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Revision 1

# **DRAFT**

## **Compensatory Wetland Mitigation Plan**

### **Permittee:**

Rio Grande LNG, LLC  
Rio Bravo Pipeline Company, LLC  
Permit Number SWG-2015-00114

### **Submitted to:**

U.S. Army Corps of Engineers, Galveston District

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Figure 2: MMS Overview Map

Figure 3. LEP Preservation Site Overview Map

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## 1.0 Introduction

This Compensatory Mitigation Plan (CMP) outlines mitigation measures that Rio Grande LNG, LLC (RGLNG) and Rio Bravo Pipeline Company, LLC (RB Pipeline) propose to mitigate wetland impacts resulting from the proposed natural gas liquefaction facility, liquefied natural gas (LNG) export terminal (Terminal), and associated pipeline system (Pipeline System) hereinafter referred to collectively as the "Project." RGLNG and RB Pipeline are hereinafter referred to collectively as the "RG Developers." This mitigation plan follows all applicable items listed in 33 CFR § 332.4 (c).

## 2.0 Mitigation Locations

This CMP includes two mitigation locations: Miradores Mitigation Site (MMS) and the Loma Ecological Preserve (LEP) preservation site (Figure 1).

The MMS consists of 350 acres of palustrine emergent (PEM) wetland creation, 21.9 acres of PEM wetland enhancement, and 1,186 acres of thornscrub and coastal prairie habitat enhancement and creation located in Cameron County Texas (Figure 2). The MMS is located approximately 9 miles northeast of Harlingen, Texas, and 7 miles upstream of the estuary of the Arroyo Colorado River (Figure 1). The approximate center of the property is 26°17'11.55"N and 97°26'15.92"W. It is located in Hydrologic Unit Code (HUC) 12110208 (South Laguna Madre).

The LEP preservation site consists of 1,325.5 acres of wetland preservation (1,241.1 acres of mudflat, 76.2 acres of mangrove shrubland, and 7.9 acres of high marsh) and 174.5 of South Texas loma grassland / loma evergreen shrubland located in Cameron County, Texas (Figure 3). The LEP preservation site is located approximately 18 miles to the east of the Brownsville, Texas and approximately 1.5 miles to the south of the Terminal site (Figure 1). The approximate center of the site is 26° 0'8.89"N and 97°12'30.01"W. It is also located in HUC 12110208 (South Laguna Madre).

## 3.0 Mitigation Objectives

The objective of this CMP is to describe the proposed mitigation measures that RG Developers will undertake to compensate for environmental losses resulting from unavoidable impacts to waters of the U.S. (WOUS) due to the construction of the Project.

Construction of the Terminal will result in unavoidable permanent impacts to 182.4 acres of WOUS. Construction of the Pipeline System will result in the permanent conversion of 13.4 acres of palustrine forested/shrub-scrub wetlands to PEM wetlands.

## 4.0 Site Selection

The 2008 Mitigation Rule (the Rule) (33 CFR §332.4(c)(3) and 33 CFR §332.4(d)) requires consideration of watershed needs, on-site alternatives where applicable, and the practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the compensatory mitigation project site. Over the course of many meetings, RG Developers reviewed and evaluated several

mitigation options, in consultation with the U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), Texas Parks and Wildlife Department (TPWD), and other federal agencies, to offset the unavoidable permanent loss of wetlands associated the Project. RG Developers utilized the hierarchy stated in the Rule to develop the mitigation solution by evaluating:

- Purchasing credits from an operational mitigation bank;
- Purchasing credits from an approved in-lieu fee program; and
- Permittee-responsible Mitigation (PRM) using a:
  - Watershed approach;
  - On-site, in-kind mitigation; and
  - Off-site and/or out-of-kind mitigation.

The mitigation strategy presented in this document is the result of a step-wise process that identified and evaluated multiple mitigation options based on the hierarchy established in the Rule (33 CFR §332.3(b)).

There are no mitigation banks or in-lieu fee programs currently available within the 8-digit HUC of the Project to offset the permanent wetlands loss, therefore the preferred options for mitigation was not available, leaving PRM as the option RG Developers pursued.

To address PRM through potential onsite and in-kind mitigation, in 2016 RG Developers proposed a Conceptual Mitigation Plan<sup>1</sup> which included work in the eastern and western boundary areas of the Terminal site as wetland restoration and enhancement areas. Since the submission this plan, RG Developers discovered that neither of these buffer areas could be protected beyond the lease agreement<sup>2</sup> that will be signed with the Brownsville Navigation District (BND), therefore RG Developers could not guarantee long-term protection of the mitigation as required under the Rule. Additionally, during the March 7, 2017 Joint Evaluation Meeting (JEM), the USFWS stated that the habitats were functional as they are and would not support restoration efforts. RG Developers do, however, plan to keep these in their natural state as buffers around the Terminal.

