GULFPORT HARBOR, GULFPORT, MISSISSIPPI



APPENDIX A1 - BENEFICIAL USE OF DREDGE MATERIAL AND DREDGED MATERIAL MANAGEMENT PLANS

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BUDM	Beneficial Use of Dredge Material
CE	Cost Effectiveness
CWA	Clean Water Act
CY	Cubic Yards
DA	Disposal Area
DMMPs	Dredged Material Management Plans
EPA	Environmental Protection Agency
ER	Engineer Regulation
FNC	Federal Navigation Channel
GIWW	Gulf Intracoastal Waterway
ICA	Incremental Cost Analysis
MCY	Million Cubic Yards
MDEQ	Mississippi Department of Environmental Quality
MDMR	Mississippi Department of Marine Resources
MPRSA	Marine Protection, Research, and Sanctuaries Act
MSPA	Mississippi State Port Authority
NEPA	National Environmental Policy Act
NFS	Non-federal Sponsor
NNBF	Natural and Nature-based Features
NOAA	National Oceanic and Atmospheric Administration
ODMDS	Ocean Dredged Material Disposal Site
O&M	Operations and Maintenance
TEU	Twenty Equivalent Units
TSP	Tentatively Selected Plan
U.S.	U.S. Highway
USACE	United States Army Corps of Engineers
USCG	U.S. Coast Guard
WRDAs	Water Resources Development Acts

Abbreviations and Acronyms

SECTION 1.0 INTRODUCTION

In accordance with Engineer Regulation (ER) 1105-2-100, dredged material management planning for all federal harbor projects is conducted by the United States Army Corps of Engineers (USACE) to ensure that maintenance dredging activities are performed in an environmentally acceptable manner, use sound engineering techniques, are economically warranted, and that sufficient confined disposal facilities are available for at least the next 20 years. These plans address dredging needs, disposal capabilities, capacities of dredge material placement areas (DMPA), environmental compliance requirements, potential for beneficial usage of dredged material, and indicators of continued economic justification. The Dredged Material Management Plans (DMMPs) shall be updated periodically to identify any potentially changed conditions.

Appendix E of ER 1105-2-100 pertains to this study and states, feasibility reports recommending Congressional authorization of new navigation projects or modifications of existing projects shall include a plan for management of dredged material associated with the construction and maintenance of the new project or project modification, consistent with the requirements for DMMPs for existing projects. This plan shall satisfy all identified dredged material management requirements associated with the project, to include construction dredging, projected maintenance dredging for the established project economic life, and other dredged material disposal requirements (for example dredging of berthing areas) needed to realize project benefits.

This appendix satisfies as the DMMP for the existing Gulfport Harbor project for the next 20 years. It also documents the availability of sufficient capacity for the construction of the Tentatively Selected Plan (TSP) and the additional shoaling material resulting from the deepening.

1.1. Federal Standard

The federal standard is defined in USACE regulations, 33 C.F.R. §335.7, as the least cost dredged material placement alternative (or alternatives) identified by the USACE that is consistent with sound engineering practices and meets all federal environmental requirements, including those established under the Clean Water Act (CWA; 33 U.S.C. § 1251 et seq.) and the Marine Protection, Research, and Sanctuaries Act (MPRSA) ((16 U.S.C. §§ 1431-1445, 1447-1447f and 33 U.S.C. §§ 1401-1445, 2801-2805)). The term "base plan" is an operational description of the federal standard that defines the placement costs assigned to the "navigational purpose" of the project. The costs assigned to the navigational purpose of the project are shared with the non-federal sponsor (NFS) of the project (USEPA, 2007).

1.2. Beneficial Use of Dredge Material (BUDM) Authorities

The federal government has placed considerable emphasis on the desirability of using dredged material in a beneficial manner, particularly with regard to improved environmental quality. Statutes such as the Water Resources Development Acts (WRDAs) of 1992, 1996, 2000, 2007, and 2020 demonstrate that beneficial use has been a Congressional priority. The USACE has emphasized the use of dredged material for beneficial use through regulations such as 33 C.F.R. Part 335, ER 1105-2-100, and ER 1130-2-520. Policy Guidance Letter No 56. ER 1105-2-100, p. E-72 states, each Management Plan study shall include an assessment of potential beneficial uses of dredged material, for meeting both navigation and non-navigation objectives. Where a beneficial use is part of the Base Plan, it shall be treated as a general navigation O&M component. Section 204 of the WRDA of 1992 (Public Law 102-580) provides programmatic authority for the selection of a placement method that provides beneficial use when it is not the least-cost method of placement. In this situation, the incremental cost of the placement could be provided by a NFS or cost-shared with a NFS pursuant to Section 204 and/or other applicable authorities. Section 207 of WRDA 1996 (Public Law 104-303) modifies Section 204 of WRDA 1992 to add a subsection (e) as follows: in developing and carrying out a project for navigation involving the disposal of dredged material, the Secretary may select, with the consent of the non-Federal interest, a disposal method that is not the least-cost option if the Secretary determines that the incremental costs of such disposal method are reasonable in relation to the environmental benefits.

