



**Freeport LNG**

## **Environmental Analysis**

**Permit Modification Application for  
Offshore Disposal of Maintenance Dredged Material**

**SWG-2013-00147**

**Updated May 2020**

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Environmental Analysis

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**OFFSHORE DISPOSAL OF MAINTENANCE DREDGED MATERIAL  
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**ACRONYMS AND ABBREVIATIONS**

Channel Widening Project	Port Freeport Channel Widening Project
Channel Widening FEIS	Final Environmental Impact Statement for the Port Freeport Channel Widening Project
CY	cubic yard
DMPA	dredged material placement area
EFH	essential fish habitat
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FHCIP	Freeport Harbor Channel Improvement Project
FLNG	Freeport LNG
FLNG Facilities	FLNG's natural gas and LNG transport, storage, pretreatment, and liquefaction facilities located between Quintana Island and Stratton Ridge, Texas
Freeport SMMP	Site Management and Monitoring Plan for the Freeport Harbor Maintenance and New Work ODMDS
ft.	feet
GIWW	Gulf Intercostal Waterway
GLO	Texas General Land Office
LEI	Lloyd Engineering, Inc.
LNG	liquefied natural gas
LQF Terminal	Freeport LNG's LNG Terminal on Quintana Island
MLLW	mean lower low water
MPRSA	Marine Protection, Research, and Sanctuaries Act of 1972/ Ocean Dumping Act
NMFS	National Marine Fisheries Service
ODMDS	Ocean Dredged Material Disposal Site
Project	Liquefaction and Phase II Developments
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
SAP	sampling analysis plan
TPWD	Texas Parks and Wildlife Department

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## 1.0 INTRODUCTION

Freeport LNG (FLNG) owns and operates natural gas and liquefied natural gas (LNG) transport, storage, pretreatment, and liquefaction facilities located between Quintana Island and Stratton Ridge, Texas (FLNG Facilities). The Freeport LNG Quintana Island Liquefaction Terminal (LQF Terminal) is located near Freeport, Brazoria County, Texas. The LQF Terminal supports FLNG's LNG facilities, including a marine basin containing two docks where LNG is loaded into vessels for export (FLNG Basin). The FLNG Basin encompasses the Phase II LNG Berthing area (authorized under SWG-2013-00147) and the Phase I LNG Berthing area (authorized under SWG-2003-02110). The authorized depth of the FLNG Basin is 46.5 NAVD88 feet plus 2 feet over dredge. Refer to Appendix A, Figure 1 for a vicinity map and Project location map depicting the FLNG Basin.

Operation of the FLNG Facilities enables FLNG to produce, store, and export LNG derived from domestic sources of natural gas. FLNG's export capabilities at the LQF Terminal help to stimulate the local, regional, and national economies by enabling U.S. natural gas producers to access the global market. In order to fulfill the purpose of the FLNG Facilities, the proposed maintenance dredging activities must occur to ensure the navigational safety for incoming and outgoing LNG vessels within the FLNG Basin.

The U.S. Army Corps of Engineers (USACE), Galveston District issued Permit No. SWG-2013-00147 under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act (Section 404/10) to FLNG for the Liquefaction Project and Phase II Developments (Project) on September 23, 2014. The USACE issued an amendment to Permit No. SWG-2013-00147 on September 9, 2015 adding the Freeport New Work Offshore Dredged Material Disposal Site (ODMDS) as a placement area. Under the original permit and subsequent amendment, 1,188,000 cubic yards (CY) of new work material was dredged from the Phase II LNG Berthing area for placement into the New Work ODMDS.

On February 14, 2018, the USACE issued an amendment to Permit No. SWG-2013-00147 that authorized 3 years of mechanical and/or hydraulic maintenance dredging of the FLNG Basin and transportation of the maintenance dredge material to the Freeport Harbor Maintenance ODMDS. On October 25, 2018, the USACE issued a revised amendment with additional special conditions related to reporting requirements. On July 10, 2019, the USACE issued a second revised amendment allowing the use of hopper dredging in addition to mechanical and/or hydraulic dredging within the FLNG Basin. During the first year's dredging cycle, FLNG utilized mechanical maintenance dredging within the FLNG Basin and placed approximately 1 million cubic yards of maintenance material into the Freeport Maintenance ODMDS. During the second year's dredging cycle, FLNG again utilized mechanical maintenance dredging within the FLNG Basin and placed approximately 200,000 cubic yards into the Freeport Maintenance ODMDS. The third year's dredging cycle has not occurred to-date. The authorization expires February 14, 2021.

FLNG is requesting a modification to the existing permit (SWG-2013-00147) to authorize the offshore disposal of maintenance material dredged from the FLNG Basin into the Freeport Maintenance ODMDS, pursuant to Section 103 of the Marine Protection Research and Sanctuaries Act (MPRSA) of 1972 (Section 103) for an additional 3 year period (until 2024). While FLNG's anticipates its primary methods of dredging will remain mechanical and/or hydraulic,

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FLNG requests to extend the authorization for hopper dredging within the FLNG Basin for an additional 3 year period. This will allow FLNG the opportunity to utilize the same dredge contractor mobilization as the USACE during the annual Freeport Harbor Channel dredging event as schedules allow. This document presents an alternatives analysis for maintenance dredged material placement and includes an assessment of the potential environmental impacts of practicable dredged material placement alternatives as well as associated dredging activities.

**2.0 PROJECT PURPOSE AND NEED**

The purpose of the proposed maintenance dredging is to ensure the navigational safety and operability of vessel traffic within the FLNG Basin, which is necessary for safe and efficient operation of the Project. Operation of the Project involves fulfilling contract commitments to export LNG products to international markets. Maintenance dredging allows for the removal of accumulated sediments resulting from ongoing sedimentation to maintain the authorized depth (48.5 ft NAVD88 including over dredge) in order to allow vessels to access Project infrastructure located within the FLNG Basin. FLNG requests the authorization of this amendment by January 15, 2021, to allow continued maintenance dredging and access of disposal at the Freeport Maintenance ODMDS.

**2.1 PREVIOUS DREDGING**

Anticipated maintenance dredge volumes for the proposed 3-year authorization are based on actual dredge volumes from the previous maintenance dredging events. Table 1 below summarizes the previous dredging events over the last five years (2016-2020) and total volume of material disposed of at the ODMDS under the current authorization.

**Table 1: Freeport Harbor and Freeport LNG Basin Dredging for the Past Five Years (2016 -2020)**

Conducted By	Dredging Dates	Total Volume	Placement Area
FLNG Basin / Weeks Marine	2/6/2016 to 4/13/2016	1,172,642 CY	Freeport New Work ODMDS
USACE	8/29/2016 to 10/19/2016	1,104,287 CY	Freeport Maintenance ODMDS
FLNG Basin/ Permitting effort only	2017	Not Applicable (NA)	NA
USACE	8/16/2017 to 12/21/2017	3,164,978 CY*	Freeport Maintenance ODMDS
FLNG Basin/ Great Lakes Dock Dredging	04/3/18 to 07/11/2018	1,005,885.3 CY	Freeport Maintenance ODMDS
USACE	8/14/2018 to 10/30/2018	1,146,029 CY	Freeport Maintenance ODMDS
<b><u>USEPA/ USACE Establish Separate Disposal Zones for Private Applicants and USACE</u></b>			
FLNG Basin/ Great Lakes Dock Dredging	07/15/2019 to 8/9/019	201,965.3 CY	Freeport Maintenance ODMDS

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USACE	11/01/2019 to 3/18/2020	2,164,666 CY	Freeport Maintenance ODMS
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\*Dredging post Hurricane Harvey, higher than normal rate of sedimentation to due natural event

Based on the values in Table 1 and the most recent dredging conducted in 2019, FLNG anticipates needing at least 250,000 CY of disposal capacity annually in order to maintain operations at the FLNG basin and satisfy the Project purpose and need.

**3.0 ALTERNATIVES ANALYSIS FOR PLACEMENT OF MAINTENANCE MATERIAL**

FLNG analyzed multiple alternatives for the placement of maintenance material dredged from the FLNG Basin. The potential to utilize a combination of different disposal sites and/or options was also investigated. Each of the placement alternatives that were analyzed is discussed further below.

**3.1 NO ACTION ALTERNATIVE**

FLNG’s current Section 103 authorization expires on February 14, 2021. Therefore, under the no action alternative, the offshore disposal of maintenance material would not be authorized. Furthermore, FLNG is not currently authorized for the placement of material maintenance dredged from the FLNG basin for beneficial use, at an existing Federal DMPA, or the development of a Private DMPA. The only material placement option available under the no action alternative is onsite. As such, the no action alternative would consist of the dredging and placement of maintenance material onsite within a currently undeveloped 22-acre area located adjacent to the FLNG basin. Refer to Appendix A, Figure 1 for a depiction of the location of the currently undeveloped 22-acre that would be utilized for the placement of maintenance material under the no action alternative.

**3.2 BENEFICIAL USE**

**3.2.1 Beach Nourishment Alternative**

Previous beach nourishment projects have been undertaken locally (including several on Quintana Island). The ideal sediment to be used for beach nourishment is dependent on the grain size, which must closely match the native beach material. Sediment containing excess silts and clay fraction typically disqualifies the material from being considered suitable for nourishment activities. Projects with unmatched grain sizes typically perform relatively poorly. FLNG performed evaluations of the maintenance material located within the FLNG Basin to determine the feasibility for the materials use for beach nourishment.

**3.2.1 Bird Island Creation and Wetland Restoration**

The placement of material dredged from the FLNG Basin for beneficial use (BU) for bird island creation and/or wetland restoration was considered as an alternative for the placement of material. FLNG conducted a screening-level assessment of potential BU sites within approximately 5 miles from the FLNG Basin (the Maintenance and New Work ODMS’ are located approximately 4 miles and 7 miles from the FLNG Basin, respectively). Additionally, FLNG engaged in discussions with the U.S. Fish and Wildlife Service USFWS, Texas Parks and Wildlife Department (TPWD), National Marine Fisheries Service (NMFS), the Texas General Land Office

(GLO), Galveston Bay Foundation, and Ducks Unlimited to identify potential BU opportunities. Refer to Appendix A, Figure 2 and Figures 3A through 3F for depictions of the location of the sites investigated for bird island creation and wetland restoration.

### **3.3 EXISTING FEDERAL DMPA**

FLNG investigated the use of existing Federal dredged material placement areas (DMPA) for the disposal of dredged material from the FLNG Basin. The Galveston District's "Dredged Material Management Plan – Final Preliminary Assessment" (March, 2012) was used to identify existing Federal DMPAs within 5 miles to the FLNG Basin to be considered as a potential alternative on a solely locational basis. Refer to Appendix A, Figures 4 and 5 for depictions of the locations of the existing Federal DMPA's investigated as a potential placement area for material dredged at the FLNG Basin.

### **3.4 PRIVATE DMPA DEVELOPMENT**

FLNG investigated the development of a private DMPA for the placement of maintenance material dredged from the FLNG basin. FLNG has conducted a revised screening-level assessment of potential private DMPA sites within approximately 5 miles of the FLNG Basin. Refer to Appendix A, Figure 6 and Figures 7A through 7F for depictions of the potential private DMPA sites investigated. FLNG submitted an application to the USACE in September 2019 for the construction and operation of a confined dredged material placement area at Private DMPA Site C to accommodate the placement of maintenance material from the FLNG Basin and create stability for future operations.

### **3.5 SEDIMENT DIVERSION**

A sedimentation study was conducted by Lloyd Engineering, Inc. (LEI) to determine the feasibility of additional measures to reduce the sedimentation in the FLNG Basin. As part of this analysis, diversion structures in the Gulf Intracoastal Waterway (GIWW) and Lower Turning Basin, as well as alternative dredging and maintenance procedures were analyzed as potential sediment reduction features.

