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TEXAS LNG

TEXAS LNG BROWNSVILLE LLC
TEXAS LNG PROJECT

Conceptual Mitigation Plan

File No. SWG-2015-00175

Prepared by

NATURAL RESOURCE GROUP
an ERM Group company

March 2016

TEXAS LNG BROWNSVILLE LLC
TEXAS LNG PROJECT

CONCEPTUAL MITIGATION PLAN

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1.0 PROJECT DESCRIPTION

Texas LNG Brownsville, LLC ("Texas LNG") proposes to construct and operate a liquefied natural gas ("LNG"), storage, and export facility along the Brownsville Ship Channel in Cameron County, Texas (figure 1-1). The proposed Terminal and Marine Facilities and associated dredging within the Brownsville Ship Channel and dredged material placement activities are collectively referred to as the "Texas LNG Project," or the "Project."

The Project requires authorization from the U.S. Army Corps of Engineers ("COE") to construct structures in Navigable Waters of the United States under Section 10 of the Rivers and Harbors Act of 1899 and to discharge dredge and/or fill material into Waters of the United States ("WOUS"), including wetlands under Section 404 of the Clean Water Act ("CWA"). This Conceptual Mitigation Plan is intended to accompany Texas LNG's COE application (File No SWG-2015-00175).

The proposed Project facilities will be constructed on an approximately 625-acre site available through a long-term lease with the Brownsville Navigation District of Cameron County (the "BND") and located on the north side of the Brownsville Ship Channel, approximately five miles southwest of the Gulf of Mexico in Cameron County, Texas. The Project Site extends for approximately 3,000 feet along the Brownsville Ship Channel and is located approximately 19 miles northeast of the City of Brownsville on State Highway 48. The leased parcel and the dredging necessary to connect the parcel to the Brownsville Ship Channel are referred to as the "Project Site".

The proposed Project will include two LNG trains with a total export capacity of 4 million tonnes per annum ("MTA"). The Project will be completed in two phases. Phase 1 will consist of the construction of a single 2 MTA LNG train, one 210,000 cubic meters ("m^3") single containment LNG storage tank, and an LNG carrier loading dock with a dredged slip connected to the Brownsville Ship Channel (figure 1-2). Texas LNG intends to construct Phase 1 upon receipt of necessary permits and authorizations. The commencement of the Phase 2 construction will be based upon market demand and will include an additional 2 MTA LNG train and one 210,000 m^3 single containment LNG storage tank. All proposed impacts on WOUS associated with construction of the Project will occur during Phase 1. No additional impacts on WOUS will result as part of the construction activities associated with Phase 2.

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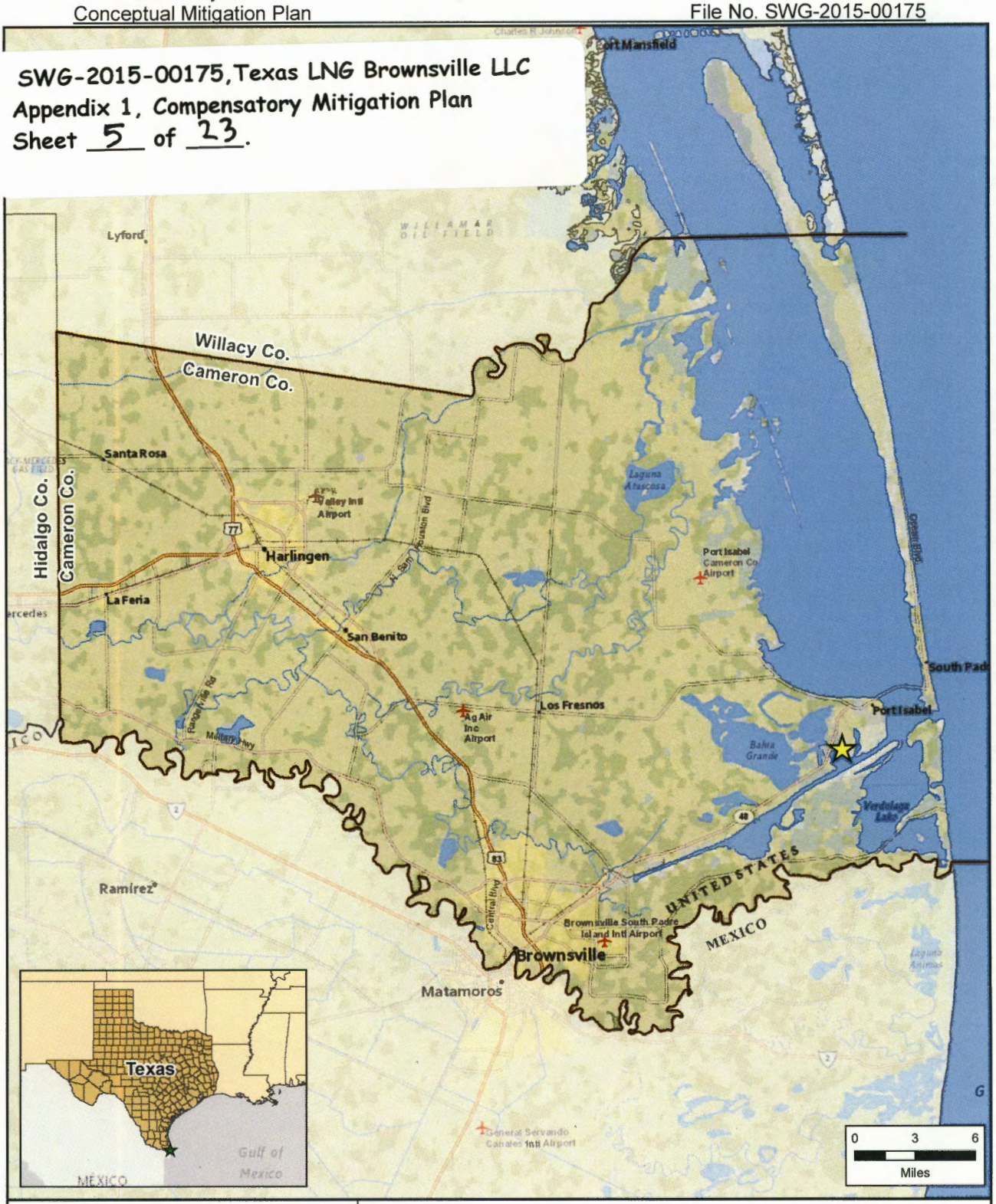

