



**Freeport LNG**

**Liquefaction Project and Phase II Developments**

**Environmental Analysis  
(Draft)**

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

**SWG-2013-00147**

**March 2017**

**LIQUEFACTION PROJECT AND PHASE II DEVELOPMENTS  
 ENVIRONMENTAL ANALYSIS  
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## ACRONYMS AND ABBREVIATIONS

Channel Widening Project	Port Freeport Channel Widening Project
CY	cubic yard
DMPA	dredged material placement area
EFH	essential fish habitat
EIS	Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FHCIP	Freeport Harbor Channel Improvement Project
FLNG	Freeport LNG
ft.	feet
GIWW	Gulf Intercostal Waterway
GLO	Texas General Land Office
LNG	liquefied natural gas
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
Terminal	existing LNG terminal on Quintana Island near Freeport, Texas
TPWD	Texas Parks and Wildlife Department

## **1.0 INTRODUCTION**

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 Freeport LNG (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. The FLNG Berth 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 berth is 46.5 feet plus 2 feet over dredge. Refer to Appendix A, Figure 1 for a vicinity map and project location map depicting the FLNG Berth.

FLNG is requesting a modification to the existing permit (SWG-2013-00147) to authorize the offshore disposal of maintenance material dredged from the FLNG Berth into the Freeport Maintenance ODMDS, pursuant to Section 103 of the Marine Protection Research and Sanctuaries Act (MPRSA) of 1972 (Section 103). This document presents an alternatives analysis for maintenance dredged material placement and assesses the potential environmental impacts of practicable alternatives.

## **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 Berth, 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. Construction of the Project is currently underway, and operation is scheduled to commence in 2018. Prior to start of operation, the FLNG Berth must be dredged to authorized depth (48.5 feet including overdredge) in order to allow vessels to access Project infrastructure located within the FLNG Berth. FLNG requests authorization of the requested permit modification by January 2018 to allow sufficient time for completion of dredging activities prior to commencement of Project operation.

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

FLNG analyzed the following alternatives for the placement of maintenance material dredged from the FLNG Berth:

- No Action Alternative
- Beneficial Use
  - Beach Nourishment
  - Bird Island Creation and Wetland Restoration
- Existing Federal DMPA
- Private DMPA Development
- Sediment Diversion
  - Southern Dredging Option
  - Locks Option
- Offshore Spoil Disposal

FLNG conducted a screening process of these various alternatives to determine which alternative would result in fulfilling the objectives for the placement of maintenance dredged material from the FLNG Berth 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:

- Allow permitting and construction (if applicable) within a timeframe necessary to meet the Project schedule
- Open for use by outside users
- Provide a minimum of 100,000 CY of dredged material capacity
- Minimize impacts to special aquatic sites
- Dredge material is suitable for placement at a given location
- Located within 5 miles of the FLNG Berth

The potential to utilize a combination of different disposal sites and/or options was also investigated. 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. The following sections detail the results of the alternative screening process for each alternative as well as identify the alternatives selected for further evaluations.

### **3.1 NO ACTION ALTERNATIVE**

As part of the No Action alternative, no dredging of the FLNG Berth would occur as no placement option would be available. Vessels would be unable to safely navigate to FLNG facilities to fulfill contract commitments to export LNG products to international markets. The No Action alternative does not fulfill the Project purpose and need and therefore was not considered a practicable placement alternative.

### **3.2 BENEFICIAL USE**

#### **3.2.1 Beach Nourishment**

Previous beach nourishment projects have been undertaken locally (including several on Quintana Island). However, the material to be dredged from the FLNG Berth, which includes a high proportion of silt and clay material, is not suitable for this purpose. Therefore, beach nourishment was not considered a practicable placement alternative.

#### **3.2.2 Bird Island Creation and Wetland Restoration**

FLNG conducted a screening-level assessment of potential beneficial use sites for bird island creation and/or wetland restoration within approximately 5 miles of the FLNG Berth. The results of this analysis are presented in Table 3.3-1 and sites investigated are displayed in Appendix A, Figure 2. FLNG also 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 regarding beneficial use of dredged material. While most of the agencies and organizations FLNG met with were generally interested in identifying future long-term beneficial use opportunities, recent discussions failed to identify any specific beneficial use sites with immediate/short-term material needs with enough detail to assess the material volume requirements or assess schedule

timeframe for potential development. While FLNG will continue to coordinate with the above-listed agencies on future long-term beneficial use opportunities, no reasonable options involving beneficial have been identified for the disposal of material associated with maintenance dredging at the FLNG Berth based on the investigative analysis and agency communications described above. Therefore, beach nourishment was not considered a practicable placement alternative.