Based on the model created, high velocity currents along with high sediment concentrations flow east along the GIWW from Brazos to Freeport. As the flow reaches the southern end of the FLNG Basin, the flow is diverted into the FLNG Basin where a large eddy forms and water velocity decreases significantly allowing sediment to settle into the FLNG Basin. As part of this study, two sediment diversion/dredging alternatives were developed to divert the ebb flow away from the FLNG Basin and out towards the Freeport channel.

#### **3.5.1 Southern Dredging Option**

The Southern Dredging Option consists of dredging an area located adjacent to the shoreline along the Freeport Channel and just south of the FLNG Basin. The goal of dredging this area would be to reduce the diversion of ebb flows from the Freeport Channel into the FLNG Basin. Refer to the FLNG Marine Basin Sedimentation Study provided in Appendix B for the modeled flow pattern for the Southern Dredging Option.

### **3.5.2 Locks Alternative**

Another sediment diversion alternative analyzed was the locks alternative which included the installation of locks at the GIWW and Brazos River. The main source of shoal material being deposited within the FLNG Basin is the Brazos River. With the locks closed, especially at high tide, there would be a major decrease in the amount of sediment traveling east along the GIWW. This option would require USACE permitting and consultations and agreements with the Texas Department of Transportation on a public private partnership to construct the locks in a form of a Section 204 agreement – Construction of Water Resources Development Projects by Non-Federal Interest. Refer to the FLNG Marine Basin Sedimentation Study provided in Appendix B for detailed descriptions of the Locks Alternative analyzed.

### **3.6 OFFSHORE SPOIL DISPOSAL (PREFERRED ALTERNATIVE)**

The option of offshore dredged material disposal at an ODMDS has historically been reserved for projects where the USACE is the sole sponsor or a co-sponsor. However, the U.S. Environmental Protection Agency (USEPA) changed the regulations to allow dredged material from the vicinity of the Federal channels to be disposed of at designated offshore placement areas. Two USEPA-designated dispersive ODMDSs are located south of Quintana Island in the Gulf of Mexico. The ODMDS closest to shore is referred to as the Freeport Maintenance ODMDS, whereas the ODMDS farthest from shore is referred to as the Freeport New Work ODMDS. Refer to Appendix A, Figure 8 for a depiction of the Freeport Maintenance and New Work ODMDS.

The USACE previously approved the use of the Freeport Maintenance ODMDS as the designated disposal location for maintenance material from the FLNG Basin in February 2018, under Permit No. SWG-2013-00147 and a new MPRSA Section 103 Permit. The USACE has the authority to issue the permit contingent upon concurrence from the USEPA that the material is suitable for ocean disposal. Based on sampling conducted by the USACE for material located in the Freeport Harbor Channel, directly adjacent to the FLNG Basin, the material that would be dredged from the Basin during maintenance activities is suitable for offshore disposal. Through coordination with the USACE Operations Group and the USEPA, FLNG submitted a Tier I Analysis in December 2019 which reassessed all new and previously evaluated data in order to provide supporting evidence to reasonably conclude that the material proposed to be dredged within the FLNG Basin remains in compliance with the existing Section 103 of the MPRSA. FLNG received confirmation that the material was suitable for ocean disposal on January 30, 2020. Refer to Appendix E for the previously submitted Tier I Analysis for the Project.

As part of this permit modification request, FLNG is submitting an updated Tier I Analysis which analyzes previously evaluated and new data to provide supporting evidence to reasonably conclude that the material proposed to be dredged remains in compliance with the existing Section 103 of the MPRSA. The updated Tier 1 Analysis is provided as Attachment C of the overall USACE Permit Modification request.

#### 4.0 ALTERNATIVE SCREENING PROCESS

FLNG conducted an alternative screening process to determine which alternatives would fulfill the objectives for the placement of maintenance dredged material from the FLNG Basin while minimizing environmental impacts. In order to be considered as a practicable disposal option, FLNG considered the alternatives detailed in the previous sections with the following selection criteria:

1. Fulfillment of the Project purpose and need to ensure the navigational safety and operability of vessel traffic within the FLNG Basin
2. Allow for permitting and construction (if applicable) within a timeframe necessary to meet the Project schedule (i.e. February 2021 when the current Section 103 permit expires)
3. Open for use by outside users
4. Provide a minimum of 250,000 CY of dredged material capacity
5. Minimize impacts to special aquatic sites
6. Dredge material is suitable for placement at a given location
7. Located within 5 miles of the FLNG Basin

The alternatives screening process was used to reduce the number of alternatives considered during more-detailed evaluations based on their ability to fulfill the requirements set forth in the selection criteria. FLNG analyzed 5 potential alternatives, including 1) the no action alternative, 2) beneficial use of dredged material, 3) disposing into an existing Federal DMPA, 4) development of private DMPA for disposal, and 5) offshore disposal. The following information is provided for each alternative disposal site that was examined, as applicable:

- Specific parcel information
  - Parcel ID numbers (see Appendix C)
  - Aerial photos and location maps (see Appendix A, Figures 1 through 8)
  - GPS Coordinates – (see Appendix A, Figures 2, 4, and 6)
- Presence, quantity and quality of wetlands and/or waters of the U.S. (see Table 2)
- County/City Zoning designations (see Table 3)
- Presence of Federally-listed threatened or endangered species or their critical habitat, state listed species, or other natural or regionally important ecosystem resource factors that may be significantly impacted (see Appendix D)
- Site infrastructure and other components for a single and complete project (see Table 4)

The following sections detail the results of the alternative screening process as well as identify the alternatives selected for further evaluation.

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<b>Table 2: Wetland/Waterbody Impacts Associated with Placement Alternatives and Dredging the FLNG Basin</b>																
NWI Classification	Acres of Impact															
	BU Sites						Undev. Fed DMPAs		Private DMPAs				Maintenance FLNG Basin ODMDS			
	A	B	C	D	E	F	8	9	A	B	C	D	E	F		
Estuarine and Marine Wetland	0.0	165.0	0.0	0.1	58.4	271.3	0.0	0.0	0.0	51.4	0.0	0.0	142.4	44.2	0.0	0.0
Freshwater Emergent Wetland	0.0	0.0	1.0	0.0	0.0	0.0	23.7	14.8	0.0	39.0	110.6	0.9	0.0	0.0	0.0	0.0
Palustrine Scrub Shrub Wetland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lake	0.0	0.0	130.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Estuarine and Marine Deepwater	18.3	0.0	0.0	24.6	1.5	0.0	0.0	0.0	18.3	0.0	0.0	0.0	9.5	0.0	1,273.0 <sup>a</sup>	62.9
Riverine	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.65	0.0	0.0	0.0	0.0	0.0
<b>Total:</b>	<b>18.3</b>	<b>165.0</b>	<b>131.0</b>	<b>24.7</b>	<b>59.9</b>	<b>271.3</b>	<b>23.7</b>	<b>14.8</b>	<b>18.3</b>	<b>90.6</b>	<b>111.3</b>	<b>0.9</b>	<b>151.9</b>	<b>44.2</b>	<b>1,273.0<sup>a</sup></b>	<b>62.9</b>

<sup>a</sup> The acreage provided for the Maintenance ODMDS (1,273.0) is the total acreage for the entire ODMDS site. Disposal activities would be limited to a smaller area to be determined by the USACE and USEPA.

<b>Table 3: County/City Zoning Restrictions Associated with Onshore Placement Alternatives</b>																
	BU Sites						Undev. Fed DMPAs		Private DMPAs							
	A	B	C	D	E	F	8	9	A	B	C	D	E	F		
None (located in unincorporated Brazoria County)	X	-	X	X	X	X	X	-	X	X	-	X	X	X	X	X
R-1 District, Single Family Residential (City of Freeport)	-	X	-	-	-	-	-	-	-	-	X	-	-	-	-	-
W-3 District, Waterfront-Heavy (City of Freeport)	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-
Planned Unit Development District, PUD (City of Freeport)	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-

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<b>Table 4: Infrastructure Requirements Associated with Onshore Placement Alternatives</b>														
<b>Required Infrastructure Development</b>	BU Sites						Undev. Fed DMPAs		Private DMPAs					
	A	B	C	D	E	F	8	9	A	B	C	D	E	F
Access Road(s)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Drainage Structure Installation within Federal Levee (408 Permit)	-	-	-	-	-	-	-	-	-	-	X	-	-	-
Site Security Infrastructure (fencing, gated access, etc.)	-	-	-	-	-	-	-	-	X	X	X	X	X	X
Water Level Control Outfalls (Weirs)	X	-	X	X	-	-	X	X	-	X	-	X	X	X
Construction of Levees	-	-	-	-	-	-	X	X	X	X	X	X	X	X
Improvement of Existing Levees	-	X	X	-	-	-	-	-	-	-	-	-	-	-
Equipment Staging Areas	X	X	X	X	X	X	-	-	X	X	X	X	X	X
Hay Bale Dikes/Sediment Control Dikes	X	X	X	X	X	X	-	-	X	-	-	-	-	-
Effluent Collection Trench	-	-	-	-	-	-	-	-	-	-	X	X	X	X
Effluent Detention Basin	-	-	-	-	-	-	-	-	-	-	-	X	X	X

#### **4.1 NO ACTION ALTERNATIVE SCREENING ANALYSIS**

Under the no action alternative, FLNG would not be authorized to place maintenance material offshore as the current Section 103 authorization expires February 14, 2021. Furthermore, FLNG is not currently authorized for the placement of maintenance material for beneficial use, at an existing Federal DMPA, or the development of a Private DMPA. As such, the only material placement option available under the no action alternative is onsite within an approximate 22-acre area located adjacent to the FLNG basin. FLNG conducted preliminary engineering to determine the maximum available onsite capacity. Based on engineering evaluations, it was determined that the maximum onsite storage capacity is an estimated 190,000 CY of maintenance material. FLNG anticipates needing at least 250,000 CY of disposal capacity in order to maintain operations at the FLNG basin and satisfy the Project purpose and need. As such, the no action alternative would not allow for the dredging and/or placement of material to obtain the required depths to ensure the navigational safety and operability of vessel traffic within the FLNG Basin. Based on this analysis, the no action alternative does not fulfill the Project purpose and need (selection criteria 1) and therefore was not considered a practicable alternative or selected for further evaluation.

#### **4.2 BENEFICIAL USE SCREENING ANALYSIS**

##### **4.2.1 Beach Nourishment**

In August 2016, FLNG collected surficial sediment and ambient water for the purposes of conducting chemical and grain-size analysis of the maintenance material located at the FLNG Basin. The grain size data collected during this analysis was reviewed to determine the suitability of the material to be dredged for the use of beach nourishment. The results of the grain-size analysis ranged in composition amongst the six sampling stations between 1.2 - 2.8 percent sand, 57.2 - 61.0 percent silt, and 38.1 - 41.3 percent clay. These results indicate that the material to be dredged at the FLNG Basin includes a high proportion of silt and clay material, and therefore is not considered suitable for beach nourishment. The beach nourishment BU option would not meet selection criteria 6; therefore, the placement of material for beach nourishment was not considered a practicable alternative or selected for further evaluation. Refer to Appendix E for the Contaminant Assessment Report FLNG Terminal Dock 1, including the results of the grain-size analysis conducted on maintenance material located within the FLNG Basin.

##### **4.2.2 Bird Island Creation and Wetland Creation/Restoration**

Discussions engaged with the various agencies and organizations failed to identify any specific BU sites with immediate/short-term material needs with enough detail to assess the material volume requirements or assess schedule timeframe for potential development. Therefore, FLNG conducted an independent analysis of six potential sites to use dredged material beneficially by creating bird islands or creating/restoring wetlands. The sites investigated are displayed in Appendix A, Figures 2 and 3A through 3F and discussed below. Wetland and waterbody impacts based on National Wetland Inventory (NWI)<sup>1</sup> data that would be required for the disposal of

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<sup>1</sup> Wetland and Waterbody acreages discussed throughout the document are based on NWI data.