Proposed Project Location

Cameron County Boundary

N

Figure 1-1
Project Site Overview

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Gas Metering Station
Phase 1 Liquefaction Train
Phase 2 Liquefaction Train
Phase 1 LNG Storage Tank
Phase 2 LNG Storage Tank
Utility Substation
WB002
MA001
MB001
Access Road
Administration Area
Access Road
Main Flare
WA002
WA001
WB001
MA002
MB002
MA003
MB003
MB004
Material Offloading Facility
Barge
Marine Berth
LNG Carrier
WATER-NRG
Brownsville Ship Channel
Brownsville-Port Isabel Hwy
Project Site Boundary
Project Facilities
Fenced Terminal Site
Brownsville Ship Channel
Tidal Mudflat
Wetland
Area to be Dredged
1:12,000
0 0.125 0.25 Miles
TEXAS LNG
Figure 1-2
Project Site Layout
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2.0 WATERS OF THE UNITED STATES

The Project site includes four palustrine emergent depressional wetlands, a tidal mudflat, and the perennial, deepwater Brownsville Ship Channel.

As shown on figure 1-2, four separate palustrine emergent ("PEM") depressional wetlands (60 acres) and a contiguous estuarine tidal mudflat (178 acres) were delineated within the Project Site. The wetland delineation report identified 59.98 acres of PEM wetland and 181.55 acres estuarine tidal mudflat. The wetland delineation was performed prior to civil survey of the Project Site resulting in a small discrepancy between the wetland delineation and the final Jurisdictional Determination. The final civil surveyed property boundary was provided to the COE during their Jurisdictional Determination evaluation.

Texas LNG's wetland delineation was approved by the COE Galveston District's Jurisdictional Determination letter dated January 13, 2016, which also updated the wetland and tidal mudflat acreages. The large contiguous tidal mudflat surrounding the north, east, and south boundaries of the Terminal Facility was portioned into seven distinct units in the COE's Jurisdictional Determination. Each unit denotes the tidal jurisdiction for the COE (i.e., Annual High Tide ["AHT"] delineates Section 404 WOUS and Mean High Tide ["MHT"] delineates Sections 404 and 10 WOUS).

Table 2-1 lists the Cowardin wetland classification, permanent acres and temporary acres of WOUS impacts within the Project Site. In total, about 74.3 acres of WOUS will be permanently impacted and 8.9 acres will be temporarily impacted. However, of the permanent impacts listed in Table 2-1, 0.7 acre of PEM and tidal mudflat WOUS will be permanently lost due to site preparation and 39.8 acres of tidal mudflat WOUS will be converted to deepwater habitats through dredging the proposed maneuvering basin. An additional 33.8 acres of deep water habitat in the Brownsville Ship Channel will be dredged for the proposed maneuvering basin. Although 3.7 acres of impacts are associated with the LNG carrier dock and Material Offloading Facility, it is excluded in the total permanent acreage. These structures are regulated under Section 10; however, since these facilities will be supported on piles and will not result in loss of deepwater habitat, the impact is not considered a permanent loss under the criteria of Section 404 of the CWA.

Previous dredging operations in the Brownsville Ship Channel in the early and mid-1900s created a berm along the channel that reduced tidal exchange in many mudflats, including at the location of Texas LNG's proposed maneuvering basin. The berm along the channel prevents natural tidal cycles into nearly 700 acres of tidal mudflat adjacent to the Project Site. Although the surrounding mudflats receive inundation during storm events, much of the area is often dry.

The lack of tidal exchange and high evaporation rates preclude the tidal mudflat at the Project Site from performing historic Essential Fish Habitat ("EFH") functions. As demonstrated in the Bahia Grande Project (about three miles up-channel) (2009), inadequate tidal circulation in lagoons and mudflats exhibit salinity greater than 100 parts per thousand; normal seawater is about 35 parts per thousand.

TABLE 2-1

Texas LNG Project
Summary of WOUS and Proposed Impacts

Wetland ID [a]	Wetland Type	Existing Wetland Size [b] (Acres)	Permanent Impacts [c] (Acres)	Temporary Impacts (Acres)
Tidal mudflat MB002	E2US3P	7.9	0.2	0.0
Wetland WA002	PEM [d]	27.3	<0.1	0.1
Wetland WB002	PEM	19.5	0.1	0.9
Tidal mudflat MA001	E2US3P [e]	30.6	<0.1	0.1
Tidal mudflat MB001	E2US3P	10.9	0.4	0.2
Tidal mudflat MB003	E2US3P	13.5	0.6	0.9
Tidal mudflat MA003	E2US3P	110.1	38.7	4.8
Tidal mudflat MB004	E2US3P	1.6	0.4	0.0
Brownsville Ship Channel	E1UBLx [f]	33.8	33.8 [g]	1.7
Total	**N/A**	**271.7** [h]	**74.3**	**8.9**

[a] Wetlands WA001 (13.0 acres), WB001 (0.1 acre), and tidal mudflat MA002 (3.4 acres) are entirely avoided and not discussed in this section.
[b] Existing delineated wetland area was verified and approved via the COE Galveston District's jurisdictional determination letter dated January 13, 2016.
[c] Permanent impacts exclude 15.4 acres of Rock Armor because it overlaps with the Maneuvering Basin and 3.7 acres associated with of the LNG carrier dock and Material Offloading Facility, which will be supported on piles and will not result in loss of WOUS.
[d] PEM = palustrine emergent
[e] E2US3P = estuarine intertidal unconsolidated shore irregularly flooded
[f] E1UBLx = Estuarine subtidal unconsolidated bottom excavated
[g] The Brownsville Ship Channel includes the 7.1 acres verified and approved via the COE Galveston District's jurisdictional determination letter dated January 13, 2016, and the additional area to the navigation channel outside the leased project boundary.
[h] Total acres of existing wetlands on the Project Site includes avoided wetlands and deepwater habitat in the Brownsville Ship Channel.