The federal share of such incremental costs shall be determined in accordance with subsection (c) of WRDA 1992. According to subsection (c), the non-federal interest would pay 25 percent of the costs associated with construction of the project for the protection, restoration, and creation of aquatic and ecologically related habitats, including provision of all lands, easements, rights-of-way, and necessary relocations; and pay 100 percent of the operation, maintenance, replacement, and rehabilitation costs associated with the project. Section 2037 of WRDA 2007 amends Section 204 of WRDA 1992 (33 U.S.C. 2326) to increase the non-federal cost share to 35 percent. Section 125(a)(2)(C) of WRDA of 2020 amends Section 204(d) of WRDA 1992 (33 U.S.C. 2326(d)) to authorize the Secretary to use funds appropriated for construction or O&M of a project involving the disposal of dredged material when selecting a disposal method that is not the least cost option based on a determination that the incremental costs of the disposal method are reasonable in relation to the environmental benefits or the hurricane and storm or flood risk reduction benefits.

The Command Philosophy Notice established on 25 January 2023 outlined a vision to beneficially use 70 percent of USACE dredged materials by 2030.

Beneficial use of dredge material can provide additional benefits not accounted for in the NED plan. In addition to being the least cost placement option, inclusion of beneficial use sites into the TSP increases project benefits. Beneficial use of dredge material for marsh creation can support biodiversity by creating new habitat for breeding, nesting, and foraging areas for fish, crustaceans, waterfowl, and shorebirds. This may result in additional tourism and recreation as the Mississippi Gulf Coast is a tourist destination for bird observing. Marsh creation also assists in reducing the atmospheric carbon dioxide since marches store carbon in sediments and plant biomass.

1.3. Project Information

The Port of Gulfport (Port) is a coastal port located in Harrison County, Mississippi. The existing channel transects the Mississippi Sound connecting the Port to the Gulf of Mexico. The Port encompasses approximately 300 acres and is located on the north shore of the Mississippi Sound within 5 miles of the Gulf Intracoastal Waterway (GIWW) and 10 miles from the Gulf of Mexico and Gulf Island National Seashore. The Port is strategically located and serves as a national leader in waterborne commerce which is an economic driver for the Mississippi Gulf Coast.



Figure 1-1. Gulfport Harbor Existing and Authorized Channel Dimensions

The Port is constructed on fill over former open-water bottom areas in the Mississippi Sound and includes the East Pier, North Harbor, West Pier, and Commercial Small Craft Harbor. Access to the Port is via the federal navigation channel (FNC) and a commercial small craft channel (8 feet deep). Located to the east of the Port are the Gulfport Small Craft Harbor, Gulfport Yacht Club, Harbor Square Park, and U.S. Coast Guard (USCG) Station Gulfport. Public beaches are located to the east and west of, and adjacent to, the Port. Its northern boundary is U.S. Highway (US) 90.

The FNC shown in Figure 1-1 is 300 feet wide in the inner channel (Sound Channel) and maintained to a depth of 36 feet within Mississippi Sound. The outer channel (Bar Channel) from Ship Island south to the safety fairway is 400 feet wide with a depth of 38 feet. The Port's North Harbor (Inner Harbor) is maintained to a depth of 32 feet, while the South Harbor (Outer Harbor) and Gulfport Anchorage Basin, which are approximately 1,320 feet wide, are maintained to a depth of 36 feet (USACE, 2009a). The depths provided do not include 2 feet of allowable overdepth and 2 feet of advance maintenance. The FNC is constructed to the authorized dimensions. Table 1-1 shows authorized dredge maintenance depths for the existing channel.

	Sound Channel (10.38 miles)		Bar Channel (10.22 miles)	
Authorization	Depth (ft)	Width (ft)	Depth (ft)	Width (ft)
RHA 1948	30	220	32	300
WRDA 1986 (mod. 1988)	36	300	38	400

Table 1-1. Gulfport Harbor authorized dimensions

1.4. Project Authority

The Gulfport Harbor, Gulfport, Mississippi Integrated Feasibility Report with Environmental Assessment (Study) is authorized by Section 216 of the Flood Control Act of 1970 (33 U.S.C 549a) which reads, "The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operations of projects the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest."

The Port of Gulfport is currently expanding its container terminal, which is expected to result in increased container throughput and larger container vessels utilizing the Port. As

larger vessels are being built and deployed to the U.S. East Coast, more of the 7,000-12,000 twenty equivalent units (TEU) ships are available to be utilized along the Gulf Coast but require deeper channels. Further, the Port was rebuilt following damages from Hurricane Katrina. The Section 216 Authority is met by the Study due to these changes in economic and physical conditions.

1.5. Background

A DMMP has not been prepared for the Gulfport Harbor Federal Navigation Project. The Gulfport Harbor Federal project has adequate dredge material placement capacity to maintain the channels to the current authorized dimensions for the 20-year planning horizon. This DMMP is being prepared to fulfill the requirement to provide a 5-year dredge material management plan for this federal navigation channel in accordance with Section 125(c) of the WRDA of 2020. Economic indicators documenting the channel being maintained as authorized are further described in the Appendix B- Economics.