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dredged material within each BU site are outlined in Table 1. A Threatened and Endangered Species Impact and Habitat Assessment for each potential BU site is presented in Appendix D. City/county zoning restrictions at each site are presented in Table 2 and required infrastructure improvements to develop each BU site is included in Table 3.

#### **4.2.2.1 Beneficial Use Site A**

BU Site A is a shallow open water area containing 18.3 acres of estuarine and marine deepwater (see Table 1 and Appendix A, Figure 3A) located approximately 2 miles southwest of the FLNG Basin within shallow manmade canals. BU Site A meets selection criteria 7 and was investigated for potential wetland creation. BU Site A meets selection criteria 1, 2, and 3, as the canals were dredged from uplands and the submerged land would likely not be claimed by, and require permitting through the GLO. While development of a BU site would require permitting through the USACE, a Nationwide Permit 27 could be utilized, which would expedite the permitting process to a timeframe that could meet the Project schedule.

While BU Site A provides 18.3 acres of available open water areas for wetland creation, the water depths in these canals are very shallow, and would only allow for a maximum of approximately 2 feet of dredged material placement to achieve wetland elevations. This would only allow for a capacity of approximately 60,000 cubic yards of dredged material, which does not meet selection criteria 4.

A total of over 1-acre of oysters, based on aerial surveys, are present along the bulkheads throughout the canal areas, which would be impacted if this area were used for dredged material disposal and wetland creation. A total of approximately 2-acres of existing wetlands, based on aerial photography, is also present within the interior of the northwestern most canal. These existing open water and wetland areas along with oysters within BU Site A currently provide valuable habitat for birds, wildlife, and fisheries. While creating wetlands would provide additional habitat for certain types of species, it would also reduce the available open water areas and oyster habitat that are currently providing habitat for other species including loafing and foraging habitat for waterfowl and are habitat for larger fish species. For these reasons, BU Site A does not meet selection criteria 5. Selection criteria 6 could be met as long as the material is contained within the disposal area during placement activities and does not risk release into adjacent wetland areas.

As indicated in Appendix D, Table D-1, BU Site A currently provides potential habitat for one species of threatened fish (opossum pipefish), 6 species of threatened or endangered aquatic reptiles including 5 species of sea turtles (green, hawksbill, Kemp's ridley, leatherback, loggerhead) and the alligator snapping turtle, 4 species of threatened or endangered birds (red knot, reddish egret, white-faced ibis, and whooping crane), and one species of marine mammal (west Indian manatee). Due to the presence of similar adjacent habitats in the surrounding area, activities associated with development of BU Site A could impact, but would not be expected to adversely impact these species. A detailed impact assessment for each species is included in Appendix D, Table D-2.

No zoning restrictions are present within BU Site A (see Table 2). Infrastructure improvements including water level control outfalls, equipment staging area, and hay bale/sediment control dikes would be required to complete BU at this site (see Table 3).

#### **4.2.2.2 Beneficial Use Site B**

BU Site B includes 3 large shallow open water areas containing 165.0 acres of estuarine and marine wetlands (see Table 1 and Appendix A, Figure 3B) located approximately 3 miles west of the FLNG Basin. BU Site B meets selection criteria 7 and was investigated for potential bird island creation and wetland creation. BU Site B does not meet selection criteria 1, 2, and 3, as the areas are located on land owned by Port Freeport. Based on initial feedback received, outside use of these areas would not be allowed, as Port Freeport wishes to retain its property for potential future BU development from Port Freeport projects.

BU Site B is located on a large tract of contiguous land (with 165 acres of open water areas, although NWI has them classified as wetlands) and would likely be able to accommodate 250,000 cubic yards of dredged material capacity, meeting selection criteria 4. Based on review of aerial photography, wetlands are located along the entire perimeter of the available open water areas, and small areas of oysters are located throughout these areas. These existing open water and wetland areas along with oysters within BU Site B currently provide valuable habitat for birds, wildlife, and fisheries. While creating wetlands would provide additional habitat for certain types of species, it would also reduce the available open water areas that are currently providing habitat for other species including loafing and foraging habitat for waterfowl. This site was analyzed for potential BU as part of the USACE's Final Environmental Impact Statement for Proposed Port Freeport Channel Widening (Channel Widening FEIS), and was deemed infeasible as utilizing this site for BU would do unnecessary damage the healthy and functioning habitat that is present at the site. This original analysis (Appendix B, DMMP and Site Habitat Report and Beach Nourishment Memo of the Channel Widening FEIS) appended to this document as Appendix F for reference. For these reasons, BU Site B does not meet selection criteria 5. Selection criteria 6 could be met as long as the material is contained within the disposal area during placement activities and does not risk release into adjacent wetland areas, as would be the case with bird island creation.

As indicated in Appendix D, Table D-1, BU Site B currently provides potential habitat for one species of threatened fish (opossum pipefish), 6 species of threatened or endangered aquatic reptiles including 5 species of sea turtles (green, hawksbill, Kemp's ridley, leatherback, loggerhead) and the alligator snapping turtle, 4 species of threatened or endangered birds (red knot, reddish egret, white-faced ibis, and whooping crane), and one species of marine mammal (west Indian manatee). Due to the presence of similar adjacent habitats in the surrounding area, activities associated with development of BU Site B could impact, but would not be expected to adversely impact these species. A detailed impact assessment for each species is included in Appendix D, Table D-2.

BU Site B is zoned as R-1 District, Single Family Residential by the City of Freeport (see Table 2). Developing this site for BU would not be consistent with current zoning regulations. Infrastructure improvements including improvement of existing levees and hay bale/sediment control dikes would be required to complete BU at this site (see Table 3).

#### **4.2.2.3 Beneficial Use Site C**

BU Site C includes a large shallow open water area containing 1.0 acre of freshwater emergent wetland and 130.0 acres of lake (see Table 1 and Appendix A, Figure 3C) located approximately 4 miles west of the FLNG Basin. BU Site C meets selection criteria 7 and was investigated for potential bird island creation and wetland creation. BU Site C does not meet selection criteria 1, 2, and 3, as portions of the open water area are located on property owned by the United States

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government that would require permitting through the Federal government. Additionally, this area is located immediately adjacent to the Federal Petroleum reserve, and may preclude construction activity from happening in the area due to security access reasons.

BU Site C is located on a large tract of contiguous land (with over 130 acres of open water areas) and would likely be able to accommodate 250,000 cubic yards of dredged material capacity, meeting selection criteria 4. Wetlands are located along the entire perimeter of the available open water areas. These existing open water and wetland areas within BU Site A currently provide valuable habitat for birds, wildlife, and fisheries. While creating wetlands would provide additional habitat for certain types of species, it would also reduce the available open water areas that are currently providing habitat for other species including loafing and foraging habit for waterfowl and habitat for larger fish species. For these reasons, BU Site C does not meet selection criteria 5. Selection criteria 6 could be met as long as the material is contained within the disposal area during placement activities and does not risk release into adjacent wetland areas, as would be the case with bird island creation.

As indicated in Appendix D, Table D-1, BU Site C currently provides potential habitat for one species of threatened fish (opossum pipefish), one species of threatened aquatic reptile (alligator snapping turtle), four species of threatened or endangered birds (red knot, reddish egret, white-faced ibis, and whooping crane). Due to the presence of similar adjacent habitats in the surrounding area, activities associated with development of BU Site C could impact, but would not be expected to adversely impact these species. A detailed impact assessment for each species is included in Appendix D, Table D-2.

No zoning restrictions are present within BU Site C (see Table 2). Infrastructure improvements including water level control outfalls, improvement of existing levees, and hay bale/sediment control dikes would be required to complete BU at this site (see Table 3).

#### **4.2.2.4 Beneficial Use Site D**

BU Site D includes a large estuarine wetland/open water complex containing 0.1 acre of estuarine and marine wetland and 24.6 acre of estuarine and marine deepwater (see Table 1 and Appendix A, Figure 3D) located approximately 3 miles north of the FLNG Basin. BU Site D meets selection criteria 7 and was investigated for potential wetland creation. BU Site D meets selection criteria 1, 2, and 3 as the property is largely owned by FLNG and the portions identified as potential BU areas are not within the GLO's jurisdiction, as verified by a Licensed State Land Survey.

BU Site D is located on a large tract of contiguous land with approximately 25 acres of shallow open water areas available for BU. While the exact depth of these areas are unknown, in order to reach 250,000 cubic yards of capacity, there would have to be approximately 5 feet of depth available throughout the entire footprint. Because water depths are currently unknown, BU Site D does not fully meet selection criteria 4.

Wetlands are located along the entire perimeter of the available open water areas. These existing open water and wetland areas within BU Site D currently provide valuable habitat for birds, wildlife, and fisheries. While creating wetlands would provide additional habitat for certain types of species, it would also reduce the available open water areas that are currently providing habitat for other species including loafing and foraging habit for waterfowl and habitat for larger fish species. For these reasons, BU Site D does not meet selection criteria 5. Selection criteria 6 could be met as long as the material is contained within the disposal area during placement activities and does not risk release into adjacent wetland areas. Similar to BU Site B discussed

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above, these areas are adjacent to high quality fringe wetland areas and currently provide valuable habitat for birds, wildlife, and fisheries. While creating wetlands would provide additional habitat for certain types of species, it would also reduce the available open water areas that are currently providing habitat for other species including loafing and foraging habit for waterfowl.

As indicated in Appendix D, Table D-1, BU Site D currently provides potential habitat for one species of threatened fish (opossum pipefish), one species of threatened or endangered aquatic reptiles (alligator snapping turtle), and 4 species of threatened or endangered birds (red knot, reddish egret, white-faced ibis, and whooping crane). Due to the presence of similar adjacent habitats in surrounding areas, activities associated with development of BU Site D could impact, but would not be expected to adversely impact these species. A detailed impact assessment for each species is included in Appendix D, Table D-2.

No zoning restrictions are present within BU Site D (see Table 2). Infrastructure improvements including water level control outfalls and hay bale/sediment control dikes would be required to complete BU at this site (see Table 3).

#### **4.2.2.5 Beneficial Use Site E**

BU Site E includes a large estuarine wetland/open water complex containing 58.4 acres of estuarine and marine wetland and 1.5 acres of estuarine and marine deepwater (see Table 1 and Appendix A, Figure 3E) located approximately 1.5 miles north of the FLNG Basin. BU Site E meets selection criteria 7 and was investigated for wetland creation/restoration. BU Site E does not meet selection criteria 1, 2, and 3, as the areas are located on state-owned submerged lands that would require permitting through the GLO.

BU Site E is located on a large tract of contiguous land (with over 73 acres of open water areas) and would likely be able to accommodate 250,000 cubic yards of dredged material capacity, meeting selection criteria 4. Wetlands are located along the entire perimeter of the available open waters and both large and small oyster reefs are located within the available open water areas. These existing open water and wetland areas along with oysters within BU Site E currently provide valuable habitat for birds, wildlife, and fisheries. Additionally, the open water areas within the site are utilized for recreational fishing. While creating wetlands would provide additional habitat for certain types of species, it would also reduce the available open water areas that are currently being utilized for recreational fishing and are providing habitat for other species including loafing and foraging habit for waterfowl. Additionally, this site was analyzed for potential BU as part of the USACE's Channel Widening FEIS, and was concluded that "filling of these areas to create low marsh vegetation grounds will negatively impact some functioning oyster beds as well as popular and functioning recreational fishing grounds" (see Appendix F for reference). For these reasons, BU Site B does not meet selection criteria 5. Selection criteria 6 could be met as long as the material is contained within the disposal area during placement activities and does not risk release into adjacent wetland areas.

