ft/sec
Z-Direction Velocity (3 feet)	0	ft/sec
X-Direction Velocity (31.2 feet*)	0.11	ft/sec
Z-Direction Velocity (31.2 feet*)	0	ft/sec

* Assuming that average velocity is 40% of surface velocity, average velocity occurs at 6/10 of the total depth, and the direction of the current is due south (shortest distance to the boundary/worse case scenario)

Disposal Operation Data

Parameter	Value	Units
Vessel Type	Barge/Scow	n/a
Location of Disposal Point from Top of Grid	5,000^	ft
Location of Disposal Point from Left Edge of Grid	5,000^	ft
Dumping Over Depression	0	n/a
Length of Disposal Vessel Bin	300	ft
Width of Disposal Vessel	72.0	ft
Pre-Disposal Draft	17.0	ft
Post-Disposal Draft	5.0	ft

Parameter	Value	Units
Vessel Type	Barge/Scow	n/a
Time Needed to Empty the Disposal Bin (sec)	60	sec

^ Due to the large size of the ODMDS area, the Wilmington USACE has designated a 6,000 ft by 6,000ft block on the lower left hand side of the grid to manage the material that is not suitable for beach re-nourishment. For the purpose of running this model, the barge was located in the middle of this lower left hand side block and the dimensions of the ODMDS station were described as a 6,000 feet x 6,000 feet sub section of the full ODMDS.

Input, Execution and Output

Parameter	Value	Units
Location of the Upper Left Corner of the Disposal Site - Distance from Top Edge	2,000	ft
Location of the Upper Left Corner of the Disposal Site - Distance from Left Edge	2,000	ft
Location of the Lower Right Corner of the Disposal Site - Distance from Top Edge	8,000	ft
Location of the Lower Right Corner of the Disposal Site - Distance from Left Edge	8,000	ft
Duration of Simulation	14,400	sec
Long Term Time Step	600	sec

Material Description Data

Parameter	Value	Units
Dredging Site Water Density	1.03	g/cc
Number of Layers	1	n/a
Material Volume	4000	Cu. Yd.
Material Velocity (X-Dir)	3.4	ft/s
Material Velocity (Z-Dir)	0	ft/s
Duration of Simulation	14,400	sec
Long Term Time Step	600	sec
Volumetric Fraction – Sand	0.365	n/a
Volumetric Fraction – Clay	0.274	n/a
Volumetric Fraction – Gravel	0.007	n/a

Coefficients

Parameter	Keyword	Value
Settling Coefficient	BETA	0.000[1]
Apparent Mass Coefficient	CM	1.000[1]
Drag Coefficient	CD	0.500[1]
Form Drag for Collapsing Cloud	CDRAG	1.000[1]
Skin Friction for Collapsing Cloud	CFRIC	0.010[1]
Drag for an Ellipsoidal Wedge	CD3	0.100[1]
Drag for a Plate	CD4	1.000[1]
Friction Between Cloud and Bottom	FRICTN	0.010[1]

Parameter	***Keyword***	***Value***
4/3 Law Horizontal Diffusion Dissipation Factor	*ALAMDA*	*0.0010*[1]
Unstratified Water Vertical Diffusion Coefficient	*AKYO*	*Pritchard Expression*
Cloud/Ambient Density Gradient Ratio	*GAMA*	*0.250*[1]
Turbulent Thermal Entrainment	*ALPHAO*	*0.235*[1]
Entrainment in Collapse	*ALPHAC*	*0.100*[1]
Stripping Factor	*CSTRIP*	*0.003*[1]

[1]Model Default Value

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APPENDIX C

Generic Special Conditions for MPRSA Section 103 Permits

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GENERIC SPECIAL CONDITIONS
FOR MPRSA SECTION 103 PERMITS
MOREHEAD CITY ODMDS

I. DISPOSAL OPERATIONS

A. For this permit, the term disposal operations shall mean: navigation of any vessel used in disposal operations, transportation of dredged material from the dredging site to the Morehead City ODMDS, proper disposal of dredged material at the disposal area within the Morehead City ODMDS, and transportation of the hopper dredge or disposal barge or scow back to the dredging site.