1.6. Maintenance Dredging History (With-out Project Conditions)

A summary of the dredge history for the Gulfport Harbor Channel is provided in Table 1-2 below and the cumulative maintenance dredge volumes are displayed in Figure 1-2. Dredging history was taken from Byrnes, et. al (2012) "Littoral Sediment Budget for the Mississippi Sound Barrier Islands," Rosati, et. al (2009) "Mississippi Coastal Improvement Project Study, Regional Sediment Budget for Mississippi Mainland and Barrier Island Coasts," and updated with USACE, Mobile District dredging records to 2023. No dredging has occurred on the channel since that time (i.e., 2023).

Figure 1-2 shows cumulative maintenance dredge volumes and varying dredge rates through time, with rates averaging approximately 235,000 cy/yr in the Anchorage Basin, 2.8 mcy per year in the Sound Channel, and 1 mcy per year in the Bar Channel since the most recent expansion in 1993.

(1909-2023)				
Dates	Dredging (CY)	Dredging Rate (CY/yr)		
1910-1919	893,851	99,317		
1920-1929	598,738	66,526		
1930-1939	299,280	33,253		
1940-1949	279,715	31,079		
1950-1959	1,418,373	157,597		

32,706,127

Table 1-2: Summary of Maintenance Dredging History for the Gulfport Channel

1960-1969

3,634,014

1970-1979	17,929,944	1,992,216
1980-1989	39,153,261	4,350,362
1990-1999	25,659,156	2,851,017
2000-2009	34,770,192	3,863,355
2010-2019	23,826,977	2,647,442
2020-2023	16,145,295	5,381,765
1909-2023	193,680,909	1,698,955
1994-2023	94,009,853	3,241,719

Source: Modified from Rosati et al., 2009, Byrnes et al., 2012, and USACE Dredging Records. Bold dates are decades where expansion was completed.



Gulfport Harbor Channel Cummulative Maintenance Dredging Records (Millions of Cubic Yards)

Figure 1-2: Gulfport Harbor Channel Cumulative Maintenance Dredged Volumes (1909 – 2023)

Source: Modified from Rosati et al, 2009, Byrnes et al., 2012, and USACE Dredging Records

In addition to analyzing the recorded dredge history for the channels, the USACE Corps Shoaling Analysis Tool (CSAT) was used to calculate the channel's subreaches existing shoaling rates using historical channel surveys. The existing annual maintenance dredging of the Anchorage Basin, Sound Channel, and Bar Channel totals to approximately 244,300 cy, 2.0 mcy, and 506,715 cy, respectively. The annualized shoaling volumes calculated by CSAT and from the dredge history differ because it cannot be confirmed that the dredging history is complete nor counting for an event more than once. Because of this, the CSAT shoaling volumes were used to predict the potential shoaling volumes for the TSP.

1.7. Maintenance Dredging Projection (With Project Conditions)

The existing shoaling volumes calculated from the CSAT rates were used to predict the with-project O&M quantities. Two methods for determining the quantity of future, with-project dredging sediments were considered: the perimeter method and the cross-section area method. These methods assume that, over time, the average annual increase in dredging is directly proportional to the increased channel perimeter or cross section area (Trawle, M.J., 1981).

In recognition that sedimentation processes can be exceedingly complex and potentially influenced by a number of factors, the use of area and perimeter methods are not recommended by some authors (e.g., Trawle, M.J., 1981) but, lacking other methods, they are widely used in practice to generate preliminary with-project dredging estimates. Some shortcomings of these methods may be overcome by sub-dividing the channel to physically and geometrically similar sections, applying the equations to each, weighting the results by reach length, and summing the results, as was done here.

Given historic average annual dredging quantities detailed in Section 1.5, the 'modified' perimeter and cross-section methods were used to predict future maintenance requirements. Results are shown in Table 1-3 and agree reasonably well with what has been seen in history with previous expansion projects. The USACE Final EIS for the *Proposed Port of Gulfport Expansion Project Gulfport, Harrison County, Mississippi* (Atkins, 2017) reported an estimated maintenance volume of 7.7 mcy/yr for the same proposed project and is comparable to the estimation given below of 6.9 mcy/yr for the

TSP. The dredge type and historical cost for work performed using rental contracts are also included in Table 1-3.

Table 1-5. Estimated Future Maintenance Dreuging					
Channel Segment	Existing O&M Quantity (cy/yr)	Future O&M Quantity (cy/yr)	Dredge Type	Historical Average Cost Rental Contract (price per cy)	
Anchorage Basin	244,300	276,725	Cutterhead Hydraulic Pipeline	\$3.52	
Sound Channel	1,955,415	5,088,900	Cutterhead Hydraulic Pipeline	\$2.98	
Bar Channel	506,715	1,562,665	Hopper	\$3.84	
Total O&M Quantities	2,706,430	6,928,290			

Table 1-3: Estimated Future Maintenance Dredging

1.8. Current Federal Standard for Operations and Maintenance (O&M)

As mentioned in Section 1.1 above, the federal standard is defined in USACE regulations as the least cost dredged material disposal or placement alternative (or alternatives) identified by USACE that is consistent with sound engineering practices and meets all federal environmental requirements. The federal standard for O&M dredging is defined in the paragraph below.