2.1 AVOIDANCE AND MINIMIZATION MEASURES

The planning of the Terminal and Marine Facilities has employed the key principles of avoidance and minimization of environmentally sensitive features. Practicable measures have been implemented across the Project design to minimize unavoidable impacts on sensitive features, including wetlands and the tidal mudflats.

Repeated design considerations have successfully avoided much of the WOUS onsite. Of the 60 acres of palustrine emergent wetlands delineated, about 0.1 acre will be permanently filled. Of the 178 acres of tidal mudflat within the leased property, about 39.8 acres will be impacted by dredging the maneuvering basin and temporary construction basin and 0.6 acre will be permanently filled.

A detailed discussion of avoidance and minimization on WOUS is presented in the permit application supplemental narrative.

2.2 COMPENSATION

For the unavoidable Project-related impacts on WOUS that cannot be further avoided or minimized, Texas LNG is providing this conceptual mitigation plan as part of its application to the COE.

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2.3 AVAILABLE MITIGATION CREDITS

As described in the COE's Final Mitigation Rule ("Mitigation Rule") (33 Code of Federal Regulations ["CFR"] 332) (COE, 2008), the fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts on WOUS. To determine the adequacy of compensation the Mitigation Rule considers the location of the compensation site relative to the impact site, its significance within the watershed, and the costs to implement. For this reason, the Mitigation Rule often considers mitigation banks or in-lieu fee programs the environmentally preferable compensation method because they consolidate compensatory mitigation projects.

As shown on figure 2.3-1, the Project Site is located in the South Laguna Madre watershed (Hydrologic Unit Code ["HUC"]: 12110208) in the U.S. Environmental Protection Agency's, Level IV Ecoregion: Laguna Madre Barrier Islands and Coastal Marshes (34i). According to the COE's *Regulatory In lieu fee and Bank Information Tracking System* website (COE, 2016), there are no mitigation bank or in-lieu fee program service areas that include the Project Site.

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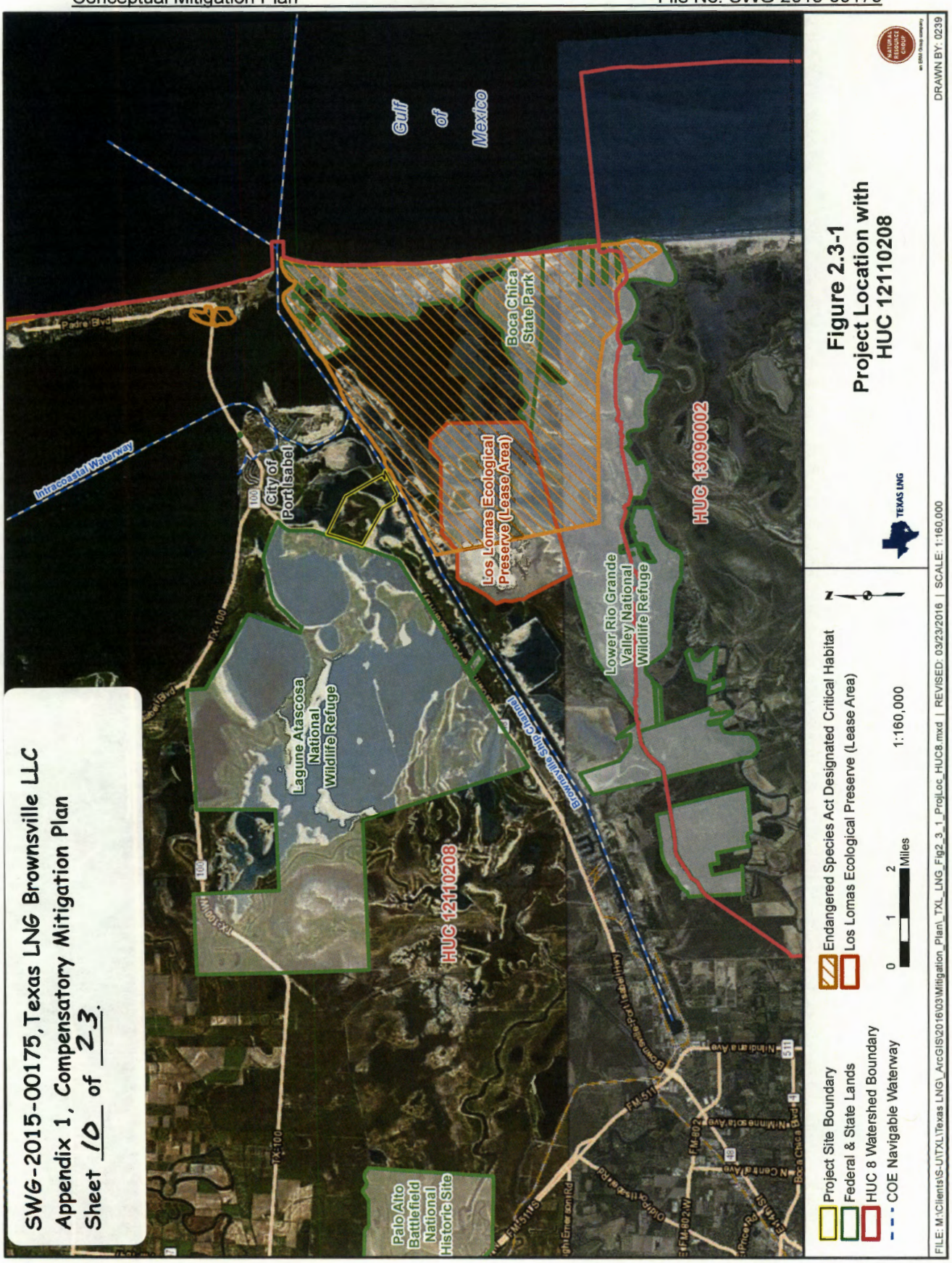
SWG-2015-00175, Texas LNG Brownsville LLC
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Figure 2.3-1
Project Location with
HUC 12110208
Gulf
of
Mexico
Intracoastal Waterway
Padre Blvd
City of
Port Isabel
Boca Chica
State Park
Los Lomas Ecological
Preserve (Lease Area)
Lagune Atascosa
National
Wildlife Refuge
HUC 12110208
HUC 13090002
Lower Rio Grande
Valley National
Wildlife Refuge
Brownsville Ship Channel
Palo Alto
Battlefield
National
Historic Site
TX-100
FM-511
Project Site Boundary
Federal & State Lands
HUC 8 Watershed Boundary
COE Navigable Waterway
Endangered Species Act Designated Critical Habitat
Los Lomas Ecological Preserve (Lease Area)
0
1
2
Miles
1:160,000
TEXAS LNG
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FILE: M:\Clients\S-U\TXL\Texas LNG_ArcGIS\2016\03\Mitigation_Plan_TXL_LNG_Fig2_3_1_ProjLoc_HUC8.mxd | REVISED: 03/23/2016 | SCALE: 1:160,000