B. The boundary coordinates of the Morehead City ODMDS is defined as the rectangle delineated by the following latitude/longitude and State Plane Coordinate system NAD 83 coordinates:

Latitude	Longitude	Northing	Easting
34^0 38'30" N	76^0 45'00" W	N 332180	E 2676711
34^0 38'30" N	76^0 41'42" W	N 332560	E 2693251
34^0 38'09" N	76^0 41'00" W	N 330519	E 2696808
34^0 36'00" N	76^0 41'00" W	N 317482	E 2697112
34^0 36'00" N	76^0 45'00" W	N 317091	E 2677142

C. For this permit, the use of the Morehead City ODMDS must be in accordance with the approved Morehead City ODMDS Site Monitoring and Management Plan (SMMP).

D. Dredging and dredged material disposal and monitoring of dredging projects using the Silent Inspector (SI) system shall be implemented for this permit. The permittee's SI system must have been certified by the SI Support Center within one calendar year prior to the initiation of the dredging/disposal. Questions regarding certification should be addressed to the SI Support Center at 251-690-3011. Additional information about the SI System can be found at http://si.usace.army.mil. The permittee is responsible for insuring that the SI system is operational throughout the dredging and disposal project and that project data are submitted to the SI National Support Center in accordance with the specifications provided at the aforementioned website. The data collected by the SI system shall, upon request, be made available to the Regulatory Division/Branch of the U.S. Army Corps of Engineers, Wilmington District and to EPA Region 4. Uploading of raw project data to the SI Support Center is required. (REGULATORY GUIDANCE LETTER No. 08-01 Date: 05 February 2008, SUBJECT: Guidance for Implementing the Silent Inspector (SI) system for dredging projects requiring Department of the Army (DA) permits)

E. The permittee shall not allow water or dredged material placed in a hopper dredge or disposal barge or scow to flow over the sides or leak from such vessels during transportation to the ODMDS. Excessive leakage is any change in draft exceeding 1.5 feet from the point of departure from the dredging site to the disposal site.

F. A disposal operations inspector and/or captain of any tug boat, hopper dredge or other vessel used to transport dredged material to the Morehead City ODMDS shall insure compliance with disposal operation conditions defined in this permit.

1. If the disposal operations inspector or the captain detects a violation, he shall report in writing the violation to the permittee immediately.

2. The permittee shall contact the U.S. Army Corps of Engineers, Wilmington District and EPA Region 4 to report the violation within twenty-four (24) hours after the violation occurs. A complete

written explanation of any permit violation shall be included in the post-dredging report.

G. For disposal operations which total greater than 50,000 cubic yards, the permittee shall conduct a bathymetric survey of the Morehead City ODMDS within two months prior to project disposal and within 60 days following project completion.

1. The number and length of the survey transects shall be sufficient to encompass the disposal zone within the ODMDS and a 1500-foot wide area around that zone. The survey transects shall be spaced at 500-foot intervals or less.

2. Vertical accuracy of the survey shall be ±0.5 feet. Horizontal location of the survey lines and depth sounding points will be determined by an automated positioning system utilizing either microwave line of site system or differential global positioning system. The vertical datum shall be mean lower low water (mllw) and the horizontal datum shall use North Carolina State Plane or latitude and longitude coordinates (North American Datum 1983). State Plane coordinates shall be reported to the nearest 0.10- foot and latitude and longitude coordinates shall be reported as degrees and decimal minutes to the nearest 0.01 minutes.

II. REPORTING REQUIREMENTS

A. The permittee shall send the U.S. Army Corps of Engineers, Wilmington District's Environmental Branch and the EPA Region 4's Oceans, Wetlands, and Streams Protection Branch (61 Forsyth Street, Atlanta, GA 30303) a notification of commencement of work at least fifteen (15) days before initiation of any dredging operations authorized by this permit and referenced by the permit number. In addition, the permittee agrees to contact the U.S. Coast Guard (Marine Safety Office) prior to disposing of any material in the ocean disposal site.

B. The permittee shall submit to the U.S. Army Corps of Engineers weekly disposal monitoring reports. These reports shall contain the information described in Special Condition I.D.