The federal standard for O&M material is to place material in open water placement sites adjacent to the federal navigation channel within the Mississippi Sound. These sites are shown on Figure 1-2 below as DA No. 1-10. Sands from the bar channel is placed in the Littoral Dredge Material Placement Area west of the navigation channel. O&M material for the bar channel can also be placed in the Ocean Dredged Material Disposal Sites (ODMDS) adjacent to the bar channel. The ODMDS sites are shown on Figure 1-2 below as Gulfport Environmental Protection Agency (EPA) East and EPA West. According to historical dredging records over the last 10 years, the average annual dredging cost is approximately \$6.7M. Cumulative maintenance dredge volumes and dredge rates vary through time, with rates averaging approximately 235,000 cy per year in the Anchorage Basin, 2.8 mcy per year in the Sound Channel, and 1 mcy per year in the Bar Channel since the most recent expansion in 1993.



Figure 1-3 Existing Dredged Material Placement Areas for O&M Material

SECTION 2.0 Considerations for Tentatively Selected Plan

The TSP for the Gulfport Harbor FNC is Alternative 14. The TSP dimensions are shown in Table 2-1 and Figure 2-1 below. When evaluating placement sites for new work and O&M material, there are multiple factors to consider including volume of material to be placed, sediment characteristics, placement area requirements, and sea level rise at placement areas. Each of these factors are considered in detail below.

Table 2-1. Tentatively Selected Flan Dimensions						
Tentatively	Anchorage Basin		rage Basin Sound Channel (10.38 miles)		Bar Channel (20.44 miles)	
Selected Plan	Depth (FT)	Width (FT)	Depth (FT)	Width (FT)	Depth (FT)	Width (FT)
Alternative 14	32 to 46	varies	46	400	48	500

Table 2-1. Tentatively Selected Plan Dimensions

2.1. Proposed Federal Project Volume Estimates

New work and O&M quantities for the TSP were computed for estimating dredged material placement needs. Approximately 38,041,381 cubic yards (CY)of "new work" material will need to be dredged to construct the TSP for the Gulfport Harbor FNC. A breakdown of new work quantities by channel segment are provided in Table 2-2. The O&M quantities were also evaluated during the Study. The maintenance dredging volumes are anticipated to increase by approximately 256% post-implementation. For reference of scale, approximately 2.7 MCY of sediment are currently dredged annually as part of the routine maintenance of the project. With the TSP implemented, it is anticipated that approximately 6.9 MCY of sediment will be dredged annually as part of the routine maintenance of the project. The details of dredged material placement options for the new work construction and future maintenance operations are provided in the following paragraphs.

Channel Segment	Quantity (CY) ¹				
Anchorage Basin (9+20 to 50+75)	1,650,015				
Sound Channel (50+75 to 612+00)	16,157,493				
Bar Channel (612+00 to 1691+23.64)	20,233,873				
Total New Work Volumes38,041,381					
Note: 1) Quantities include the proposed depths plus 2' advanced maintenance and 2' allowable overdepth.					

Table 2-2. TSP New Work Material Quantities



Figure 2-1. Overview of the Tentatively Selected Plan (Elevations referenced in MLLW).

2.2. Sediment Characteristics for Placement

Sediment characteristics are an important consideration in the evaluation of the placement sites for each channel segment. No additional geotechnical information was collected during the study phase of this project. Historical geotechnical data was utilized to characterize sediment to be dredged. Table 2-3 below provides an overview of material characteristics by channel stationing. The characterization was leveraged to develop a strategy for determining sediment suitability for each of the placement sites. While this strategy was primarily developed for the construction material dredged as part of the TSP, the assumptions are also applicable for the placement of O&M material. The general sediment characteristics associated with each beneficial use opportunity are provided in the following sections of this appendix. Refer to Appendix A, Engineering, for additional information on sediment characteristics throughout the Gulfport Harbor federal navigation channel.

Channel Reach	Material Type	Estimated Available Volume
Anchorage Basin	50% fine grained and 50% sand	2.0 MCY
Station 100+00 to 225+00	50% fine grained and 50% sand	5.1 MCY
Station 225+00 to 500+00	10% fine grained and 90% sand	9.6 MCY
Station 500+00 to 700+00	40% fined grained and 60% sand	8.0 MCY
Station 700+00 to 1100+00	50% fine grained and 50% sand	13.8 MCY

Table 2-3 Material Characteristics by Channel Stationing



Figure 2-2 Material Characteristics by Channel Stationing Overview

2.3. Dredge Material Placement Areas

Dredged material placement sites considered for the Gulfport Harbor Study include both traditional ODMDS and beneficial use placement sites. The Pascagoula ODMDS was the

initial site considered for material placement. Several beneficial use options were also identified including La France Canal, Pelican Key, Cat Island North, Cat Island South, Mississippi State Port Authority (MSPA) Pier Expansion, Biloxi Marsh, and Chandeleur Islands which are shown in Figure 2-2. Each placement site identified is described and analyzed in the following sections.



Figure 2-3. Gulfport Harbor potential placement sites.