As indicated in Appendix D, Table D-1, BU Site E currently provides potential habitat for one species of threatened fish (opossum pipefish), 6 species of threatened or endangered aquatic reptiles including 5 species of sea turtles (green, hawksbill, Kemp's ridley, leatherback, loggerhead) and the alligator snapping turtle, 4 species of threatened or endangered birds (red knot, reddish egret, white-faced ibis, and whooping crane), and one species of marine mammal (west Indian manatee). Due to the presence of similar adjacent habitats in surrounding areas, activities associated with development of BU Site D could impact, but would not be expected to

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adversely impact these species. A detailed impact assessment for each species is included in Appendix D, Table D-2.

No zoning restrictions are present within BU Site E (see Table 2). Infrastructure improvements including equipment staging areas and hay bale/sediment control dikes would be required to complete BU at this site (see Table 3).

#### **4.2.2.6 Beneficial Use Site F**

BU Site F includes a large estuarine wetland/open water complex containing 271.3 acres of estuarine and marine wetlands (see Table 1 and Appendix A, Figure 3F) located approximately 3 miles northeast of the FLNG Basin. BU Site F meets selection criteria 7 and was investigated for potential bird island creation and wetland creation. BU Site F does not meet selection criteria 1, 2, and 3, as the areas are located on state-owned submerged lands that would require permitting through the GLO.

BU Site F is located on a large tract of contiguous land (with over 270 acres of open water areas) and would be able to accommodate 250,000 cubic yards of dredged material capacity, meeting selection criteria 4. Wetlands are located along the entire perimeter of the available open waters. A review of aerial photography indicates that both large and small areas of oysters are located within the available open water areas. These existing open water and wetland areas along with oysters within BU Site F currently provide valuable habitat for birds, wildlife, and fisheries. Additionally, the open water areas within the site are utilized for recreational fishing. While creating wetlands would provide additional habitat for certain types of species, it would also reduce the available open water areas that are currently being utilized for recreational fishing and providing habitat for other species including loafing and foraging habitat for waterfowl. This site was analyzed for potential BU as part of the Channel Widening FEIS, and was deemed infeasible as utilizing this site for BU would do unnecessary damage to the healthy and functioning habitat that is present at the site (see Appendix F for reference). For these reasons, BU Site F does not fully meet selection criteria 5. Selection criteria 6 could be met as long as the material is contained within the disposal area during placement activities and does not risk release into adjacent wetland areas, as would be the case with bird island creation.

As indicated in Appendix D, Table D-1, BU Site F currently provides potential habitat for one species of threatened fish (opossum pipefish), 6 species of threatened or endangered aquatic reptiles including 5 species of sea turtles (green, hawksbill, Kemp's ridley, leatherback, loggerhead), 4 species of threatened or endangered birds (red knot, reddish egret, white-faced ibis, and whooping crane), and one species of marine mammal (west Indian manatee). Due to the presence of similar adjacent habitat in surrounding areas, activities associated with development of BU Site E could impact, but would not be expected to adversely impact these species. A detailed impact assessment for each species is included in Appendix D, Table D-2.

No zoning restrictions are present within BU Site F (see Table 3). Infrastructure improvements including equipment staging areas and hay bale/sediment control dikes would be required to complete BU at this site (see Table 4).

#### **4.2.2.7 COMBINED BU SITE ALTERNATIVE**

The capacity of each individual BU site discussed above is likely limited due to the fact that sediment cannot be stored above elevations required to maintain wetland hydrology and connection. Therefore, FLNG also considered the combination of multiple BU sites as a

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placement alternative. This would involve utilizing more than one individual BU Site to satisfy the needs of the Project. See Appendix A, Figure 3 for a depiction of all the BU sites considered for the combination alternative.

The Combined BU Site alternative meets selection criteria 7 and the total capacity of all the BU Site alternatives would likely meet selection criteria 4. However, only 2 of the BU sites (BU Site A and BU Site D) meet selection criteria 1, 2, and 3, and could be considered potentially viable options, and the total capacity of both sites would not meet selection criteria 4. Additionally, as stated previously, while creating wetlands would provide additional habitat for certain types of species, it would also reduce the available open water areas that are currently providing habitat for other species including loafing and foraging habitat for waterfowl. It cannot be assumed that the creation of emergent wetland habitat is more desirable than open water habitat in all cases and all sites. As such the Combined BU Site alternative does not meet selection criteria 5, but could meet selection criteria 6 provided the material is contained appropriately.

Therefore, using a combination of multiple BU Sites as the dredged material placement solution was not deemed feasible and does not meet the Projects purpose and need and therefore was not considered further.

**4.2.3 Conclusion**

Based on the screening-level assessment conducted at potential bird island creation and/or wetland restoration sites, none of the sites analyzed adequately fulfilled the selection criteria necessary to be considered as a practicable alternative and therefore, were not selected for further evaluation. However, FLNG will continue to coordinate with the various agencies on future long-term BU opportunities. Table 5 includes a summary of the results of the screening level analysis against the selection criteria at each potential BU Site.

Selection Criteria	Potential Beneficial Use Site						
	A	B	C	D	E	F	Combined
Submerged land wholly owned or leased by FLNG to allow permitting timeframe that meets Project schedule and regulatory filing requirements (selection criteria 1, 2, and 3)	M	N	N	M	N	N	N
Contiguous land and/or water depth to provide a minimum of 250,000 CY of dredged material capacity (selection criterion 4)	N	M	M	P	M	M	M
Minimize impacts to special aquatic sites (selection criterion 5)	N	N	N	N	N	N	N
Dredge material is suitable for placement at a given location (selection criterion 6)	M	M	M	M	M	M	M
Within 5 miles of the FLNG Basin (selection criteria 7)	M	M	M	M	M	M	M
M = Meets P = Partially Meets N = Does Not Meet							

**4.3 EXISTING FEDERAL DMPA SCREENING ANALYSIS**

FLNG conducted a screening level analysis of a total of 13 existing Federal DMPA's, including 11 that are currently developed and 2 that are currently undeveloped. The results of this analysis

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are presented in Table 6 and the existing DMPA locations investigated are displayed in Appendix A, Figure 4.

Table 6: Selection Criteria Summary for Existing Federal DMPA Site Alternatives - Summary													
Selection Criteria	Developed DMPA No.											Undev. DMPA No.	
	1	7	78	79	80	81	82	84	85	86/87	88	8	9
Existing/fully constructed or completion of construction possible within timeframe that meets Project schedule and regulatory filing requirements (selection criteria 1 and 2)	N	M	P	P	P	P	P	N	M	M	M	N	N
Open to use by outside users and not fully-committed to other users (selection criterion 3)	N	N	N	N	N	N	N	N	N	N	N	N	N
Sufficient available capacity to accommodate a minimum of 250,000 CY of maintenance material (selection criterion 4)	N	P	P	P	P	P	N	N	N	P	P	N	N
Active DMPA that has been used in past 5 years / minimize impacts to special aquatic sites (selection criterion 5)	M	N	N	N	N	N	N	N	M	P	N	N	N
Location within 5 miles of FLNG Basin (selection criterion 7)	M	P	P	P	P	P	M	M	M	M	M	P	P
M = Meets P = Partially Meets N = Does Not Meet													

**4.3.1 Developed Federal DMPA Sites**

FLNG investigated the potential use of 13 existing developed Federal DMPA sites. FLNG has historically worked with the USACE to dispose of dredged material into Federal DMPAs 1 or 85. The USACE recently awarded a contract to raise the levees and DMPA 1. While this work will ultimately increase the capacity of DMPA 1, during the period that the work is occurring, no disposal activities can take place within DMPA 1. Due to the unknown timeframe of the levee improvement work on top of the additional permitting timeframe that would be required, DMPA 1 was considered to not meet selection criteria 1 through 4.

In August 2016, surficial sediment and ambient water were collected and analyzed to obtain permission from the USACE, to place 150,000 cubic yards from Dock 1, FLNG Basin into DMPA 85. A real-estate application was submitted in June 2016 associated with the same action. Selection criterion 6 would be met as the results showed were no exceedances of chemical concentrations compared to benchmarks. The sediment collected was composed primarily of silt and clay. A summary of these data are incorporated into Appendix E for reference. To date, the application has not been approved. Due to this unknown permitting timeframe, which is anticipated to take a minimum of 18 months, for just a fraction of the capacity (less than 15%) that is needed for dredged material disposal in early 2018, FLNG claims that utilizing an existing developed Federal DMPA would not meet selection criteria 1, 2 and 3.

Based on the screening-level assessment conducted at existing developed Federal DMPA sites (see Table 6), none of the sites analyzed adequately fulfilled the selection criteria necessary to be considered as a practicable alternative, and therefore were not selected for further evaluation.

#### **4.3.2 Undeveloped Federal DMPA Sites**

FLNG investigated the potential use of 2 undeveloped Federal DMPA sites. The sites investigated are displayed in Appendix A, Figures 4 and 5. Both of these sites described below were analyzed as potential placement areas in the Final Environmental Impact Statement for Freeport Harbor Channel Improvement Project (FHCIP FEIS) in September 2012. Wetland and waterbody impacts based on NWI data that would be required for the development of each DMPA site are outlined in Table 2. An assessment of potential threatened and endangered species habitat at each site is presented in Appendix D. City/county zoning restrictions at each site are presented in Table 3 and a list of required infrastructure developments for each site is included in Table 4.

##### **4.3.2.1 DMPA 8**

DMPA 8 is an undeveloped tract of land located approximately 5 miles northwest of the FLNG Basin (meeting selection criteria 7). DMPA 8 contains 23.7 acres of freshwater emergent wetland (see Table 2 and Appendix A, Figure 5). The FHCIP FEIS states that DMPA 8 contains 23 acres of wetlands as well as two small stock ponds. These features provide valuable habitat for a variety of bird, fish, and other wildlife species. FHCIP FEIS also indicates that Port Freeport has plans to develop portions of this site, which could reduce the amount of land available for DMPA development. DMPA 8 does not meet selection criteria 1, 2, and 3, as DMPA 8 contains wetlands that would require an individual permit through the USACE, which is anticipated could take up to 18 months. The development of DMPA 8 would be able to accommodate 250,000 cubic yards of dredged material capacity, meeting selection criteria 4. As stated previously, wetlands and waterbodies are located within the site, which would be impacted if this area was used for dredged material disposal. For this reason, DMPA 8 does not meet selection criteria 5. Selection criteria 6 would be met as the material would be contained within levees.

As indicated in Appendix D, Table D-1, DMPA 8 currently provides potential habitat for 1 species of threatened aquatic reptile (alligator snapping turtle) and 1 species of delisted bird (brown pelican). Activities associated with development of DMPA 8 could impact, but would not be expected to adversely impact these species. A detailed impact assessment for each species is included in Appendix D, Table D-2.

No zoning restrictions are present within DMPA 8 (see Table 3). Infrastructure improvements including access roads, water level control outfalls, and construction of levees would be required to complete DMPA development at this site (see Table 4).

##### **4.3.2.2 DMPA 9**

DMPA 9 is an undeveloped tract of land located approximately 5 miles northwest of the FLNG Basin (meeting selection criteria 7). DMPA 9 contains 14.8 acres of freshwater emergent wetlands (see Table 2 and Appendix A, Figure 5). The FHCIP FEIS states that DMPA 9 contains 16 acres

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of wetlands, 21 acres of riparian forest, and 250 acres of prime farmland. The wetlands and riparian forest currently provide habitat to bird and wildlife species in the area. Additionally, the FHCIP states that cultural resources were identified within the footprint of DMPA 9. DMPA 9 does not meet selection criteria 1, 2, and 3, as DMPA 9 contains wetlands that would require permitting through the USACE, which is anticipated could take up to 18 months. DMPA 9 would be able to accommodate 250,000 cubic yards of dredged material capacity, meeting selection criteria 4. Wetlands, forested habitat, and prime farmland soils are located within the site, which would be impacted if this area was used for dredged material disposal. Due to the presence of these valuable habitats, DMPA 9 does not meet selection criteria 5. Selection criteria 6 would be met as the material would be contained within levees.