C. The permittee shall send one (1) copy of the disposal summary report to the Wilmington District and one (1) copy of the disposal summary report to EPA Region 4 documenting compliance with all general and special conditions defined in this permit. The disposal summary report shall be sent within 30 days after completion of the disposal operations authorized by this permit. The disposal summary report shall include the following information:

1. The report shall indicate whether all general and special permit conditions were met. Any violations of the permit shall be explained in detail.

2. The disposal summary report shall include the following information: Corps permit number, actual start date and completion date of dredging and disposal operations, total cubic yards disposed at the Morehead City ODMDS, locations of disposal events, and pre and post disposal bathymetric survey results (in hard and electronic formats).

III. PERMIT LIABILITY

A. The permittee shall be responsible for ensuring compliance with all conditions of this permit.

B. The permittee and all contractors or other third parties who perform an activity authorized by this permit on behalf of the permittee shall be separately liable for a civil penalty of up to $50,000 for each violation of any term of this permit they commit alone or in concert with the permittee or other parties. This liability shall be individual, rather than joint and several, and shall not be reduced in any fashion to reflect the liability assigned to and civil penalty assessed against the permittee or any other third party as defined in

33 U.S.C. Section 1415(a).

C. If the permittee or any contractor or other third party knowingly violates any term of this permit (either alone or in concert), the permittee, contractor or other party shall be individually liable for the criminal penalties set forth in 33 U.S.C. Section 1415(b).

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APPENDIX D

Typical Contract Language for Implementing the Morehead City ODMDS SMMP Requirements

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CONTRACT LANGUAGE
FOR IMPLEMENTING SMMP REQUIREMENTS

3.3 DISPOSAL OF DREDGED MATERIAL

3.3.1 General

All material dredged shall be transported to and deposited in the disposal area(s) designated in the drawings. The approximate maximum and average distance to which the material will have to be transported are as follows:

Disposal Area	Maximum Distance Statute Miles	Average Distance Statute Miles
Morehead City ODMDS		
[INSERT DISPOSAL AREA]	[XX miles]	[XX miles]

[IF MATERIAL FROM DIFFERENT PROJECT AREAS GOES TO DIFFERENT DISPOSAL AREAS, IT COULD BE SPECIFIED HERE]

3.3.2 Ocean Disposal Notification

a. The Corps or the contractor shall notify EPA Region 4's Ocean, Wetlands, and Streams Protection Branch (61 Forsyth Street, Atlanta, GA 30303) at least 15 calendar days and the local Coast Guard Captain of the Port at least 5 calendar days prior to the first ocean disposal. The notification will be by certified mail with a copy to the Contracting Officer. The following information shall be included in the notification:
   (1) Project designation, Corps of Engineers' Contracting Officer's name and contact number, and the name, address, and telephone number of the Contractor;
   (2) Port of departure;
   (3) Location of ocean disposal area (and disposal zone, if applicable); and
   (4) Schedule for ocean disposal, giving date and time projected for first ocean disposal.

3.3.3 Ocean Dredged Material Disposal Sites (ODMDS)

The material excavated shall be transported to and deposited in the Morehead City ODMDS shown on the drawings. When dredged material is disposed, no portion of the hopper dredge or disposal barge or scow shall be outside of the boundaries of the Morehead City ODMDS boundary as shown on the drawings. Additionally, disposal shall be initiated within the disposal release zone defined by the following coordinates:

[insert coordinates for appropriate release zone]

	Geographic NAD 83		State Plane NAD 83	
	Latitude	Longitude	Northing	easting
Center				
North				
West				
South				
East				

Dredged material shall not be placed higher than elevation -xx feet MLLW in the Morehead City ODMDS.

3.3.4 **Logs**

The Contractor shall keep a log for each load placed in the Morehead City ODMDS. The log entry for each load shall include:

1. Load Number
2. Disposal Vessel or Scow Name
3. Tow Vessel Name (if scow used)
4. Captain of Disposal Vessel or Tow Vessel
5. Estimated volume of Load
6. Description of material disposed
7. Source of Dredged material
8. Date, time and location (coordinates) at Start of Initiation and Completion of Disposal Event

At the completion of dredging and at any time upon request, the log(s) shall be submitted in paper and electronic formats to the Contracting Officer for forwarding to the appropriate agencies.