2.4. Potential Placement Site Volumes and Capacities

Table 2-4 provides an overview of the approximate capacities of the dredged material placement sites, material characterization requirements, and placement area size in acres. These volumes are estimates and will need to be finalized once sites have been permitted to receive material. Each potential placement site is further described in the following sections.

		Material	Placement	
Placement Site	Approximate Capacity	Requirement	Area (acres)	
Pascagoula ODMDS*	3.0-8.0 MCY per year	N/A	11,520	
La France Canal [^]	300,000 – 400,000 CY	Mixed	TBD	
Pelican Key [^]	13.4 MCY	Mixed	900	
Cat Island North* [^]	26.0 MCY	Mixed	1,060	
Cat Island South [^]	12.0 – 18.0 MCY	Sand	410	
MSPA Pier Expansion [^]	10.0 MCY	Sand	178	
Biloxi Marsh ^{^(LA)}	9.0 MCY	Mixed	815	
Chandeleur Island ^{^(LA)} 3.9 MCY Sand 5,400				
*Placement site was included in the current cost estimate as the Federal Standard Base plan. ^ Placement site is considered beneficial use of dredged materials (BUDM).				

Table 2-4. Overview of Placement Site Characteristics.

2.5. Sea Level Change and Future Placement Areas

The projection for sea level change in the Mississippi Sound is predicated to rise more than seven (7) feet over the next 100 years (USACE, 2022). Many shorelines around the Mississippi Sound area currently experience erosion and continued sea level rise would exacerbate this issue. The State of Mississippi has prioritized beneficial use of dredged material projects to create nature-based solutions (NBS) to protect shorelines and to combat sea level rise. Some potential examples of NBS that may be appropriate for the Mississippi Sound area include island restoration, living shoreline beaches, dunes, and marshes. The USACE maintains a collaborative relationship with Mississippi Department of Environmental Quality (MDEQ) and Mississippi Department of Marine Resources (MDMR) to identify beneficial use opportunities utilizing material for the federal navigation channels that align with the collective mission and needs. Initiatives currently being considered include submerged breakwaters, living shorelines, and marsh restoration features. Additional National Environmental Policy Act (NEPA) documentation would be required if any beneficial use placement sites other than those included in the TSP were considered to receive material from the federal navigation channel in the future.

SECTION 3.0 DESCRIPTION AND EVALUATION OF PLACEMENT SITES

3.1. General

The Pascagoula ODMDS and the Cat Island North beneficial use site are the only placement areas considered the federal standard for new work dredging material in the TSP. Open water placement was considered for the O&M dredging material in the TSP. The assumed placement locations of new work dredged material represent the least costly placement alternative that is consistent with sound engineering practices and meets all federal environmental requirements (i.e., the Federal Standard). Any additional beneficial uses of dredged material would be implemented at the option of the USACE, and any associated cost differences would likely be paid by a NFS requesting the use of the material.

The capacities of the federal standard placement sites for dredged O&M material as part of the future project, open water placement sites DA No. 1-10 and Pascagoula ODMDS, were evaluated to ensure adequate placement site capacity for the anticipated dredged material from Gulfport Harbor. The USACE policy requires that navigation projects maintain 20 years of capacity for maintenance dredged materials. This period of analysis will begin in 2026 and end in 2046. In addition, 50 years of capacity for the TSP induced maintenance material resulting from navigation improvements is required. This period of analysis starts in 2035 and ends in 2084. Construction of the TSP is anticipated to start in 2029 and end in 2033. The available capacity in Pascagoula ODMDS is adequate for the period of analysis.

3.2. Beneficial Use Basis of Evaluation

The Federal Government has placed considerable emphasis on using dredged material in a beneficial manner. Several placement areas were considered and discussed in more detail in Section 3.3 through 3.12 below. Seven (7) possible beneficial placement areas include: LaFrance Canal, Pelican Key, Cat Island North, Cat Island South, MSPA Pier Expansion, Biloxi Marsh, and Chandeleur Island Littoral Zone. Existing information was leveraged for the basis of evaluation of all beneficial use placement sites. Placement sites chosen to be included into the TSP will be further analyzed to develop a preliminary design prior to ADM. The sections below describe each beneficial use site, associated real estate action, permit, and the source providing the basis of design, capacity, and cost. Although recognized as possible beneficial placement areas, only one of the beneficial use sites was considered in the TSP cost assumptions due to the requirement to use the least cost placement area. The costs are approximations and depend on designs, equipment selection, and material type and quantity. As beneficial use designs are refined and assumptions are modified, the costs may differ from the costs reported.

The site included in the Tentatively Selected Plan will be updated to a preliminary design prior to ADM.

3.3. Pascagoula Ocean Dredge Material Disposal Site (ODMDS) (Federal Standard for Bar Channel)

The Pascagoula ODMDS is located within the area surrounded by Horn Island to the north, the Pascagoula entrance channel to the east, the navigation safety fairway to the south and a north-south line running through Dog Key Pass to the west. The existing ODMDS was selected by the USACE, Mobile District, under Section 102 of the MPRSA. The site encompasses approximately 18.5 square nautical miles (15,680 acres) with water depths varying from 30 to 52 feet. Due to the large size of the site, the site can receive 3-5 MCY annually over the next 10 years without capacity concerns. If the placement volume exceeds projections by more than 25%, capacity will need to be considered (USACE, 2016). The Pascagoula ODMDS site is located approximately 12 miles east of the federal navigation channel. The material will be bottom dumped in this location which is the least-cost option for the new work material from the bar channel and bar channel extension. This site will also be permitted for future O&M material placement. The material to be placed within the site consists of mixtures of silts, clays, and sands in varying percentages. USACE will be responsible for all permitting and coordination for use of this site. No real estate actions are required.