3.0 PERMITTEE-RESPONSIBLE MITIGATION SITE SELECTION PROCESS

As described in Section 2.1, Texas LNG has avoided and minimized impacts on WOUS to the maximum extent possible. Since existing mitigation bank or in-lieu fee service areas do not include the Project Site, Texas LNG has prepared this Permittee Responsible Mitigation Plan to offset unavoidable loss of WOUS.

Texas LNG's search for a potential compensatory mitigation site used the following goals and objectives:

Goals

- Preserve aquatic ecosystem functions and hydrologic conditions in sufficient quantity to offset the Project-related impacts within the context of the South Laguna Madre watershed.

Objectives

- Identify land available for preservation within the South Laguna Madre watershed.
- Offset permanent impacts to about 40.5 acres of wetlands and tidal mudflats.
- Provide ecologically self-sustaining aquatic resource preservation.
- Secure at least 405 acres of tidal wetlands for preservation in perpetuity, preferably contiguous to existing protected land.

3.1 WATERSHED APPROACH

The goal of a watershed approach is to maintain and improve the quality and quantity of aquatic resources within watersheds through the strategic selection of compensatory mitigation sites. Therefore, factors such as current trends in habitat loss or conversion; cumulative impacts of past development activities; and chronic environmental problems such as flooding or poor water quality were used to identify potential mitigation opportunities within the same 8-digit HUC and sub-watershed as the Project Site (the South Laguna Madre watershed, HUC: 12110208) (see figure 2.3-1).

3.1.1 Current Watershed Initiatives

Below is a discussion of key watershed initiatives that Texas LNG considered during preparation of this conceptual mitigation plan.

Lower Rio Grande Watershed Initiative

The Lower Rio Grande Watershed Initiative (2016) has brought multi-national federal, state, and private stakeholders together to improve water quality by removing water quality impairments. The primary impairment is high levels of fecal indicator bacteria (e.g., *E. coli*) coming from untreated septic systems. The goal of the initiative is to establish viable and sustainable institutional mechanisms to protect water quality in this coastal watershed. Mechanisms to achieve this goal are protecting coastal wetlands and natural flood protection areas.

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Lower Rio Grande Basin Study

The Lower Rio Grande Basin Study (2013) was developed by the U.S. Department of the Interior - Bureau of Reclamation to address flood control and water management. It projects that water demand will increase in the next 50 years by 35 percent. The plan identifies objectives such as preserving existing water rights and adaptive strategies such as water allocations. Potential measures could include increased water reuse.

Bahia Grande Restoration Project

The Bahia Grande Restoration Project (2009) is a local plan sponsored by Ocean Trust made up of local, state, and federal stakeholders. The project first opened a pilot channel to connect the Bahia Grande to the Brownsville Ship Channel. Later the Laguna Larga and Vadia Ancha were interconnected and subject to tidal cycles. The overarching goal is to restore historic tidal connections to many of the waterbodies between Brownsville and Port Isabel.

South Bay Coastal Preserve

The expansive seagrass beds in South Bay provide habitat to many species including federally listed sea turtles and West Indian manatee. In 1988 the General Land Office leased South Bay's approximately 3,500 surface acres to Texas Parks and Wildlife Department ("TPWD") to manage as a coastal preserve.

Draft Ocelot (*Leopardus pardalis*) Recovery Plan

In south Texas, the ocelot and Gulf Coast jaguarundi are federally listed as endangered under the Endangered Species Act. Although Designated Critical Habitat ("DCH") has not been designated for these felines, the U.S. Fish and Wildlife Service's ("FWS") Draft Ocelot (*Leopardus pardalis*) Recovery Plan, (2010) identified reconnection of sufficient habitat to support viable populations in the United States and Mexico. In the Brownsville area, efforts have been underway since 1979 to create a habitat corridor along the Laguna Madre coast connecting the Laguna Atascosa National Wildlife Refuge ("NWR") with suitable habitat in Mexico (FWS, 2015).