As indicated in Appendix D, Table D-1, DMPA 9 currently provides potential habitat for 1 species of threatened aquatic reptile (alligator snapping turtle) and 2 species of protected birds (bald eagle and brown pelican). Largely, activities associated with development of DMPA 9 could impact, but would not be expected to adversely impact these species. However, adverse impacts to the bald eagle could occur if construction activities were to occur during bald eagle nesting season if a nest were present nearby, as potentially suitable nesting habitat is located immediately adjacent to the site. A detailed impact assessment for each species is included in Appendix D, Table D-2.

DMPA 9 is zoned as a Planned Unit Development District by the City of Freeport (see Table 2), which is defined as “a development of land which is under unified control and is planned and developed as a whole in a single development operation or programmed series of development, and which includes street, utilities, lots or building sites and which indicates all structures and their relationship to each other and to adjacent uses and improvements, as well as open spaces.” Developing this property into a DMPA would not be consistent with current zoning regulations. Infrastructure improvements including access roads, water level control outfalls, and construction of levees would be required to complete DMPA development at this site (see Table 4).

#### **4.3.3 Conclusion**

Based on this assessment, no Federal land-based DMPA's are available for spoil disposal associated with maintenance dredging activities at the FLNG Basin. Based on this analysis, the use of existing Federal DMPA's (either developed or undeveloped) for the placement of dredged material was not considered a practicable alternative or selected for further evaluation. Table 6 includes a summary of the results of the screening level analysis against the selection criteria at each existing developed and undeveloped Federal DMPA site.

#### **4.4 PRIVATE DMPA DEVELOPMENT SCREENING ANALYSIS**

FLNG conducted an independent analysis of six potential sites for private DMPA development. The sites investigated are displayed in Appendix A, Figures 6 and 7A through 7F and discussed below. Wetland and waterbody impacts based on NWI data that would be required for the development of each DMPA site are outlined in Table 2. An assessment of potential threatened and endangered species habitat at each site is presented in Appendix D. City/county zoning restrictions at each site are presented in Table 3 and a list of required infrastructure developments for each site is included in Table 4.

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#### 4.4.1 Private DMPA Site A

Private DMPA Site A is an undeveloped canal subdivision that contains 18.3 acres of estuarine and marine deepwater (see Table 2 and Appendix A, Figure 7A) located approximately 2 miles southwest of the FLNG Basin (meeting selection criteria 7). Private DMPA Site A does not meet selection criteria 1, 2, and 3, as filling the open water area, including existing wetlands and oyster habitat, in the canals would require an individual permit through the USACE (expected to take up to 18 months). Additionally, once the permit is obtained, up to 12 months would be required to complete construction of the DMPA. While Private DMPA Site A would meet selection criteria 4, this site is not large enough to accommodate FLNG's long-term dredged material disposal needs.

A total of over 1-acre of oysters, based on aerial surveys, are present along the bulkheads throughout the canal areas, which would be impacted if this area were used for DMPA development. A total of approximately 2-acres of existing wetlands is also present within the interior of the northwestern most canal. These existing shallow open water and tidal emergent wetland areas along with oysters within DMPA Site A currently provide valuable functioning shallow open water, wetland, and oyster habitat for a variety birds, wildlife, and fisheries species. Due to the site's connectivity to tidal waters, it currently provides essential fish habitat for a variety of estuarine and marine species. Mitigation for impacts to these habitats would be required through USACE permitting. However, depending on the type of mitigation available, mitigation areas may take months or years to function at the level of quality that these areas are functioning currently. Additionally, the open water areas within the site are periodically utilized for recreational fishing, which would be permanently lost at this area through DMPA development. As such, Private DMPA Site A does not meet selection criteria 5. Selection criteria 6 would be met as the material would be contained inside constructed levees and any dewatering would be in accordance with USACE Nationwide Permit 16.

As indicated in Appendix D, Table D-1, Private DMPA Site A currently provides potential habitat for one species of threatened fish (opossum pipefish), 6 species of threatened or endangered aquatic reptiles including 5 species of sea turtles (green, hawksbill, Kemp's ridley, leatherback, and loggerhead) and the alligator snapping turtle, 4 species of threatened or endangered birds (red knot, reddish egret, white-faced ibis, and whooping crane), and one species of marine mammal (west Indian manatee). Due to the presence of similar adjacent habitats in the surrounding area, activities associated with the development of this site would not be expected to adversely impact these species. A detailed impact assessment for each species is included in Appendix D, Table D-2.

No zoning restrictions are present within Private DMPA Site A (see Table 3). Required infrastructure improvements including site security infrastructure, construction of levees, equipment staging areas, and hay bale/sediment control dikes would be required to complete DMPA construction and operation activities at this site (see Table 4).

#### 4.4.2 Private DMPA Site B

Private DMPA Site B is an undeveloped tract of land containing 51.4 acres of estuarine and marine wetlands, 39.0 acres of freshwater wetlands, and 0.2 acre of lake (see Table 2 and Appendix A, Figure 7B) located approximately 3.5 miles southwest of the FLNG Basin (meeting selection criteria 7). Private DMPA Site B does not meet selection criteria 1, 2, and 3, as the site contains open water and wetland habitat that would require an individual permit through the USACE, which is expected to take up to 18 months. Additionally, portions of the site may be considered state-owned submerged lands which would require permitting through the GLO.

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Further, once required permits are obtained, up to 12 months would be required to complete construction of the DMPA. Private DMPA Site B would meet selection criteria 4, and this site would likely be large enough to accommodate FLNG's long-term dredged material disposal needs.

The vast amount of existing wetlands and open water areas within Private DMPA Site B currently provide valuable functioning habitat for a variety birds, wildlife, and fisheries species. Private DMPA Site B may contain tidally influenced areas that support essential fish habitat. Mitigation for impacts to these habitats would be required through USACE permitting. However, depending on the type of mitigation available, mitigation areas may take months or years to function at the level of quality that these areas are functioning currently. Additionally, this site is located adjacent to critical habitat for piping plover (see Appendix A, Figure 6). Due the large amount of existing functioning wetland and open water habitat, and the proximity to critical habitat, Private DMPA Site B does not meet selection criteria 5. Selection criteria 6 would be met as the material would be contained inside constructed levees and any dewatering would be in accordance with USACE Nationwide Permit 16.

As indicated in Appendix D, Table D-1, Private DMPA Site B currently provides potential habitat for one threatened fish (opossum pipefish), one threatened aquatic reptile (alligator snapping turtle), and 4 species of threatened or endangered birds (red knot, reddish egret, white-faced ibis, and whooping crane). Due to the presence of similar adjacent habitats in the surrounding area, activities associated with the development of this site would not be expected to adversely impact these species. While Private DMPA Site B is located adjacent to piping plover critical habitat (see Appendix A, Figure 6), due to the approximately 1400-feet of separation between the proposed site and critical habitat, development of Private DMPA Site B is not expected to impact the piping plover or its critical habitat. A detailed impact assessment for each species is included in Appendix D, Table D-2.

No zoning restrictions are present within Private DMPA Site B (see Table 3). Infrastructure improvements including site security infrastructure, water level control outfalls, and construction of levees would be required to complete DMPA construction and operation activities at this site (see Table 4).

#### **4.4.3 Private DMPA Site C**

Private DMPA Site C is an undeveloped tract of land containing approximately 110.6 acres of palustrine wetlands and 0.7 acre of riverine areas based on NWI data (see Table 2 and Appendix A, Figure 7C) located approximately 4 miles west of the FLNG Basin (meeting selection criteria 7). Private DMPA Site C does not meet selection criteria 1, 2, and 3, as the site contains large amounts of wetland and open water habitat that would require an individual permit through the USACE, which is expected to take up to 18 months to obtain. Additionally, once the permit is obtained, up to 12 months would be required to complete construction of the DMPA. Private DMPA Site C would meet selection criteria 4, and this site would likely be large enough to accommodate FLNG's long-term dredged material disposal needs.

The vast amount of existing contiguous wetlands within DMPA Site C currently provide valuable functioning habitat for a variety bird and wildlife species. However, DMPA Site C is not tidally influenced and does not contain essential fish habitat. Mitigation for impacts to these habitats would be required through USACE permitting. However, depending on the type of mitigation available, mitigation areas may take months or years to function at the level of quality that these areas are functioning currently. Due to the presence of large amounts of existing wetlands but

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the absence of essential fish habitat, Private DMPA Site C only partially meets criteria 5. Selection criteria 6 would be met as the material would be contained inside constructed levees and any dewatering would be in accordance with USACE Nationwide Permit 16.

As indicated in Appendix D, Table D-1, DMPA Site C currently provides potential habitat for one threatened fish (opossum pipefish), one threatened aquatic reptile (alligator snapping turtle) and 4 species of protected birds (red knot, reddish egret, white-faced ibis, and whooping crane). Due to the presence of similar adjacent habitats in the surrounding area, activities associated with the development of this site would not be expected to adversely impact these species. A detailed impact assessment for each species is included in Appendix D, Table D-2.

Private DMPA Site C is located within an area zoned as R-1 District, Single Family Residential and W-3 District, Waterfront-Heavy by the City of Freeport (see Table 3). While the W-3 District zoning is consistent with DMPA development, developing the DMPA within the portions of the site zoned as R-1 would not be consistent with current zoning regulations. Infrastructure improvements including access roads, site security infrastructure, construction of levees, and effluent collection trench would be required to complete DMPA construction and operation activities at this site. Additionally, due to the location within the floodplain, development of Private DMPA Site C would require installation of a drainage structure within a Federal levee, which would require a 408 permit through the Velasco Drainage District and USACE (see Table 4).

#### **4.4.4 Private DMPA Site D**

Private DMPA Site D is an undeveloped tract of land containing 0.9 acre of freshwater emergent wetlands (see Table 2 and Appendix A, Figure 7D) located approximately 2.8 miles north of the FLNG Basin (meeting selection criteria 7). As DMPA Site C is not tidally influenced, it does not contain essential fish habitat. Private DMPA Site D does not meet selection criteria 1, 2, and 3, as the site contains wetland habitat that would require an individual permit through the USACE, which is expected to take up to 18 months to obtain. Additionally, once the permit is obtained, up to 12 months would be required to complete construction of the DMPA. Although Private DMPA Site D would likely meet selection criteria 4, this site is not large enough to accommodate FLNG's long-term dredged material disposal needs. Due to the presence of existing wetlands but absence of essential fish habitat, DMPA Site D only partially meets selection criteria 5. Selection criteria 6 would be met as the material would be contained inside constructed levees and any dewatering would be in accordance with USACE Nationwide Permit 16.

As indicated in Appendix D, Table D-1, Private DMPA Site D currently provides potential habitat for 1 species of threatened aquatic reptile (alligator snapping turtle) and 3 species of protected birds (red knot, reddish egret, and white-faced ibis). Due to the presence of similar adjacent habitats in the surrounding area, activities associated with the development of this site would not be expected to adversely impact these species. A detailed impact assessment for each species is included in Appendix D, Table D-2.

No zoning restrictions are present within Private DMPA Site D (see Table 3). Infrastructure improvements including site security infrastructure, water level control outfalls, and construction of levees would be required to complete DMPA construction and operation activities at this site (see Table 4).

#### **4.4.5 Private DMPA Site E**

Private DMPA Site E is an undeveloped tract of land containing 142.4 acres of estuarine and marine wetlands and 9.5 acres of estuarine and marine deepwater (see Table 2 and Appendix A, Figure 7E) located approximately 3 miles northeast of the FLNG Basin (meeting selection criteria 7). Private DMPA Site E does not meet selection criteria 1, 2, and 3, as the site contains large amounts of wetland and open water habitat that would require an individual permit through the USACE, which is expected to take up to 18 months to obtain. Additionally, once the permit is obtained, up to 12 months would be required to complete construction of the DMPA. Private DMPA Site E would meet selection criteria 4, and would likely be large enough to accommodate FLNG's long-term dredged material disposal needs.