3.4. Open Water Placement (Federal Standard for O&M Material)

A portion of the material dredged as part of the routine maintenance of the Sound Channel (primarily fine-grained sediments) is currently placed in the open water placement areas DA No. 1-10 adjacent to the channel, as shown in Figure 1-2. Sand from the bar channel is placed in the Littoral Dredge Material Placement Area west of the navigation channel. O&M material for the bar channel can also be placed in the ODMDS sites adjacent to the bar channel can also be placed in the ODMDS sites adjacent to the bar channel. The ODMDS sites are shown on Figure 1-2 below as Gulfport EPA East and Gulfport EPA West. National Oceanic and Atmospheric Administration (NOAA) nautical charts were reviewed for the open water placement sites. Based on the size, maintenance material characteristics and sediment transport within the Mississippi Sound capacity is not a concern for the next 20 years. USACE currently utilized these sites, and no additional real estate or environmental coordination is needed at this time.

Variations to the open water placement for new work material was also considered as an alternative, specifically for the Littoral Dredge Material Placement Area. The two alternatives for new work material placement included 1) open water placement similar to the current O&M placement practices and 2) island creation within Littoral Dredge Material Placement Area. The island creation alternative was identified to provide potential tidal marsh habitat. Placement of new work material within any open water sites

would have to be permitted by USACE if either of these alternatives were selected during PED. Placement in the open water sites would require USACE to lead the design and permitting efforts for these options. Real Estate coordination with the NPS and/or the State of Mississippi may also be required.

3.5. Direct Placement on Barrier Islands

Various alternatives for direct placement of sand on the barrier islands adjacent to the channel was considered. Historically, sand from the FNC has been placed directly on Cat Island to nourish the barrier island. The previous placement provided 2 MCY of material along the eastern shoreline of the island. Sand from the FNC was also placed on the northwest tip of Ship Island to protect Fort Massachusetts. The previous efforts were authorized by the MsCIP barrier Island restoration efforts and any placement will be consistent with and coordinated with the MsCIP Monitoring and Adaptive Management Plan. Placement of sand on Ship Island would require close coordination with the National Park Service. USACE will be responsible for all permitting and coordination for use of this site including estate actions required. If allowed, approximately 500,000 CY of sand could be used in this placement site. The placement quantity was estimated based on the latest aerial imagery and available topographic surveys of this area.

3.6. La France Canal

The LaFrance Canal project located in Bay St. Louis, Mississippi was endorsed by MDEQ and the City of Bay St. Louis as a potential Section 204 Beneficial Use project. The site is a manmade canal through the largest contiguous marsh complex in Mississippi, bisecting the Hancock County Coastal Preserve. Coastal marshes are vital to ecological integrity and ecosystem health within the coastal ecosystem. Continuity of such marshes provide storm surge protection, fisheries production, water quality enhancement through sediment and nutrient reduction, carbon sequestration, and habitat for multiple trophic levels within the coastal ecosystem. The LaFrance Canal project would provide significant benefit to the marsh system by limiting its fragmentation and associated impacts including erosion and scouring from tropical storms flood events and provide crucial habitat for an array of species. It is anticipated that this site could accept a single placement of approximately 300,000 – 400,000 CY of dredge material. No sediment characterization requirements have been identified at this time. USACE will be responsible for all permitting and coordination for use of this site including estate actions required. All information for this site was leveraged from a Study Initiation Report date 12 August 2024 provided in Attachment 1.

3.7. Pelican Key

Pelican Key is a 900-acre beneficial use site identified during a study to determine viable beneficial use options in the Western Mississippi Sound for MDEQ. MDMR chose the site at Pelican Key to create approximately 820 acres of marsh habitat with an additional 80 acres of containment berms. This site is a remnant island located approximately 5.5 miles to the west of the western tip of Cat Island and approximately 7 miles to the south of Pass Christian, Mississippi. Construction of this site would create productive marsh habitat for various species of birds, fish, crustaceans, and other invertebrates. It is anticipated that this site could accept a single placement of approximately 13,400,000 CY of dredge material. Additional placement events could occur to accept O&M dredge material depending on the amount of settlement that occurs overtime within the containment area. No sediment characterization requirements have been identified at this time. The preliminary design includes containment berms with a sediment core armored with stone which is typically allows for a mixture of both fine- and coarse-grained sediment. A DA permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344) for this site was obtained by MDMR on 09 September 2023 under permit number SAM-2022-00145-KMN (included in Attachment 1). All information regarding this site was leveraged from a Public Notice date 01 September 2022 provided in Attachment 1. The NFS does not have funding available to construct the containment for this site.