**Table 3.3-1**  
**Freeport LNG Liquefaction Project and Phase II Developments**  
**Selection Criteria Potential Beneficial Use Sites**

Selection Criteria	Potential Beneficial Use Site				
	A	B	C	D	E
Within 5 miles of the FLNG Berth	high	high	medium	medium	high
Submerged land wholly owned or leased by FLNG to allow permitting timeframe that meets project schedule and regulatory filing requirements	low	low	low	high	low
Contiguous land and/or water depth to provide a minimum of 100,000 CY of dredged material capacity	low	medium	high	low	medium
Presence of special aquatic sites	low	high	medium	low	medium

### 3.3 EXISTING FEDERAL DMPA

FLNG investigated the use of existing Federal DMPAs for the disposal of dredged material from the FLNG Berth. Initially, the Galveston District’s “Dredged Material Management Plan – Final Preliminary Assessment” (March, 2012) was used to identify existing Federal DMPAs close enough to the FLNG Berth to constitute potential alternatives on a solely locational basis. A screening-level assessment of each Federal DMPA was conducted and results of this analysis are presented in Table 3.3-2 and existing DMPA locations are displayed in Appendix A, Figure 3. Based on this assessment, no Federal land-based DMPA’s are available for spoil disposal associated with maintenance dredging activities at the FLNG Berth. As such, an existing federal DMPA was not considered a practicable placement alternative.

**Table 3.3-2**  
**Freeport LNG Liquefaction Project and Phase II Developments**  
**Selection Criteria Summary for Existing DMPA Site Alternatives**

Selection Criteria	DMPA No.													
	1	7	8	9	78	79	80	81	82	83	84	85	86/87	88
Location within pumping distance of FLNG Berth	H	M	M	M	M	M	M	M	H	H	H	H	H	H
Open to use by outside users and not fully-committed to other users	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Existing/fully constructed or completion of construction possible within timeframe that meets project schedule and regulatory filing requirements	H	H	L	L	H	M	M	M	M	L	L	H	H	H
Active DMPA that has been used in past 5 years	H	L	L	L	L	L	L	L	L	L	L	H	M	L
Sufficient available capacity to accommodate a minimum of 100,000 CY of maintenance material	L	M	L	L	M	M	M	M	L	L	L	L	M	M
H = high M = medium L = low														



### 3.4 PRIVATE DMPA DEVELOPMENT

FLNG is currently investigating the option of developing a private DMPA to accommodate the placement of maintenance material from the FLNG Berth on a long-term basis. FLNG conducted a screening-level assessment of potential private DMPA sites within approximately 5 miles of the FLNG Berth. The results of this analysis are presented in Table 3.3-3 and sites investigated are displayed in Appendix A, Figure 4. Based on this assessment, all the potential private DMPA sites investigated have several issues that make them either unfeasible or less favorable for development overall. Additionally, none of the sites analyzed would allow permitting and construction within a timeframe necessary to accommodate for the first few maintenance dredging cycles as required for operations. FLNG will continue to further investigate the option of developing a private DMPA for long-term dredged material disposal and will work with the USACE and U.S. Environmental Protection Agency (USEPA) once a potential site has been identified, and sufficient engineering has occurred to deem the site feasible for private DMPA development. Development of a private DMPA would not meet the Project purpose and need as this placement option could not be permitted and constructed in time to allow safe vessel access to the FLNG Berth prior to commencement of Project operation in 2018; therefore, was not considered to be a practicable alternative.

**Table 3.3-3**  
**Freeport LNG Liquefaction Project and Phase II Developments**  
**Selection Criteria Summary for Private DMPA Development Site Alternatives**

Selection Criteria	Private DMPA Site				
	A	B	C	D	E
Location within 5 miles of FLNG Berth	high	high	medium	medium	low
Sufficient contiguous land acreage to create levees and provide enough capacity for long-term use	low	high	low	high	medium
Proposed industrial use compatible with existing surrounding land use(s) and aesthetics	low	high	medium	low	low
Suitable access to allow for safe construction and maintenance activities	high	low	low	high	medium
Land owned by FLNG or available for purchase or long-term lease	medium	high	high	high	high
Potential for impacts to special aquatic sites	low	high	low	high	low
Site would allow for detailed engineering and permit application development within timeframe that meets project schedule and regulatory filing requirements	low	low	medium	low	medium
Cost of development and maintenance	medium	high	medium	high	medium
Potential for floodplain impacts	medium	high	high	medium	medium
Potential to impact federal interest	medium	high	low	medium	medium

### **3.5 SEDIMENT DIVERSION**

Based on a sedimentation study conducted by Lloyd Engineering, Inc., the results of the modeling were utilized 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. The following 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. The modeling of this alternative 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. Additionally, the required 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 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 allow for the initial navigation of LNG vessels, and therefore was not considered to fulfill the necessary project goals and objectives and was not considered a practicable alternative.

#### **3.5.2 Locks Alternative**

Another sediment diversion alternative analyzed 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. These negotiations in combination with obtaining the necessary permits is anticipated to take 36 months. This option would still require both initial and subsequent maintenance dredging events to remove accumulated sediments until the locks are installed. Refer to the FLNG Marine Basin Sedimentation Study provided in Appendix B for detailed descriptions of the Locks Alternative analyzed. 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 necessary to ensure safe operations at the FLNG Berth. As such, installation of locks at the GIWW was not considered to be a practicable alternative.