In 1998, an ocelot was radio-collared and tracked to determine movement patterns and habitat utilization. During tracking, the ocelot spent most days on lomas south of the Brownsville Ship Channel. In order to create a habitat corridor for the ocelot, the FWS and Brownsville Navigation District ("BND") established a wildlife corridor between State Highway 48 and the Brownsville Ship Channel to connect areas of potentially suitable ocelot and jaguarundi habitat within the Laguna Atascosa NWR's Bahia Grande Unit with suitable habitat located south of the Brownsville Ship Channel. The FWS ultimate goal is to create a corridor connecting the NWR lands habitats in Mexico.

Piping Plover

Much of the area south of the Brownsville Ship Channel surrounding South Bay is mapped DCH for the federally listed piping plover. This DCH is part of the 7,217-acre South Bay and Boca Chica TX-1 Unit. This DCH is intended to provide wintering piping plover habitat components that are essential for foraging, sheltering, and roosting.

4.0 PROPOSED COMPENSATORY MITIGATION SITE

The Project Site layout leaves minimal space to implement compensatory mitigation onsite. Therefore, Texas LNG examined available properties within the same HUC as the Project Site to identify ecosystems that could be re-established, rehabilitated, or enhanced. However, many of the surrounding properties are currently high-quality WOUS and provide potential habitat for federally listed species, which limits restoration opportunities. Furthermore, a considerable portion of the coastal habitats within this HUC is either already developed or under ownership by federal or state agencies and thus already protected. Therefore, Texas LNG focused on available high-quality coastal ecosystems within the HUC that are privately owned and could be preserved.

4.1 PRESERVATION OPPORTUNITY

Texas LNG identified a large tract of land with significant ecological value owned by the BND called Los Lomas Ecological Preserve ("LLEP") (figure 4-1). The LLEP is 4,600 acres of tidal mudflat and upland lomas about one mile south of the Project Site that was leased to the FWS in 1983 at no charge to fulfill the BND's compensatory mitigation requirements for a previous channel deepening project. However, the COE did not ultimately require compensatory mitigation for their project. Figure 4-1 identifies the location of the LLEP. In 2023 the lease with the FWS will expire and the BND may return it to their developable land holdings for future development and maintenance of the port (e.g., industrial development, expansion of dredged material placement areas, or oil and gas exploration)

Both the Project Site and LLEP are located close in proximity within the South Laguna Madre watershed (HUC: 12110208) and occupy the same hydrogeomorphic landscape position, tidal mudflat. Texas LNG proposes to preserve 405 acres at the LLEP, which is a ratio of 10:1 to Texas LNG's proposed permanent impacts on WOUS (figure 4-2). This mitigation approach is consistent with the Galveston District's recently approved SpaceX Project (SWG-2012-00381), which also provided compensatory mitigation in the form of preservation within the LLEP adjacent to the land offered by Texas LNG.

During the pre-application meeting with the COE at the Galveston District headquarters on March 11, 2015, Texas LNG proposed to use this strategy (a watershed approach to develop Permittee Responsible Mitigation based on preservation). During the discussion the COE agreed that the strategy was feasible but will likely require a higher than normal ratio and directed Texas LNG to the SpaceX Project for guidance. Subsequently, Texas LNG presented the LLEP location to the COE during a conference call on July 9, 2015, as the best mitigation opportunity available in the vicinity. The COE acknowledged that the approach had precedent in the Galveston District and Brownsville area.

Texas LNG's proposed mitigation site ("Mitigation Site") is a unique assemblage of high-quality wetland habitat. The natural tidal hydrology flows from South Bay and includes a dendritic network of tidal creeks. Aerial interpretation indicates stands of submerged aquatic vegetation and mangroves. Areas mapped by the TPWD as mangroves are shown on figure 4-1; however, aerial photos suggest that additional areas within the Mitigation Site may include mangroves. Since the water depth is shallower than the adjoining South Bay, propeller scarring is less evident and it appears to have less human interactions. The mitigation site is entirely mapped as DCH for piping plover and EFH. In general, it currently includes the characteristics that historically existed at the location of Texas LNG's proposed maneuvering basin (tidal mudflat impacts).