3.8. Cat Island North (Federal Standard Anchorage Basin and Sound Channel)

Cat Island North is a 1,060-acre beneficial use site identified during a study to determine viable beneficial use options in the Western Mississippi Sound for MDEQ. (MDEQ, 2018) The site is located approximately 3,000 feet north of Cat Island and 11,500 feet from the GIWW centerline. Water depths in the area vary from 6 to 14 feet. The Cat Island North beneficial use site has the potential to create approximately 1,060 acres of marsh habitat. Construction of this site would create productive marsh habitat for various species of birds, fish, crustaceans, and other invertebrates. It is anticipated that this site could accept a single placement of approximately 26,000,000 CY of dredge material. Additional placement events could occur to accept O&M dredge material depending on the amount of settlement that occurs overtime within the containment area, site would be contained on the northern-facing side by 18,000 linear feet sand containment with rip rap protection and the remainder of the 19,000 linear feet of berms would be traditional sand containment berms. No sediment characterization requirements have been identified at this time. The preliminary design includes containment berms with a sediment core armored with stone which is typically allows for a mixture of both fine- and coarse-grained sediment. All information regarding this site was leveraged from a Reconnaissance Study and Decision Matrix for Western Mississippi Sound dated December 2018 prepared by

Anchor QEA for the MDEQ. A preliminary design for this site will be developed prior to ADM as this site was identified as the least cost option for placement of material from the Anchorage Basin as well as the Sound Channel. Placement in this site would require USACE to lead the design, environmental permitting, and real estate efforts for this site.

3.9. Cat Island South

The Cat Island South beneficial use project is intended to restore and create sand dune and marsh habitat on the southern and eastern shores of Cat Island while providing beneficial use of dredge material for future dredging events. The site would be located within the Mississippi Sound at the southeast end of Cat Island and approximately 9 miles southeast of Pass Christian, Mississippi. The proposed restoration project ties into the previous USACE restoration project constructed in 2017. The proposed 660-acre project site would be created in two phases. The Phase 1 footprint is approximately 250 acres to include approximately 91 acres of berm, 173 acres of dune, and 42 acres of marsh. Approximately 4.2 to 6.7 MCY of material would be required for construction of the proposed 12,700 linear foot sand berm and dunes. The interior containment area would be able to hold approximately 575,000 to 750,000 CY of dredged material. The Phase 2 footprint would add approximately 410 acres to include approximately 71 acres of berm, 149 acres of dune, and 168 acres of marsh. Approximately 4.3 to 6.4 MCY of material would be required for construction of the proposed 12,300 linear foot sand berm and dunes. The interior containment area would be able to hold approximately 3.3 to 4.2 MCY of dredged material. The estimated total volume of material would range from 8.5 to 13.1MCY. At this time, it is understood that coarse grained sediment (predominantly sands) is required for this placement area. MDMR received a DA permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344) under permit number SAM-2022-00356-KMN. All information regarding this site was leveraged from a Public Notice date 06 March 2023 provided in Attachment 1. The final permit was issued on 03 December 2024 and is provided in Attachment 1. The NFS has funding available to construct the containment for this site; therefore, the containment construction cost would become an associated cost in the TSP.

3.10. MSPA Pier Expansion

The proposed MSPA Expansion Project (project) would result in the expansion of the East Pier (14.5 acres), West Pier (155 acres), North Harbor Fill (9 acres), and Turning Basin (85 acres) areas, and the installation of 4,000 linear feet of breakwater on the eastern side of the FNC. Approximately 10,000,000 CY of material would be required to construct the proposed project. At this time, it is understood that coarse grained sediment (predominantly sands with less than 10% fines) is required for this placement area. A DA

permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344) for this site was obtained by MSPA on 28 November 2017 and extended on 11 May 2022 under permit number SAM-2009-01768-DMY. All information regarding this site was leveraged from a Public Notice date 30 October 2015 provided in Attachment 1.

3.11. Biloxi Marsh

The proposed Biloxi Marsh Complex project was permitted in May 2018 with MDMR as the applicant. The proposed project includes dredged material placement for the restoration of eroded and subsided land in the Biloxi Marsh Complex and to provide protection to existing marsh. Approximately 9,000,000 CY of material will be placed onsite across 815 acres via barge and hydraulic dredge pipeline. No sediment characterization requirements have been identified at this time. The preliminary design includes containment berms which typically allows for a mixture of both fine- and coarse-grained sediment. A DA permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344) for this site was obtained by MDMR on 07 September 2017 under permit number MVN-2015-00886-EPP. All information regarding this site was leveraged from the permit provided in Attachment 1. The NFS does not have funding available to construct the containment for this site.

3.12. Chandeleur Island Littoral Zone

The Chandeleur Island littoral zone placement area is a beneficial use site adjacent to Chandeleur Island, which is part of Breton National Wildlife Refuge managed by the U.S. Fish and Wildlife Service. Placement of material at this site would benefit the island chain by supplementing the littoral system with much needed sediment. Depths of the Chandeleur Island littoral zone placement area vary from 19 to 35 feet. Material would be placed into target water depths of 25 feet or greater, which is the littoral zone east of the Chandeleur Islands in St. Bernard Parish, Louisiana. The placement area is 5,400 acres. No sediment characterization requirements have been identified at this time; however, it is anticipated that predominately sand material will be required for placement to match the island compatibility. The placement capacity is unknown for this site; however, approximately 3.9 MCY of material was previous placed in this site in water depths greater than 25 feet. (USACE, 2017) If this option is pursued further, USACE will be responsible for all environmental permitting, coordination, and real estate actions required to use this site.