3.3.5 **Overflow, Spills and Leaks**

Water and excavated material shall not be permitted to overflow, leak out, or spill out of barges, dump scows, or hopper dredges while en route to the ODMDS disposal release zone(s). Failure to repair leaks or change the method of operation which is resulting in the overflow, leakage, or spillage will result in suspension of dredging operations and require prompt repair or change of operation to prevent overflow, leakage, or spillage as prerequisite to the resumption of dredging. Transit to the ODMDS begins as soon as dredged material loading into the disposal vessel is completed and the vessel begins moving to the ODMDS. All appropriate measures to avoid spillage during transit must be taken. Appropriate measures may include, but, are not limited to: up-to-date U.S. Coast Guard and/or American Bureau of Shipping certification of all disposal-related vessels; maintenance (inspection and/or replacement) of gaskets on barge doors, minimization of excess free liquids in barge loads, pre-transit testing of barge door hydraulics, and pre- transport verification of appropriate weather and sea state conditions. The Contracting Officer shall be notified within 24 hours if any apparent leaking or spilling of dredged material occurs as indicated by an average loss of draft during transit from the dredging area to the disposal release zone(s) (forward draft loss plus aft draft loss divided by 2) in excess of x.x feet. Excessive leakage may be classified as a mis-dump and pay deducted for the entire load.

3.3.5.1 **Mis-Dump**

Any scow load or hopper dredge load that is released outside the boundaries of the release zone as shown on the plans will be classified as a mis-dump and will result in a suspension of dredging operations. Re dredging of such materials will be required as a prerequisite to the resumption of dredging unless the Contracting Officer, at his discretion, determines that re dredging of such material is not practical. If re dredging of such material is not required then the quantity of the mis-dumped load shall be deducted from the Contractor's pay quantity. If the quantity for each mis-dumped load to be deducted cannot initially be agreed to by both the Contractor and Contracting Officer, then an average hopper/scow load quantity for the entire contract will be used in the determination. In addition, the

Contractor must notify the Contracting Officer within 24 hours of a misplaced dump or any other violation of the Site Management and Monitoring Plan for Morehead City ODMDS. Corrective actions must be implemented by the next dump and the Contracting Officer must be informed of actions taken.

3.3.5.2 **Vessel Doors**

All hopper doors, dump scow doors, or split hull dumping mechanisms shall be closed and sealed prior to exiting the ODMDS as documented by the hull sensors. In the event that a dump vessel exits the ODMDS with open doors, then the Contractor shall notify the COR immediately of the occurrence. Corrective actions must be implemented by the next dump and the Contracting Officer must be informed of actions taken.

3.3.6 **Electronic Tracking System (ETS) for Ocean Disposal Vessels**

[USE LANGUAGE BELOW FOR NON DQM PROJECTS]

3.3.6.1 ETS Standards

The Contractor shall provide automated (computer) system and components to perform in accordance with COE EM 1110-1-2909. A copy of the EM (Spell out – engineering manual) can be downloaded from the following web site:

http://www.usace.army.mil/inet/usace-docs'eng-manuals/em.htm

Horizontal location shall have an accuracy equal to or better than a standard DGPS system, equal to or better than plus/minus 10 feet (horizontal repeatability). Vertical (draft) data shall have an accuracy of plus/minus 0.1 foot. Horizontal location and vertical data shall be collected in sets and each data set shall be referenced in real-time to date and local time (to nearest minute) and shall be referenced to the same state plane coordinate system used for the survey(s) shown in the contract plans. The ETS shall be calibrated, as required, in the presence of the Contracting Officer at the work location before disposal operations have started, and at 30-day intervals while work is in progress. The Contracting Officer shall have access to the ETS to observe its operation. Disposal operations will not commence until the ETS to be used by the Contractor is certified by the Contracting Officer to be operational and within acceptable accuracy. It is the Contractor's responsibility to select a system that will operate properly at the work location. The complete system shall be subject to the Contracting Officer's approval.