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SpaceX Wetland Mitigation Site (50 Acres)
South Bay
Loma Silvan
Loma de la Banderita
Loma de los Tequios
Loma de la Loma Seca
Loma Ocana
Loma del Gato
Loma del Burro
Loma de las Gachupines
Loma Palona
Loma del Divisadero
Brownsville Ship Channel
48
4
Project Site Boundary
Los Lomas Ecological Preserve (Lease Area) *
SpaceX Wetland Mitigation Site
COE Navigable Waterway
U.S. or State Highways
* Boundaries Approximate
1:50,000
0
0.5
1
Miles
Figure 4-1
Los Lomas Ecological Preserve
Cameron County, Texas
TEXAS LNG
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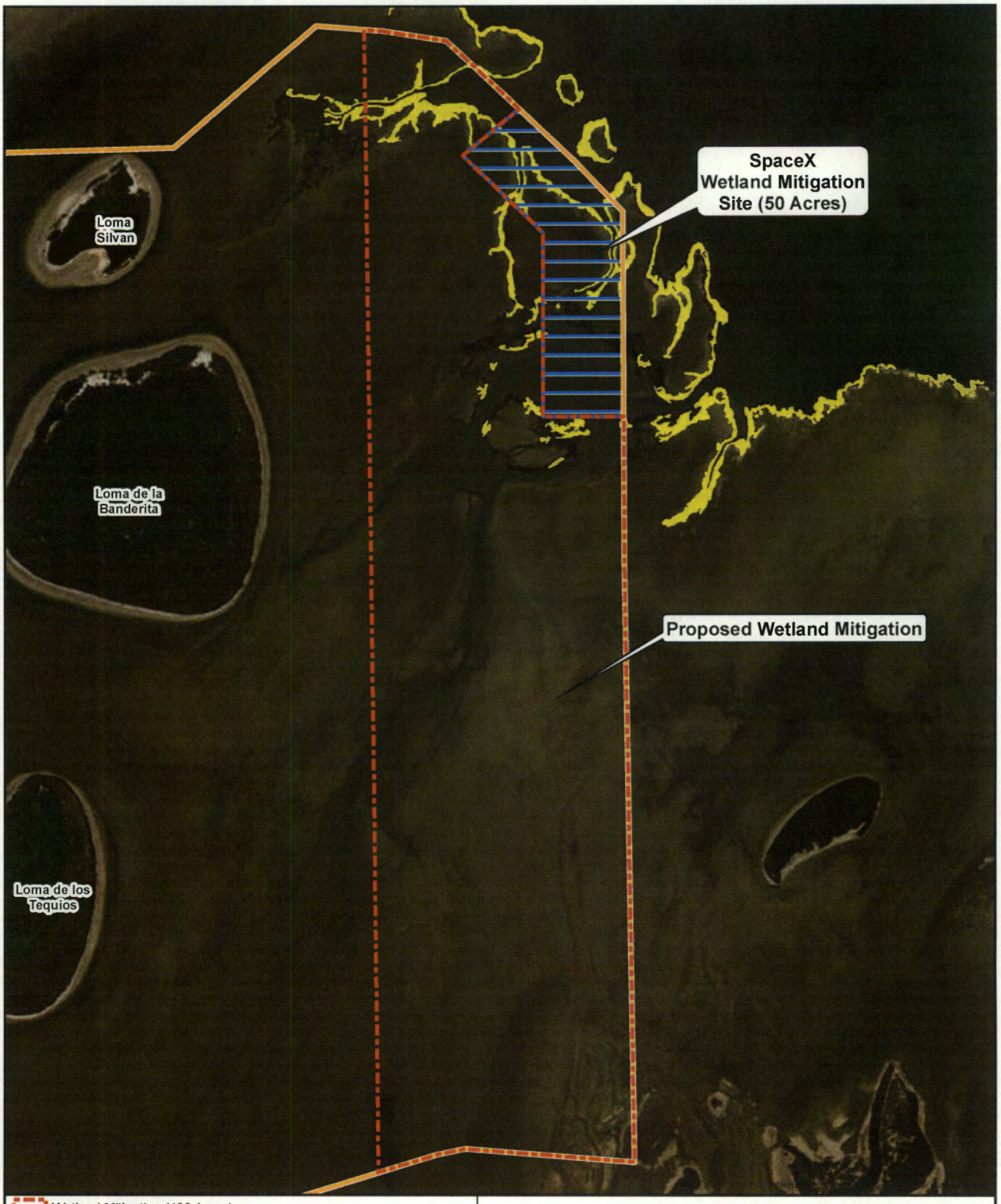

Wetland Mitigation (490 Acres)
Los Lomas Ecological Preserve (Lease Area) *
SpaceX Wetland Mitigation Site
Texas Parks and Wildlife Department Mapped Mangroves
1:15,000
* Boundaries Approximate
0 1,250 2,500 Feet
N

Figure 4-2
Texas LNG Wetland Mitigation Site
Cameron County, Texas

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The Mitigation Site as depicted on figure 4-2 is approximately 405 acres. Texas LNG has pursued a larger site to ensure that the property will provide sufficient mitigation and allow flexibility as the Project design is finalized. This site is currently larger than preservation acres that Texas LNG estimates will be required to offset unavoidable losses of WOUS. The property boundary of the final mitigation site may be modified in consultation with the COE to match the preservation acres required and outlined in the COE's permit.

4.1.1 Mitigation Site Preservation Criteria

The Mitigation Site will be held in perpetuity. This will maintain the high functioning tidal mudflat ecosystem and prevent future development. The Final Mitigation Rule identifies the following five criteria for using preservation as compensatory mitigation (33 CFR 332.3). In the bullets below, Texas LNG has provided verification for meeting the preservation criteria for the Mitigation Site.

- *The resources to be preserved provide important physical, chemical, or biological functions for the watershed.*
    - The Mitigation Site will match watershed priorities with a high-quality WOUS under threat of development.
    - The Mitigation Site is uniquely situated within the South Laguna Madre watershed near the mouth of the Brownsville Ship Channel and the Gulf of Mexico. According to the South Laguna Madre Watershed Environmental Plan (Medina, 2010) South Bay and adjacent tidal mudflats, with nearby upland lomas, provide physical connectivity to wildlife, water quality processes, and flood retention.
    - Previous dredging of the Brownsville Ship Channel in the early and mid-1900s created a berm along the channel that cutoff or reduced tidal exchange in many mudflats. Therefore, the Mitigation Site is unique in that the tidal exchange from South Bay has never been cutoff. This allows the South Bay and the Mitigation Site to provide a healthy exchange of nutrients supporting critical EFH functions.
    - The expansive seagrass beds in South Bay provide habitat for many species including federally listed sea turtles and West Indian manatee. In 1988 the General Land Office leased South Bay's approximately 3,500 surface acres to TPWD to manage as a Coastal Preserve. Texas LNG's proposal to protect the Mitigation Site in perpetuity will significantly augment protection of this critical South Bay resource.
    - The Mitigation Site is also within DCH for piping plover listed under the Endangered Species Act.
- *The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available.*

- The Mitigation Site will preserve high-quality WOUS within the same subbasin watershed and with sufficient ecological benefit to offset permanent unavoidable impacts on WOUS at the Project Site.
- Texas LNG used the interim Hydrogeomorphic ("iHGM") models to quantify the ecological functions at the Project Site and the proposed Mitigation Site.