3.13. Cost Effectiveness/ Incremental Cost Analysis (CE/ICA) for BUDM

The study team identified the Federal Standard Base Plan (Base Plan), which is the least costly alternative for disposal or placement of excavated land and dredged material,

consistent with sound engineering practices and meeting all federal environmental requirements as described in Section 1.1 above. During the screening process, multiple sites were eliminated from the cost estimating scope as these sites were determined to be significantly higher cost than other potential options considered due distance from the dredging area. An incremental cost will be developed during PED for LaFrance Canal, MSPA Pier Expansion, Biloxi Marsh, and Chandeleur Island as needed. After identifying the Base Plan, the study team assessed all beneficial use opportunities beyond the Base Plan to determine whether there would be appropriate matches of sources and uses of dredged material. To establish that the incremental cost to place materials at a beneficial use site compared to placement at the ODMDS was reasonable, based on the environmental benefits to be achieved, a simple incremental cost analysis was performed. The incremental cost developed includes the cost for design and construction of the beneficial use site. The Cat Island North Beneficial Use site was found to be a least cost option for the Anchorage Basin and Sound Channel material and is included in the Base Plan for this study. The beneficial use site will include the placement of approximately 17.8 mcy of dredged material in the Cat Island North site to provide up to 370 acres of tidal marsh habitat. Additional engineering design and analysis is required to develop a preliminary design the Cat Island North site post-TSP. Other beneficial uses of dredged material may be implemented at a later date at the option of the USACE and any associated cost differences would be paid by a NFS requesting the use of the material. The study team estimated the additional cost above the base plan for placing new work material into other beneficial use site which is summarized below.

Placement Option	Dredge Material Source	Capacity	Potential Habitat (acres)**	Federal Standard Placement Area	Incremental Cost Above Federal Standard
Pascagoula ODMDS	Bar Channel	3.0-8.0 MCY per year	NA	Pascagoula ODMDS	Federal Standard
La France Canal	Sound Channel, Anchorage Basin	300,000 – 400,000 CY	TBD	Cat Island North	*
Pelican Key BU	Anchorage Basin	13.4 MCY	900	Cat Island North	\$5.00/cy
Cat Island North BU	Sound Channel, Anchorage Basin	26 MCY	1,060	Cat Island North	Federal Standard
Cat Island South BU	Sound Channel (Sand)	12 - 18 MCY	410	Cat Island North	\$4.00/cy
MSPA Pier Expansion	Sound Channel (Sand)	10 MCY	NA	Cat Island North	*
Biloxi Marsh	Bar Channel	9.0 MCY	815	Pascagoula ODMDS	*
Chandeleur Island	Bar Channel	TBD (4 MCY)	5,400	Pascagoula ODMDS	*
Littoral Placement	Sound Channel (Sand)	12 MCY	NA	N/A	\$4.00/cy
Littoral Island Creation BU	Sound Channel (Sand)	12 MCY	TBD	N/A	\$0/cy
Cat Island Direct Placement BU	Sound Channel (Sand)	2 MCY	NA	N/A	*
Ship Island Direct Placement BU	Sound Channel (Sand)	500,000 CY	NA	N/A	*

Table 3-1: Placement Area CE/ICA for BU

* Site was screened from the cost estimating scope
** Potential Habitat in acres leveraged from existing documentation.

SECTION 4.0 CONCLUSION

Based on the above analysis and the contents of the Study, continued maintenance of Gulfport Harbor to the authorized depth is warranted on the basis of project usage, sufficient placement area capacity availability, indicators of economic productivity, and maintenance activities in compliance with applicable environmental laws and regulation. Based on the costs of dredging and the benefits derived, the project remains economically justified. There is sufficient capacity at the proposed placement sites for dredged materials from the construction of the TSP. For O&M material, there is sufficient capacity at the sites identified as the federal standard for the next 20 years. The federal standard for the project is summarized in Table 4-1 below. Pursuant to Section 125 of WRDA 2020, if stakeholder engagement identifies an alternative that is equal to or less than the federal standard, or if there is financial support for alternatives above the federal standard that retain capacity or have greater benefit, these beneficial use alternatives can be used for placement of dredged material.

Channel Segment	Quantity (cy) ¹	Federal Standard			
Anchorage Basin (9+20 to 50+75)	1,650,014	Cat Island North			
Sound Channel (50+75 to 612+00)	16,157,493	Cat Island North			
Bar Channel (612+00 to 1691+23.64)	20,233,872	Pascagoula ODMDS			
O&M Material 6.9 MCY/yr Open Water Placement					
Note: 1) Quantities include the proposed depths plus 2' advanced maintenance and 2' allowable overdepth.					

Table 4-1. Federal Standard Summary for TSP and O&M

SECTION 5.0 REFERENCES

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