3.3.6.2 ETS Data Requirements and Submissions

a. The ETS for each disposal vessel shall be in operation for all dredging and disposal activities and shall record the full round trip for each loading and disposal cycle. (NOTE: A dredging and disposal cycle constitutes the time from commencement of dredging to complete discharge of the material.) The Contracting Officer shall be notified immediately in the event of ETS failure and all dredging operations for the vessel shall cease until the ETS is fully operational. Any delays resulting from ETS failure shall be at the Contractor's expense.

b. All data shall be collected and stored on CD-ROM(s) in ASCII format and shall be readable by MS Windows compatible software. Each dredging and disposal cycle shall be a separate and distinct ASCII file, labeled by the trip number. More than one file may be stored on the disc(s) or CD-ROM(s).

c. Data shall be collected at least every 0.25 nautical mile or every 4 minutes during travel to and from the ODMDS and twelve seconds or every 30 feet of travel, while the hull status is open within the ODMDS.

d. In addition to the continuous tracking data, the following trip information shall be electronically recorded for each disposal cycle:

1. Load Number
2. Disposal Vessel Name and Type
3. Estimated Volume of Load
4. Description of Material Disposed
5. Source of Dredged Material
6. Date, Times, and Location at Initiation and Completion of Disposal Event

e. Plot Reporting (2 types):

1. Tracking Plot - For each disposal event, data collected while the disposal vessel is in the vicinity of the disposal area shall be plotted in chart form, in 200-foot intervals, to show the track and draft of the disposal vessel approaching and traversing the disposal area. The plot shall identify the exact position at which the dump commenced.
2. Scatter Plot - Following completion of all disposal events, a single and separate plot will be prepared to show the exact disposal locations of all dumps. Every plotted location shall coincide with the beginning of the respective dump. Each dump shall be labeled with the corresponding Trip Number and shall be at a small but readable scale.
3. Summary Table – A spreadsheet which contains all of the information in the log(s) above shall be prepared and shall correspond to the exact dump locations represented on the Scatter Plot.

f. ETS data and log data required shall be provided to EPA Region 4 on a weekly or more frequent basis. Data shall be submitted to EPA Region 4 as an eXtensible ?? Markup Language (XML) document via Internet e-mail to DisposalData.R4@epa.gov. XML data file format specifications are available from EPA Region 4. All digital ETS data shall be furnished to the Contracting Officer within 24 hours of collection. The digital plot files should be in an easily readable format such as Adobe Acrobat PDF file, Microstation DGN file, JPEG, BMP, TIFF, or similar. The hard copy of the ETS data and tracking plots shall be both maintained onboard the vessel and submitted to the Contracting Officer on a weekly basis.

[FOR DQM PROJECTS]

See: http://dqm.usace.army.mil/Specifications/Index.aspx

For scows, the monitoring profile, TDS profile or Ullage profile shall be used.

1. NATIONAL DREDGING QUALITY MANAGEMENT PROGRAM SYSTEM (HOPPER DREDGES AND SCOWS)

   National Dredging Quality Management Program (NDQMP) System certification is required prior to award. See provision NATIONAL DREDGING QUALITY MANAGEMENT PROGRAM SYSTEM -- HOPPER DREDGES -- SPECIAL STANDARD OF RESPONSIBILITY of Section 00100 INSTRUCTIONS TO
   OFFERORS in Volume 1.

2. System Requirements

   See Section 35 20 24 NATIONAL DREDGING QUALITY MANAGEMENT PROGRAM SCOW - MONITORING PROFILE and Section 35 20 26 NATIONAL DREDGING QUALITY MANAGEMENT PROGRAM HOPPER DREDGE. However,
   in the event of NDQMP System failure (not fully operational), the Contractor shall notify the Contracting Officer and continue tracking using ETS (see paragraph "Electronic Tracking System (ETS) for Ocean Disposal Vessels" below) for up to 48 hours until the NDQMP System is fully operational and in use. If, upon NDQMP System failure, the Contractor cannot use ETS or cannot use the NDQMP System within 48 hours of failure, all dredging operations for the vessel shall cease until the NDQMP System is fully operational. Any delays resulting from failure of the Contractor's DQM hardware or software shall be at the Contractor's expense.

   All digital ETS data shall be furnished to the Contracting Officer within 24 hours of collection. The digital plot files should be in an easily readable format such as Adobe Acrobat PDF file, Microstation DGN file, JPEG, BMP, TIFF, or similar. The hard copy of the ETS data and tracking plots shall be both maintained onboard the vessel and submitted to the Contracting Officer on a weekly basis.