The vast amount of existing contiguous wetland and open water areas within Private DMPA Site E currently provide valuable habitat for birds, wildlife, and fisheries. Due to the site's connectivity to tidal waters, portions of it currently provide essential fish habitat for a variety of estuarine species. Mitigation for impacts to these habitats would be required through USACE permitting. However, depending on the type of mitigation available, mitigation areas may take months or years to function at the level of quality that these areas are functioning currently. Due to the presence of large amounts of existing wetlands and open water areas and essential fish habitat, DMPA Site E does not meet selection criteria 5. Selection criteria 6 would be met as the material would be contained inside constructed levees and any dewatering would be in accordance with USACE Nationwide Permit 16.

As indicated in Appendix D, Table D-1, Private DMPA Site E currently provides potential habitat for one species of threatened fish (opossum pipefish), one species of threatened aquatic reptile (alligator snapping turtle), and 4 species of threatened or endangered birds (red knot, reddish egret, white-faced ibis, and whooping crane). Due to the presence of similar adjacent habitats in the surrounding area, activities associated with the development of this site would not be expected to adversely impact these species. A detailed impact assessment for each species is included in Appendix D, Table D-2.

No zoning restrictions are present within Private DMPA Site E (see Table 3). Infrastructure improvements including access roads, site security infrastructure, water level control outfalls, construction of levees, effluent collection trench and effluent detention basin would be required to complete DMPA construction and operation activities at this site (see Table 4).

#### **4.4.6 Private DMPA Site F**

Private DMPA Site F is an undeveloped tract of land containing 44.2 acres of estuarine and marine wetlands (see Table 2 and Appendix A, Figure 7F) located approximately 5 miles north of the FLNG Basin (meeting selection criteria 7). Private DMPA Site F does not meet selection criteria 1, 2, and 3, as the site contains wetland habitat that would require an individual permit through the USACE, which is expected to take up to 18 months to obtain. Additionally, once the permit is obtained, up to 12 months would be required to complete construction of the DMPA. Private DMPA Site F would meet selection criteria 4, and this site would likely be large enough to accommodate FLNG's long-term dredged material disposal needs.

Due to the presence of large amounts of existing wetlands and immediate adjacency to the Brazoria National Wildlife Refuge, Private DMPA Site F would not meet selection criteria 5. Selection criteria 6 would be met as the material would be contained inside constructed levees and any dewatering would be in accordance with USACE Nationwide Permit 16.

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As indicated in Appendix D, Table D-1, Private DMPA Site F currently provides potential habitat for three species of threatened birds (red knot, reddish egret, and white-faced ibis). Due to the presence of similar adjacent habitats in the surrounding area, activities associated with the development of this site would not be expected to adversely impact these species. A detailed impact assessment for these species is included in Appendix D, Table D-2.

No zoning restrictions are present within Private DMPA Site F (see Table 3). Infrastructure improvements including site security infrastructure, water level control outfalls, construction of levees, effluent collection trench and effluent detention basin would be required to complete DMPA construction and operation activities at this site (see Table 4).

**4.4.7 Conclusion**

Based on the screening-level assessment conducted at six potential private DMPA sites, none of the sites analyzed adequately fulfilled the selection criteria necessary to be considered as a practicable alternative and therefore, were not selected for further evaluation. Table 7 includes a summary of the results of the screening level analysis against the selection criteria at each potential Private DMPA site.

<b>Table 7: Selection Criteria Summary for Private DMPA Development Site Alternatives - Summary</b>						
Selection Criteria	Private DMPA Site					
	A	B	C	D	E	F
Site would allow for detailed engineering and permit application development within timeframe that meets Project schedule and regulatory filing requirements (selection criteria 1 and 2)	N	N	N	P	N	P
Land owned by FLNG or available for purchase or long-term lease (selection criterion 3)	P	M	M	M	M	M
Sufficient contiguous land acreage to create levees and provide enough capacity for long-term use (selection criterion 4)	N	M	M	N	M	P
Minimize impacts to special aquatic sites (selection criterion 5)	N	N	P	P	M	N
Location within 5 miles of FLNG Basin (selection criterion 7)	M	M	M	P	P	N
Proposed industrial use compatible with existing surrounding land use(s) and aesthetics <sup>a</sup>	N	N	M	P	N	N
Cost of development and maintenance <sup>a</sup>	P	P	M	P	M	P
Potential for floodplain impacts <sup>a</sup>	P	M	M	M	P	P
Potential to impact Federal interest <sup>a</sup>	P	P	M	N	P	P
M = Meets P = Partially Meets N = Does Not Meet <sup>a</sup> Additional consideration above those listed as selection criteria that FLNG has taken into account when evaluating potential private DMPA sites provided for reference.						

In June 2018, FLNG submitted a request for permit modification to USACE Permit No. SWG-2013-00147 for the construction and operation of a Private DMPA at Site C to accommodate the placement of maintenance material from the FLNG Basin and create stability for future operations. Following a public notice issued for the original LTDMPA, substantial comments were received resulting in revisions to the overall Project design. On May 20, 2019, the USACE issued a letter withdrawing the permit modification request. Since that time, FLNG has completed substantial engineering and feasibility studies of a revised Project with a significantly reduced footprint and

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resubmitted a revised permit modification request to the USACE in September 2019. Although FLNG is committed to the development of a private DMPA, the required timeline for the permitting, engineering, and construction is not sufficient to address immediate needs for the placement of maintenance material to allow continued operations of existing FLNG infrastructure.

#### **4.5 SEDIMENT DIVERSION SCREENING ANALYSIS**

##### **4.5.1 Southern Dredging Option Screening Analysis**

The southern dredging alternative was considered during analysis but does not fulfill the Project purpose and need to ensure the navigational safety and operability of vessel traffic within the FLNG Basin. The modeling of this alternative, as described in Appendix B, shows a 10 percent reduction of sedimentation within the basin. The Southern Dredging Option would require modifications to the existing USACE permit for the additional dredging and modification of the rock groins located south of the FLNG Basin. Such modifications would likely require a Section 408 permit review and real estate agreement with the USACE Galveston District.

The anticipated timeline associated with obtaining the necessary regulatory approvals, engineering, and construction is anticipated to require 24 months. Additionally, this option would require the disposal of dredged material as a result of the described modifications as well as the disposal of already accumulated sediments located within the FLNG Basin to obtain depths necessary to ensure safe navigation of incoming and outgoing vessel traffic. The southern dredging option would help to alleviate future sedimentation within the FLNG Basin but does not meet the Project purpose and need of allowing for the initial navigation of vessels within the FLNG Basin in 2018. Based on this analysis, the southern dredging alternative does not fulfill the Project purpose and need and therefore was not considered a practicable alternative or selected for further evaluation.

##### **4.5.2 Locks Alternative Screening Analysis**

The locks alternative was considered during analysis but does not fulfill the Project purpose and need for the placement of material already accumulated at the FLNG Basin. Additionally, the required permitting and Section 204 agreement with the Texas Department of Transportation are anticipated to take 36 months. This option would still require both the initial and subsequent maintenance dredging events to remove accumulated sediments until the locks are installed. This option could be considered in future analysis as a viable option to reduce the amount of sediment accumulated in the FLNG Basin, but does not fulfill the immediate Project goals and objectives and therefore was not considered a practicable alternative or selected for further evaluation.

##### **4.5.3 Conclusion**

Based on the screening-level assessment conducted sediment diversion alternatives, neither alternative analyzed adequately fulfilled the selection criteria necessary to be considered as a practicable alternative and therefore, were not selected for further evaluation. Table 8 includes a summary of the results of the screening level analysis against the selection criteria for each sediment diversion alternative.

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**Table 8: Selection Criteria Summary for Sediment Diversion Alternatives - Summary**

Selection Criteria	Southern Dredging Option	Locks
Site would allow for detailed engineering and permit application development within timeframe that meets Project schedule and regulatory filing requirements (selection criteria 1 and 2)	N	N
Land owned by FLNG or available for purchase or long-term lease (selection criterion 3)	M	N
Provides 250,000 cubic yards of capacity (selection criterion 4)	N/A	N/A
Minimize impacts to special aquatic sites (selection criterion 5)	M	N
Material is suitable for placement (selection criterion 6)	N/A	N/A
Location within 5 miles of FLNG Basin (selection criterion 7)	M	M
N/A = Not Applicable		

**4.6 OFFSHORE SPOIL DISPOSAL SCREENING ANALYSIS (PREFERRED ALTERNATIVE)**

The option of offshore disposal of maintenance dredged material was considered during the screening level analysis. The disposal of material dredged from the FLNG Basin would create the conditions necessary to ensure the navigational safety and operability of vessels for the utilization of existing FLNG infrastructure and fulfillment of contract commitments. The permitting timeframe associated with the offshore disposal of material meets selection criteria 1 and 2, based on recent input received from the USACE and USEPA that indicate testing/analysis separate from the federal project will not be required. The Freeport Maintenance and New Work ODMDS's, satisfy selection criterion 3 as they are available for non-federal use. Due to the dispersive nature of ODMDS's and the procedures and protocols in place within the ODMDS Site Management and Monitoring Plan to monitor the status of the sites, FLNG expects the ODMDS's to have sufficient capacity for the Project, satisfying selection criterion 4. As the Maintenance and New Work ODMDS's are existing designated disposal sites, and the regulations updated in 2015 allow for the disposal of material within the FLNG Basin to be deposited offshore, FLNG considers this alternative will meet selection criterion 5.

In August 2016, FLNG collected surficial sediment and ambient water for the purposes of conducting chemical and grain-size analysis for the maintenance dredging of approximately 150,000 CY of material from Dock 1 of the FLNG Basin for disposal at the Federal DMPA 85. Based on the results of this data, there were no exceedance of chemical concentrations or indications that would suggest a cause for concern for significant impacts to special aquatic resources as a result of the placement of material at the Freeport Maintenance ODMDS.

The USACE previously approved the use of the Freeport Maintenance ODMDS as the designated disposal location for maintenance material from the FLNG Basin in February 2018, under Permit No. SWG-2013-00147 and a new MPRSA Section 103 Permit. The USACE has the authority to issue the permit contingent upon concurrence from the USEPA that the material is suitable for ocean disposal. In association with FLNG's current Section 103 authorization, which expires February 14, 2021, FLNG conducted field sampling of the material which was to be dredged and disposed of in the Freeport Maintenance ODMDS, in accordance with the USACE and USEPA-approved SAP in May 2017. Furthermore, based on sampling conducted by the USACE for

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material located in the Freeport Harbor Channel, directly adjacent to the FLNG Basin, the material that would be dredged from the Basin during maintenance activities is suitable for offshore disposal.

Subsequently, a Tier I Analysis was submitted in December 2019 in anticipation of a dredging event. The Tier I Analysis included a reassessment of all new and previously evaluated data in order to provide supporting evidence to reasonably conclude that the material proposed to be dredged within the FLNG Basin remains in compliance with the existing Section 103 of the MSRPA. The Tier I analysis referenced the 2017 sediment chemistry report approved by and conducted in accordance with the USACE and USEPA. Since that time, no evidence of significant spills or other potential sources of contamination have been identified near the Project area which would indicate a cause for concern. As such, the material within the FLNG Basin met the criteria for ocean disposal outlined in 40 CFR § 227.13(b)(3). FLNG received confirmation that the material was suitable for ocean disposal on January 30, 2020. Refer to Appendix E for the previously submitted Tier I Analysis and subsequent confirmation.