- *Preservation is determined by the district engineer to be appropriate and practicable.*
  - In 2015, the COE Galveston District approved the SpaceX Project (SWG-2012-00381) using preservation as compensatory mitigation. As described in 33 CFR 332.3 (h) 2, the District Engineer is allowed to accept preservation as the sole source of mitigation provided the ratios are higher. Texas LNG is proposing preservation as mitigation because the proposed property augments the existing watershed plans. It is also appropriate because the tidal mudflats within the Project Site are impaired (low functioning) and the impacts associated with dredging of the maneuvering basin are a conversion rather than a permanent loss of WOUS.
- *The resources are under threat of destruction or adverse modifications.*
  - Since the Mitigation Site is situated adjacent to a deep water channel close to the Gulf of Mexico, development potential is increased. As described above, when the lease to the FWS expires in 2023, the area may return to the BND's available lands for future development and maintenance of the port.
- *The preserved site will be permanently protected through an appropriate real estate or other legal instrument.*
  - Texas LNG has submitted a Memorandum of Agreement to the BND to use a portion of the LLEP for this Project. If approved, Texas LNG will prepare a legal site protection instrument that complies with the COE's recommended conservation easement as described in (33 CFR 332.4 (c) 4). The Memorandum of Agreement and sample conservation easement is provided in attachment A.

4.2 SITE SELECTION

As described in Section 2.3, mitigation banks and in-lieu fee service areas are not available in the South Laguna Madre watershed (HUC: 12110208). Therefore, Texas LNG reviewed available watershed plans to identify the following key goals for selection of the wetland Mitigation Site:

- The Mitigation Site will fulfill the objectives of the Lower Rio Grande Watershed Initiative by ensuring in perpetuity that large contiguous tidal wetlands continue to perform water quality improvement functions in the South Laguna Madre watershed. Texas LNG will also ensure that the Project complies with federal and state permit water quality requirements during construction and operation.

- Both the Project Site and Mitigation Site will facilitate the objectives of the Lower Rio Grande Basin Study. The Mitigation Site will protect the tidal wetlands that dissipate flood events by storing the excess flow and discharge within an asynchronous period.
- Texas LNG's proposed maneuvering basin will augment the Bahia Grande Restoration Project by removing the berm along the Brownsville Ship Channel and restoring the historic tidal cycle to up to 700 acres of mudflat adjacent to the Project Site.
- An objective in the Draft Ocelot (Leopardus pardalis) Recovery Plan is to create a corridor for federally listed felines and other species to migrate between the NWR and Mexico. Preservation of the Mitigation Site will provide an incremental step to FWS' goal of creating a habitat corridor.
- DCH for piping plover will be protected in perpetuity by Texas LNG's proposed compensatory Mitigation Site.

4.2.1 Hydrological Conditions

The Mitigation Site is unique in that historic tidal cycles have been maintained via South Bay. Therefore, the mudflats within the Mitigation Site will continue to provide EFH. This is particularly evident around the stands of mangrove. The physical and soil characteristics of the mudflats at both the Project Site and the Mitigation Site are similar (mapped as Barrada Clay soils).

4.2.2 Watershed-scale Features

On a watershed scale, the Mitigation Site provides greater opportunity for functions than the Project Site. The South Bay and LLEP are capable to store flood water while providing refuge for wildlife on lomas. As described above, the LLEP was previously identified by the FWS as a potential corridor for federally listed felines.

4.2.3 Scale of Hydrologic Sources

Adequate hydrology is anticipated because of the tidal exchange in South Bay.

4.2.4 Land Use Compatibility

The surrounding land use is compatible with the Mitigation Site functions. Existing dredge material placement areas occur near the north boundary of the Mitigation Site and nearby to the west. These areas have restricted access therefore disturbance to wildlife will be minimal.

4.2.5 Reasonably Foreseeable Effects

Dredging of the maneuvering basin at the Project Site will restore the historic tidal cycle to a large mudflat complex adjacent to the Project Site. Texas LNG believes this will provide a significant ecological lift to mudflats adjacent to the Project Site. Texas LNG's proposed Mitigation Site will ensure that a large contiguous area of unaffected tidal mudflat is preserved in perpetuity. Preservation of the mudflats will also provide additional protection for mapped DCH for the piping plover and EFH.

4.2.6 Relevant Factors

Development trends within the BND demonstrate an increasing demand for properties with deepwater access along the Brownsville Ship Channel. The recently approved deepening of the channel by the COE to accommodate larger vessels is expected to further increase demand (COE, 2014). Additionally, oil and gas exploration is increasing in south Texas (Meyers, 2014). Texas LNG's proposed Mitigation Site within the LLEP will ensure protection from future encroachments to a high-quality ecosystem.

4.3 SITE PROTECTION

As described above, Texas LNG has submitted a Memorandum of Agreement to the BND to use a portion of the LLEP for this Project. If approved, Texas LNG will prepare a legal site protection instrument that complies with the COE's recommended conservation easement as described in (33 CFR 332.4(c)4). The Memorandum of Agreement and sample conservation easement is provided in attachment A.

4.4 BASELINE CONDITION

To quantify the ecological functions at the Project Site and provide a comparison to the proposed Mitigation Site, Texas LNG used the iHGM methodology. The iHGM methodology was developed by the COE to measure the potential of a wetland to perform critical functions. The Galveston District issued a Standard Operating Procedure memo dated September 11, 2008, outlining the iHGM methodology's role in determining compensatory mitigation requirements. Of the four iHGM assessment models offered by the Galveston District COE, the herbaceous riverine and tidal fringe models were used by Texas LNG to evaluate the wetlands and tidal flats present at the Project Site.

Although the iHGM herbaceous riverine model is not an absolute fit for the palustrine emergent wetlands (WOUS) at the Project Site, it is the best model available. The tidal mudflats (WOUS) were aggregated together as a single Wetland Assessment Area ("WAA") and evaluated using the iHGM tidal fringe model.

The iHGM herbaceous riverine model is a mathematic formula to assess the WOUS functions of each WAA. The model focuses on the following three primary functions:

- temporary storage and detention of storage water ("Physical"),
- maintain plant and animal communities ("Biota"), and
- removal and sequestration of elements and compounds ("Chemical").