### **3.6 OFF-SHORE SPOIL DISPOSAL**

The option of off-shore 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 USEPA changed the regulations to allow dredged material from the vicinity of the Federal channels to be disposed of at designated offshore placement areas. The evident lack of a viable beneficial use or land-based options for disposal of dredged material from the FLNG Berth has rendered off-shore placement as FLNG's only feasible alternative from a technical design perspective.

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. FLNG is proposing to place maintenance material dredged at the FLNG Berth at the Freeport Maintenance ODMDS.

As described in Section 3.5, no significant environmental impacts associated with use of the Maintenance ODMDS are anticipated. As such, and with the lack of available alternative disposal methods, offshore placement at the Freeport Maintenance ODMDS is the preferred disposal method for spoil from the FLNG Berth. Refer to Appendix A, Figure 5 for a depiction of the Freeport Maintenance ODMDS.

## **4.0 ENVIRONMENTAL ANALYSIS**

### **4.1 OVERVIEW**

The results of the alternatives analysis concluded that offshore disposal of maintenance dredged material is the only practicable alternative. As such, only those impacts associated with offshore disposal of maintenance dredged material are discussed in this environmental analysis.

#### **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 Final Environmental Impact Statement (EIS) for the Proposed Port Freeport Channel Widening Project (Channel Widening Project) in January 2008, and subsequently in the Final EIS for the FHCIP (FHCIP EIS) in September 2012.

FLNG will conduct field sampling of the material to be dredged and disposed of in the Freeport Maintenance ODMDS, in accordance with the USEPA-approved SAP. An MPRSA Section 102/103 evaluation report for the material will be prepared and submitted once the analytical data becomes available. While FLNG does not anticipate environmental impacts from contaminated or other problematic sediments, the following sections will be updated as necessary should the evaluation report contain evidence to the contrary.

## **FLNG Berth**

Previous environmental analysis for the FLNG Berth was conducted by the Federal Energy Regulatory Commission (FERC) in the Final EIS for the FLNG Project in May 2004 (Phase I EIS) and the Final EIS for the Liquefaction Project and Phase II Modification Project in June 2014 (Liquefaction EIS).

### **4.2 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 EIS. As stated in Appendix B (page 9) of the FHCIP EIS, 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 Berth**

Previous environmental analysis for the FLNG Berth was conducted by the FERC in the Final EIS for the FLNG Project in May 2004 (Phase I EIS) and the Final EIS for the Liquefaction Project and Phase II Modification Project in June 2014 (Liquefaction EIS). The FLNG Berth is positioned off the south shoreline of the GIWW and west of the Freeport Entrance Channel. The FLNG Berth is approximately 61.7 acres in size and based on recent bathymetry surveys, it exhibits depths ranging from 29 to 47 ft. Refer to Appendix A, Figure 1 for a depiction of the location of the FLNG Berth.

### **4.3 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. Pending permit approvals, FLNG proposes to utilize the Freeport Maintenance ODMDS for the placement of maintenance dredged material located within the FLNG Berth as required to provide sufficient depths to initiate operations of the newly constructed infrastructure.

#### **FLNG Berth**

Historically, the FLNG Berth and area land uses include 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 Berth serves as an open water basin which will allow vessel access to FLNG docks for loading and offloading of LNG products.

### **4.4 ENVIRONMENTAL IMPACTS**

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

#### **4.4.1 Historic and Cultural Resources**

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

As indicated in Section 4.14.3 (page 4-41) of the FHCIP EIS, the Freeport Maintenance ODMDS has been fully surveyed and no historic properties were identified.

##### **FLNG Berth**

The initial dredging of the FLNG Berth was authorized by the FERC in 2004 and 2014 following the analyses contained in the Phase I EIS and Liquefaction EIS, respectively. As the proposed maintenance dredging would occur within areas that have been previously assessed and authorized for previous FLNG projects, no impacts to historic properties is anticipated.

#### **4.4.2 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 dredging activities are completed. No significant impacts to water quality will result from the placement of dredged material into the Freeport Maintenance ODMDS.

##### **FLNG Berth**

FLNG anticipates using a 30-inch hydraulic cutter head dredge to excavate the maintenance material located within the FLNG Berth. This type of dredge produces less turbidity than other common dredge types. Turbidity is most common near the bottom and will likely be confined to deeper water in the berth 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 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.

#### **4.4.3 Endangered Species**

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

Sea turtles are the only federally listed marine species with the potential to occur within the Freeport Maintenance ODMDS during some portion of the year (see Table 2). Temporary impacts to sea turtles could result from increased turbidity and sedimentation if sea turtles are present at the Freeport Maintenance ODMDS during dredged material placement activities. Sea turtles are mobile and have the ability to temporarily move into similar adjacent habitat areas and avoid activities that would cause potential adverse effects. As such, no significant adverse impacts to sea turtles are anticipated to occur as a result of the placement of dredged material into the Freeport Maintenance ODMDS.