Based on previous analyses, FLNG anticipates that the material will be suitable for ocean disposal at the Freeport Maintenance ODMDS. As part of this permit modification request, FLNG is submitting an updated Tier I Analysis which analyzes previously evaluated and new data to provide supporting evidence to reasonably conclude that the material proposed to be dredged remains in compliance with the existing Section 103 of the MPRSA. The updated Tier 1 Analysis is provided as Attachment C of the overall USACE Permit Modification request.

The New Work ODMDS is located approximately 6 miles offshore and 7 miles south of the FLNG Basin, which does not satisfy selection criteria 7. The Freeport Maintenance ODMDS is located approximately 3 offshore and 4 miles from the FLNG Basin, satisfying selection criterion 7. Since the Maintenance ODMDS is the only alternative considered that meets all the identified selection criteria, the Maintenance ODMDS was considered the only practicable alternative. Table 9 includes a summary of the results of the screening level analysis against the selection criteria for each ODMDS site.

Selection Criteria	Maintenance ODMDS	New Work ODMDS
Site would allow for detailed engineering and permit application development within timeframe that meets Project schedule and regulatory filing requirements (selection criteria 1 and 2)	M	M
Land owned by FLNG or available for purchase or long-term lease (selection criterion 3)	M	M
Sufficient contiguous land acreage to create levees and provide enough capacity for long-term use (selection criterion 4)	M	M
Minimize impacts to special aquatic sites (selection criterion 5)	M	M
Material is compatible with ODMDS designation (selection criterion 6)	M	N
Location within 5 miles of FLNG Basin (selection criterion 7)	M	N

**5.0 ALTERNATIVES CONSIDERED FOR DETAILED ANALYSIS**

The alternative screening process was completed based on comprehensive knowledge of the requirements to complete a project in this environment. Based on this analysis, the offshore spoil

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disposal at the Freeport Maintenance ODMDS was considered as the only viable alternative for the placement dredged material, and therefore was carried forward for further analysis. As such, the following sections discuss the impacts associated with offshore soil disposal at the Freeport Maintenance ODMDS. The maintenance dredging at the FLNG Basin and disposal of dredged maintenance material into the Freeport Maintenance ODMDS forms the basis for FLNG's requested authorization amendment and is herein referred to as the "proposed Permit modification".

## **6.0 ENVIRONMENTAL ANALYSIS**

### **6.1 OVERVIEW**

#### **Freeport Maintenance ODMDS**

Previous environmental analyses for the Freeport Maintenance ODMDS were conducted by the USEPA during the initial designation of the site in 1991, and by the USACE – Galveston District in the FEIS for the Proposed Port Freeport Channel Widening Project (Channel Widening Project) in January 2008, and subsequently in the FHCIP FEIS in September 2012.

In association with FLNG's current Section 103 authorization, which expires February 14, 2021, FLNG conducted field sampling of the material which was to be dredged and disposed of in the Freeport Maintenance ODMDS, in accordance with the USACE and USEPA-approved SAP in May 2017. Furthermore, based on sampling conducted by the USACE for material located in the Freeport Harbor Channel, directly adjacent to the FLNG Basin, the material that would be dredged from the Basin during maintenance activities is suitable for offshore disposal.

Subsequently, a Tier I Analysis was submitted in December 2019 in anticipation of a dredging event. The Tier I Analysis included a reassessment of all new and previously evaluated data in order to provide supporting evidence to reasonably conclude that the material proposed to be dredged within the FLNG Basin remains in compliance with the existing Section 103 of the MSRPA. The Tier I analysis referenced the 2017 sediment chemistry report approved by and conducted in accordance with the USACE and USEPA. Since that time, no evidence of significant spills or other potential sources of contamination have been identified near the Project area which would indicate a cause for concern. As such, the material within the FLNG Basin met the criteria for ocean disposal outlined in 40 CFR § 227.13(b)(3). FLNG received confirmation that the material was suitable for ocean disposal on January 30, 2020. Refer to Appendix E for the previously submitted Tier I Analysis and subsequent confirmation.

Based on previous analyses, FLNG anticipates that the material will be suitable for ocean disposal at the Freeport Maintenance ODMDS. As part of this permit modification request, FLNG is submitting an updated Tier I Analysis which analyzes previously evaluated and new data to provide supporting evidence to reasonably conclude that the material proposed to be dredged remains in compliance with the existing Section 103 of the MPRSA. The updated Tier 1 Analysis is provided as Attachment C of the overall USACE Permit Modification request.

## **FLNG Basin**

Previous environmental analysis for the FLNG Basin was conducted by the Federal Energy Regulatory Commission (FERC) in the FEIS for the FLNG Phase I Project in May 2004 (Phase I EIS) and the Final EIS for the Liquefaction Project and Phase II Modification Project in June 2014 (Liquefaction FEIS). FLNG proposes to utilize the currently authorized methods of mechanical dredging, hydraulic dredging, and/or hopper dredging within the FLNG Basin.

### **6.2 ENVIRONMENTAL SETTING**

#### **Freeport Maintenance ODMDS**

A description of the environmental setting for the Freeport Maintenance ODMDS is included in Section 3.3 (pages 3-5 – 3-17) of the FHCIP FEIS. As stated in Appendix B (page 9) of the FHCIP FEIS, the Freeport Maintenance ODMDS is approximately 2.0 square miles (1,293 acres) in size and located about 3 miles offshore in water depths ranging from 31 to 38 feet (ft.).

#### **FLNG Basin**

Previous environmental analysis for the FLNG Basin was conducted by the FERC in the Phase I EIS and the Final EIS for the Liquefaction FEIS. The FLNG Basin is positioned off the south shoreline of the GIWW and west of the Freeport Entrance Channel. The FLNG Basin is approximately 62.9 acres in size and based on recent bathymetry surveys, it exhibits depths ranging from 44 to 48 ft. Refer to Appendix A, Figure 1 for a depiction of the location of the FLNG Basin.

### **6.3 HISTORIC AND CURRENT USE**

#### **Freeport Maintenance ODMDS**

The Freeport Maintenance ODMDS was designated for maintenance dredging activities within the Freeport Harbor Channel. The Freeport Maintenance ODMDS is located approximately 3 miles offshore, and about 1,000 ft. southwest of the centerline of the Outer Bar Channel. Past use of the New Work and Maintenance ODMDS by FLNG and the USACE since FLNG obtained Section 103 authorizations is included in Table 1. Pending permit approvals, FLNG proposes to utilize the Freeport Maintenance ODMDS for the placement of maintenance dredged material located within the FLNG Basin as required to provide sufficient depths to maintain safe Project operations.

#### **FLNG Basin**

Historically, the FLNG Basin and area land uses included commercial, residential, open land, and open water. Cattle grazing was the predominant land use within open land prior to the construction of FLNG infrastructure. Currently, the FLNG Basin serves as an open water basin which allow vessel access to FLNG docks for loading and offloading of LNG products.

## **6.4 ENVIRONMENTAL IMPACTS**

The potential environmental impacts associated with the dredging of maintenance material within the FLNG Basin and subsequent offshore disposal of maintenance material within the Freeport Maintenance ODMDS are described below.

### **6.4.1 Historic and Cultural Resources**

#### **Freeport Maintenance ODMDS**

As proposed, disposal activities would be consistent with disposal activities that have been occurring at the Maintenance ODMDS for over the past 28 years, FLNG does not anticipate any impacts to historic and cultural resources from proposed disposal activities.

#### **FLNG Basin**

The initial dredging of the FLNG Basin was authorized by the FERC in 2004 and 2014 following the analyses contained in the Phase I EIS and Liquefaction EIS, respectively. The initial Maintenance dredging of the FLNG Basin was authorized by the USACE in the current Section 103 authorization which expires on February 14, 2021. As the proposed maintenance dredging would continue to occur within areas that have been previously assessed and authorized for previous FLNG projects, impacts to historic properties are not anticipated.

### **6.4.2 Water Quality**

#### **Freeport Maintenance ODMDS**

Increases in sedimentation and turbidity during dredged material placement could temporarily decrease water quality at the Freeport Maintenance ODMDS. Water quality is expected to return to ambient shortly after placement activities are completed. No significant impacts to water quality will result from the placement of dredged material into the Freeport Maintenance ODMDS.

#### **FLNG Basin**

FLNG anticipates using hydraulic cutter head dredging, mechanical bucket dredging, and/or hopper dredging to excavate the maintenance material located within the FLNG Basin. FLNG will utilize best management practices during dredging to minimize turbidity impacts. Turbidity is most common near the bottom and will likely be confined to deeper water in the Basin or immediately adjacent water bottoms. Increased turbidity within shallow water areas of the GIWW or Freeport Harbor Channel is not anticipated. Excavated material will be loaded directly into a scow barge or the hopper barge which will then be transported to the Freeport Maintenance ODMDS. It is not anticipated that this amount or type of dredged material will compromise water quality on a greater than temporary basis. The dredging and placement of material will be conducted in compliance with the existing National Dredging Quality (DQM) Program requirements as specified in the special conditions of the previously authorized permit modification to USACE Permit No. SWG-2013-00147.

### **6.4.3 Endangered Species**

#### **Freeport Maintenance ODMDS**

As indicated in Appendix D, Table D-1, The Freeport Maintenance ODMDS currently provides potential habitat for one species of threatened fish (giant manta ray), 5 species of threatened or endangered sea turtles (green, hawksbill, Kemp's ridley, leatherback, and loggerhead) and 5 threatened or endangered marine mammals (fin whale, humpback whale, sei whale, sperm whale, and West Indian manatee).

Increases in turbidity and sedimentation would result within the Maintenance ODMDS during the period of disposal activities. The giant manta ray, sea turtles, and marine mammals are mobile species and have the ability to relocate to the abundant amount of similar habitat located adjacent to the areas where the disposal activities would occur. As such, impacts to these species during disposal activities are not anticipated. A detailed impact assessment for these species is included in Appendix D, Table D-2.

#### **FLNG Basin**

As indicated in Appendix D, Table D-1, The FLNG Basin currently provides potential habitat for one threatened fish (opossum pipefish), 5 species of threatened or endangered sea turtles (green, hawksbill, Kemp's ridley, leatherback, and loggerhead), and 2 endangered marine mammals (humpback whale and West Indian manatee).

Increases in turbidity and sedimentation would result within the FLNG Basin during the period of dredging activities. Sea turtles and marine mammals are mobile species and have the ability to relocate to the abundant amount of similar habitat located adjacent to the areas where the disposal activities would occur. While FLNG's anticipates its primary methods of dredging will remain mechanical and/or hydraulic, FLNG requests to extend the authorization for hopper dredging within the FLNG Basin in order to have the option of utilizing the same dredging contactor as the USACE during the annual Freeport Harbor Channel dredging event. Impacts to these species resulting from hydraulic or mechanical dredging activities are not anticipated. To minimize potential impacts to sea turtles, all dredging and disposal work would be conducted in accordance with the Gulf of Mexico Region Biological Opinion on Hopper Dredging to meet Section 7 requirements under the Endangered Species Act. A detailed impact assessment for these species is included in Appendix D, Table D-2.

### **6.4.4 Fish and Wildlife Values (including Essential Fish Habitat)**

#### **Freeport Maintenance ODMDS**

Increases in sedimentation and turbidity from the placement of dredged material within the Freeport Maintenance ODMDS could temporarily impact marine water column essential fish habitat (EFH) and benthic communities including marine non-vegetated bottom EFH. As stated in Section 4.3.1 (page 4-10 – 4-11) of the FHCIP FEIS, benthic communities will likely shift from the current composition to that of more-opportunistic species following placement of dredged material within the Freeport Maintenance ODMDS. Benthic communities at the Freeport Maintenance ODMDS are expected to recover in a relatively short timeframe following placement of the material and no long-term impacts will result from the placement of maintenance material at the

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Freeport Maintenance ODMDS. Impacts to fish and wildlife values, including EFH, will be temporary and minor.