However, in the iHGM tidal fringe model, the plant and animal communities are divided into "Botanical" and "Biota" functions.

To assess the functions for each WAA a subindex value was assigned to each variable that quantitatively ranks the functions. For example, a subindex is assigned to the following variables in order to characterize the Physical function:

- Distance to water greater than six feet deep;
- Average marsh width;
- Manning's roughness coefficient (describes the tidal flow);
- Predominant soil texture (e.g., clay, loam, or sand); and
- Hydroperiod (the tidal cycle).

Using the assigned subindex, the Functional Capacity Index ("FCI") is calculated for each WAA. The FCI is a numeric expression of the potential functions. The FCI value is then multiplied by the respective WAA area (WOUS acreage) to yield the Functional Capacity Unit ("FCU"). Therefore, the FCU is a numeric expression of the potential functions but is modified by the size of the WAA. The iHGM data forms are located in attachment B.

4.5 DETERMINATION OF CREDITS

Palustrine emergent wetlands at the Project Site were evaluated using the iHGM herbaceous riverine model. The pre- and post-project FCUs for the palustrine wetlands functions are included in table 4.5-1. The results of the iHGM model indicate that the functions of the palustrine emergent wetlands will be maintained after impacts occur along the perimeter of the wetland boundary associated with development of the Project Site.

TABLE 4.5-1

Texas LNG Project
Summary of Wetland FCUs at the Proposed Project Site

Function	Pre-Project FCU [a]	Post-Project FCU [b]	Net Change FCU
Physical	31.8	31.8	-0.1
Biota	32.0	31.9	-0.1
Chemical	32.6	32.5	-0.1

FCU = Functional Capacity Units
[a] Pre-Project FCU calculation is based on 60.0 acres of palustrine emergent wetlands.
[b] Post-Project FCU calculation is based on 59.9 acres of palustrine emergent wetlands.

Tidal mudflats at the Project Site were evaluated using the iHGM tidal fringe model. The pre- and post-project FCUs for the tidal mudflat functions at the Project Site are included in table 4.5-2. The results of the Botanical function component of the iHGM model indicate a loss of function in the tidal mudflat (where the maneuvering basin will be dredged). However, the results of the iHGM model for the biota, physical, and chemical components indicate a slight gain (improvement). The recorded gain of function can be attributed primarily to the result of removing the barrier to daily tidal water exchange within the Project Site.

TABLE 4.5-2

Texas LNG Project
Summary of Tidal Mudflat FCUs at the Proposed Project Site

Function	Pre-Project FCU [a]	Post-Project FCU [b]	Net Change FCU
Biota	28.0	57.0	29.0
Botanical	17.8	13.8	-4.0
Physical	92.6	96.3	3.8
Chemical	17.8	43.5	25.7

FCU = Functional Capacity Units
[a] Pre-Project FCU calculation is based on 178.0 acres.
[b] Post-Project FCU calculation is based on 137.6 acres.

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The pre- and post-project FCUs for the tidal mudflat functions at the Texas LNG Mitigation Site are included in table 4.5-3. Since the Mitigation Site is targeted as mitigation through preservation, therefore no alteration of the site conditions, there will be no change (gain or loss) in functions. The Mitigation Site is expected to continue supporting the high-quality functions as it does currently.

TABLE 4.5-3

Texas LNG Project
Summary of Tidal Mudflat FCUs at the Proposed Mitigation Site

Function	Pre-Project FCU[a]	Post-Project FCU	Net Change FCU
Biota	206.5	206.5	0
Botanical	49.0	49.0	0
Physical	372.4	372.4	0
Chemical	120.0	120.0	0

FCU = Functional Capacity Units
[a] Preserving the high-quality tidal mudflat habitat will not yield a net change in FCU; the FCU will remain the same pre- and post-project.

As described above, Texas LNG's proposed permanent impacts on WOUS at the Project Site will result is a loss of about 0.7 acre of WOUS and a conversion of about 39.8 acres of tidal mudflats to deepwater habitats. However, based upon the high functioning wetlands to be preserved at the Mitigation Site, Texas LNG believes these impacts are adequately offset as demonstrated through the iHGM model analysis of impacts and mitigation above.

4.6 MITIGATION WORK PLAN

Texas LNG will survey the boundary of the proposed Mitigation Site to officially record the easement. No additional impacts on WOUS are anticipated as a result of establishing the Mitigation Site. The site consists of currently functioning wetland habitat. No grading, planting, soil management, erosion control measures or non-native species controls are therefore necessary or proposed in this plan.

4.7 PERFORMANCE STANDARDS

Performance standards for the Mitigation Site will focus on completing a conservation easement that provides appropriate protection in perpetuity. No additional performance standards are proposed by Texas LNG.

4.8 MONITORING REQUIREMENTS

Within one year of completing Phase I of the Project or as specified in the COE permit, Texas LNG will provide a summary of the mitigation site showing the civil survey of boundaries, executed conservation easement, and proposed land management entity to hold the easement in perpetuity.

4.9 LONG TERM MANAGEMENT

Texas LNG will donate the conservation of the Mitigation Site to an independent land management entity pursuant to the timeframe outlined in the permit to be issued by the COE. Texas LNG will therefore not be responsible for the long-term management of the property.

4.9.1 Ownership of the Mitigation Site

Texas LNG's proposed Mitigation Site will be owned by the BND. However, administration of the conservation easement will become the responsibility of the land management entity.

4.10 FINANCIAL ASSURANCE

The proposed Mitigation Site will be protected by a conservation easement executed pursuant to the timeframe outlined in the permit to be issued by the COE; no restoration activities are proposed by Texas LNG. Therefore, Texas LNG has not proposed additional short or long-term financial assurances to implement the Mitigation Site.

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