The TPWD Artificial Reef Program's George Vancouver Liberty Ship Reef is located approximately 8 miles southwest of the Maintenance ODMDS. Due to the distance from the Maintenance ODMDS and the fact that disposal activities would be consistent with those the USACE has conducted in the past at the Maintenance ODMDS, no adverse impacts to this reef are anticipated as a result of the placement of dredged material within the Maintenance ODMDS.

### **FLNG Basin**

The proposed dredging can result in temporary disturbance to fishery resources and habitat due to increased turbidity in the water column from fine material suspension entrainment and burial of species (especially benthic species). Studies by the USACE and others have found that benthic organism populations regenerate rapidly after dredging. Since many of the potential impacts on marine habitats and species are associated with water quality, the measures reference in Section 6.4.2 will also aid in reducing impacts on marine habitat and species.

#### **6.4.5 Wetlands and Special Aquatic Sites**

##### **Freeport Maintenance ODMDS**

No wetlands or special aquatic sites are located within or adjacent to the Freeport Maintenance ODMDS. The only habitat type located at the Freeport Maintenance ODMDS is marine unvegetated bottom and marine water column. The proposed disposal of material into the Freeport Maintenance ODMDS will result in no impacts to wetlands or special aquatic sites.

##### **FLNG Basin**

No wetlands or special aquatic sites are located within the FLNG Basin dredge footprint or are anticipated to be impacted as a result of the dredging activities at the FLNG Basin.

#### **6.4.6 Shoreline Erosion and Accretion**

##### **Freeport Maintenance ODMDS**

As the Freeport Maintenance ODMDS is located approximately 3 miles offshore, the placement of dredged material into the Freeport Maintenance ODMDS will not impact shoreline erosion or accretion.

##### **FLNG Basin**

Shoreline protection of the FLNG Basin was permitted and constructed under SWG-2013-00147. With the shoreline protection in place, the proposed maintenance dredging activities are not expected to impact shoreline erosion and accretion.

#### **6.4.7 Recreation**

##### **Freeport Maintenance ODMDS**

Any recreational fishing activities within the Freeport Maintenance ODMDS area could be temporarily affected by increases in suspended sediment and turbidity during dredging operations. These impacts will be short term and minor as water quality will return to ambient following dredging operations.

##### **FLNG Basin**

The FLNG Basin is a designated exclusion zone where no recreational fishing or other activities are permitted. As such, maintenance dredging activities within the FLNG Basin will not impact recreation.

#### **6.4.8 Aesthetics**

##### **Freeport Maintenance ODMDS**

As stated in Section 4.16.2 (page 4-49 – 4-50) of the FHCIP FEIS, the placement of dredged material within the Freeport Maintenance ODMDS would have minimal effect on the overall visual quality of the ODMDS area.

##### **FLNG Basin**

Minimal impacts to aesthetics would occur as a result of maintenance dredging activities at the FLNG Basin. The proposed dredging process produces less turbidity than other common dredge types. Turbidity as a result of dredging would likely be confined to the deeper water marine Basin and therefore will not affect the surrounding shallow water areas.

#### **6.4.9 Land Use**

##### **Freeport Maintenance ODMDS**

As placement of the dredged material would be confined to the existing designated Freeport Maintenance ODMDS, no impacts to land use are expected.

##### **FLNG Basin**

Since dredging activities would be confined to the existing FLNG Basin, no impacts to land use are expected.

#### **6.4.10 Navigation**

##### **Freeport Maintenance ODMDS**

Navigation could be temporarily impacted during disposal activities. The location of the scow vessel during trips between the FLNG Basin and Freeport Maintenance ODMDS could temporarily obstruct navigation paths for commercial and recreational vessels. To minimize this

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impact, the dredging contractor will coordinate the dredging work with the U.S. Coast Guard, which publishes Notices to Mariners informing waterway users of the nature, location, and duration of construction work, as well as how to contact the dredging contractor to arrange for passage, if necessary.

Per the Site Management and Monitoring Plan for the Freeport Harbor Maintenance and New Work ODMDS (Freeport SMMP), bathymetry surveys of the maintenance ODMDS are required prior to- and immediately following disposal activities to closely monitor mounding of the dredged material and the potential hazard to navigation. FLNG will abide by all requirements outlined in the Freeport SMMP to ensure hazard to navigation is minimized or mitigated for, if necessary.

No significant impacts to navigation are expected from disposal activities at the Freeport Maintenance ODMDS.

### **FLNG Basin**

Navigation within the FLNG Basin will be temporarily impacted as a result of dredging activities. The location of the dredge and support vessels could temporarily obstruct navigation paths during dredging activities. Both the U.S. Coast Guard and USACE (including the Freeport Area Engineer of USACE, Galveston District, and Northern Area Office) will be advised of the dredge schedule. Coordination with the U.S. Coast Guard and Brazos Pilots Association will be ongoing throughout the dredging operations to facilitate passage of commercial shipping and other vessels along the Freeport Harbor Channel and GIWW.

#### **6.4.11 Federal Projects**

The Freeport Maintenance ODMDS was anticipated to maintenance material volume of 4.05 million cubic yards of maintenance material from the FHCIP, a Federal Navigation Project. The FHCIP very recently received funding and is in the early stages of construction. Due to the dispersive nature of the site, and the fact that current maintenance material quantities being disposed of annually at the Maintenance ODMDS are much less than 4 million cubic yards a year, FLNG believes sufficient capacity exist in the Maintenance ODMDS for placement of maintenance material from the FLNG Basin, in addition to and generated in the future for the FHCIP. FLNG commits to working with the USACE and USEPA to abide by the Freeport SMMP.

#### **6.4.12 Mineral Needs**

### **Freeport Maintenance ODMDS**

As stated in Section 3.8 of the FHCIP FEIS (page 3-53 – 3-55), three natural gas pipelines are located beneath the Freeport Maintenance ODMDS. However, no impacts to these pipelines will occur during placement of dredged material.

### **FLNG Basin**

No pipelines are currently located beneath the FLNG Basin; therefore, no impacts to pipelines will occur during maintenance dredging activities.

### **6.4.13 Other Federal, State, or Local Requirements**

In order for the USACE to authorize disposal of dredged material into the Freeport Maintenance ODMDS under Section 103 of the MPRSA, the USEPA must concur that requirements under Section 102 of the MPRSA are met, including sampling and sediment analysis criteria. FLNG will conduct analysis of the proposed maintenance material in accordance with the USACE and USEPA approved SAP. A Texas Coastal Zone consistency certification is required for the dredging of material at the FLNG Basin and placement of material within the Freeport Maintenance ODMDS. Additionally, FLNG is coordinating with the USACE to determine the necessary coordination and clearances necessary for a water quality certification administered either by the Texas Railroad Commission or Texas Commission on Environmental Quality (TCEQ).

### **6.4.14 Cumulative and Secondary Impacts**

#### **Freeport Maintenance ODMDS**

Cumulative and secondary impacts associated with the proposed placement of dredged material at the Freeport Maintenance ODMDS from the FLNG project as well as other past, ongoing, and future projects are assessed in the section below. This impacts assessment focuses on the effect of proposed FLNG project in addition to the federal maintenance dredging project of the Freeport Harbor. Potential cumulative impacts would include direct impacts to benthic macroinfaunal and microinfaunal communities by burying, and secondary cumulative impacts to aquatic and benthic organisms via changes in water quality characteristics. FLNG understands that the Freeport Maintenance ODMDS is utilized by the USACE for the placement of dredged material generated during annual dredging of the Freeport Harbor Channel. As such, impacts to the benthic communities could occur as a result of the increased frequency of suspended sediment and turbidity during the disposal of material. To mitigate these impacts, FLNG is assigned a specific non-federal portion of the Freeport Maintenance ODMDS footprint for disposal that separates the FLNG disposal area from the USACE disposal area to maintain the same frequency of disturbance that currently exists. While frequency of disturbance would remain the same, the over volume of dredge material placed at the Freeport ODMDS would increase by approximately 250,000 cubic yards per dredge cycle. Partitioning the disposal areas reduces the cumulative impacts due by minimizing the suspended sediment and turbidity to portions of the ODMDS being utilized during each dredge cycle. For instance, the USACE disposes of maintenance material within the Freeport Maintenance ODMDS approximately every 10 months, per the SMMP. FLNG estimates the USACE's dredge duration to be about 3 months, which means historically, on average, benthic communities within the footprint of the ODMDS disposal area have had about 7 months between dredge cycles to recover before subsequent dredge events. FLNG proposes to dredge every 12 to 18 months, with the same 3-month dredge duration, which would allow for a minimum of 7 months between dredge cycles, consistent with the impacts that have been occurring on the benthic community historically at the maintenance ODMDS.

To further minimize secondary impacts to benthic communities associated with disposal activities, FLNG proposes to cooperatively coordinate with the USACE to develop a consolidated dredging timeframe which would minimize cumulative impacts associated with dredged material disposal at the Freeport Maintenance ODMDS. Benthic communities within the Freeport Maintenance

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ODMDS are expected to recover in a relatively short timeframe following placement of the material and no long-term impacts are anticipated to occur as a result the placement of maintenance material at the Freeport Maintenance ODMDS. The Freeport Maintenance ODMDS is a currently utilized, designated ODMDS in which the placement of material precludes the need to impact other undisturbed marine or terrestrial areas that may provide higher quality habitat.

### **FLNG Basin**

Cumulative and secondary impacts associated with the maintenance dredging of the FLNG Basin and the federal maintenance dredging project of the Freeport Harbor include impacts to the benthic macroinfaunal and microinfaunal communities located within the dredge footprint and temporary impacts to water quality and dissolved oxygen. Incidental mortality to benthic organisms are likely to occur during dredging and transport of material to the Freeport Maintenance ODMDS. Benthic communities will be allowed to regenerate at the FLNG Basin between maintenance dredging events. The repeated dredging of the FLNG Basin over time could reduce the abundance and diversity benthic organisms; however, the initial dredging of FLNG Basin created additional submerged bottom and that habitat is plentiful in the area. Therefore, no large-scale impacts to benthic communities would be anticipated as a result of the proposed project. Temporary impacts to water quality including increased suspended solids and decreases in dissolved oxygen are anticipated to occur based on the nature of dredging operations. Turbidity is most common near the bottom and will likely be confined to deeper water in the Basin or immediately adjacent water bottoms. Increased turbidity could cause fishes in the surrounding area to be displaced temporarily, but is not expected to cause permanent displacement of mobile organisms. Increased turbidity within shallow water areas of the GIWW or Freeport Harbor Channel is not anticipated. Additionally, continued dredging of the Basin would allow a layer of higher salinity water to develop near the bottom of the water column. These areas have been shown to support fisheries species present in the surrounding area, especially during events where freshwater dominates the environment. The cumulative impacts of the proposed FLNG project over time along with ongoing projects is expected to have minimal impacts to the FLNG Basin.

#### **6.4.15 Other Factors**

##### **Freeport Maintenance ODMDS & FLNG Basin**

The following factors were not included in the current analysis as they do not pertain to the Freeport Maintenance ODMDS or FLNG Basin site for the proposed activities: floodplain values; safety; energy needs; floodplain hazards; economics; water supply and conservation; air pollution; and food and fiber production. These factors were evaluated originally for the USACE Permit and the results of that evaluation remain unchanged with the proposed Permit modification.

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## 7.0 REFERENCES

Federal Energy Regulatory Commission, 2004. Final Environmental Impact Statement Freeport LNG Project. Docket No. CP03-75-000 issued May 28, 2004. FERC/EIS-0164.

Federal Energy Regulatory Commission, 2014. Freeport LNG Liquefaction Project Phase II Modification Project Final Environmental Impact Statement. Docket No. CP12-509-000 and CP12-29-000 issued June 16, 2014. FERC/EIS-250F.

U.S. Army Corps of Engineers, 2008. Final Environmental Impact Statement for Proposed Port Freeport Channel Widening Brazoria County, Texas. Northwestern University, Evanston, Illinois.

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