In the 2016 Conceptual Mitigation Plan, RG Developers also proposed PRM through off-site and/or out-of-kind mitigation through the preservation of a portion of the LEP to offset the Project's impacts to WOUS. RG Developers presented this plan at the March 7, 2017 JEM. The agencies commented that there are limited wetland mitigation options available due to the geographical location of the Terminal site; and even though preservation-only mitigation may be applicable in this case, it is still the least-preferred form of compensatory mitigation. Therefore, the resource agencies stated that the mitigation plan should be revised to have a more robust description of the alternative mitigation options that were evaluated to offset the wetland impacts that would result from the construction of the Terminal.

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<sup>1</sup> RG Developers proposed on-site mitigation at the Terminal site in the July 2016 *Rio Grande LNG Terminal Conceptual Mitigation Plan. Rio Grande LNG Project* that was as Appendix E of the *Rio Grande LNG Terminal Federal Dredge and Fill Permit Application*

<sup>2</sup> On March 6, 2019, RG Developers executed a lease agreement with the BND for the 984-acre parcel for an initial term of thirty years, with two options to renew and extend the term of the lease for periods of ten years each, which is the maximum term allowable under Texas Water Code, Title 4, Chapter 60, Sec. 60.039(a).

In response to the comments received during the March 7, 2017 JEM, RG Developers developed the initial October 2017 Mitigation Alternative Analysis. A second JEM was initiated on November 7, 2017 by RG Developers to discuss the findings of the Mitigation Alternative Analysis. The feedback received during the November 7, 2017 JEM was incorporated into an April 2019 Compensatory Mitigation Plan which retained preservation of a portion of the LEP. This plan was presented to the USACE during a June 12, 2019 meeting at which the USACE stated that a preservation only mitigation strategy would still not meet the requirements of the Rule and that any future mitigation plan will need to incorporate a component of wetland establishment, restoration, and/or enhancement. RG Developers then conducted a feasibility analysis for off-site and in-kind wetland mitigation options in the region. This analysis evaluated the feasibility of alternative mitigation options in accordance with the Rule and presented why off-site in-kind wetland establishment, restoration, and/or enhancement was not a feasible option for compensatory mitigation.

Based on the USACE's guidance provided at the June 12, 2019 meeting, and due the lack of feasible off-site in-kind mitigation options, the RG Developers contracted with Ecosystem Investment Partners (EIP) to locate and develop mitigation which includes wetland restoration and habitat improvement. EIP located a site within the 8-digit HUC, that can provide out-of-kind wetland restoration and enhancement. This mitigation option is discussed herein as the MMS.

This CMP presents a mitigation strategy that includes a combination of PRM through off-site wetland restoration and enhancement at the MMS and off-site preservation at the LEP preservation site as compensatory mitigation for the Project. MMS will create 350 acres of PEM wetlands and enhance 21.9 acres of PEM wetlands. The LEP preservation site (1,500-acres) will preserve 1,241.1 acres of mudflat, 76.2 acres of mangrove shrubland, and 7.9 acres of high marsh.

## 5.0 Mitigation Sites Objectives

The following presents the mitigation site objectives for the MMS and the LEP preservation site. The goal of this CMP is to:

- Create 350 acres of PEM wetlands;
- Enhance 21.9 acres of PEM wetlands;
- Preserve 1,241.1 acres of mudflat;
- Preserve 76.2 acres of mangrove shrubland; and
- Preserve 7.9 acres of high mash.

### 5.1 MMS

RG Developers were unable to find suitable PRM through off-site and/or out-of-kind mitigation within the 12-digit HUC 121102080900 where the proposed impact will occur. However, the MMS is located in the same 8-digit HUC and is considered to be within the "watershed" per 33 CFR 332.

The MMS will be owned by Ecosystem Investment Partners III LLC, and the land owner will place the property under a perpetual conservation easement. Historically, the area consisted of freshwater herbaceous wetlands, coastal prairie, and thornscrub habitat prior to being manipulated for agricultural production (e.g., sorghum, cotton, and cattle). A July 2019 wetland delineation survey of the MMS during determined that 32.4 acres (2%) of the 1,558-acre tract are WOUS, which consist of freshwater herbaceous wetlands, irrigation ditches, and excavated ponds. The remaining 1,525 acres (98%) are non-wetlands, which consist of degraded coastal prairie, pasture, native invasive mesquite, cropland, and roads. Since the MMS is only 1,300 feet from the eastern boundary of the Laguna Atascosa National Wildlife Refuge (LANWR), it will serve as a connection corridor for LANWR and is within the Acquisition Boundary for *the LANWR Proposed Refuge Expansion Plan* (USFWS 1999).



Photos of Existing Site Conditions at MMS

## 5.2 LEP Preservation Site

In addition to wetland creation and enhancement at the proposed MMS, RG Developers also propose the preservation of 1,241.1 acres of mudflat, 76.2 acres of mangrove shrubland, and 7.9 acres of high marsh at the LEP preservation site (see Figure 3 for the configuration of the preservation site). A determination of 1,325.5 acres of wetlands within the LEP preservation site was found based on the results of August 2019 *Loma Ecological Preserve (LEP) Wetland Delineation Report and Approved Jurisdictional Determination Request* (E & E 2019). In addition to the wetlands within the preservation site, 174.5 of uplands (South Texas loma grasslands and South Texas loma evergreen shrublands) will

be preserved, equating to a total of 1,500 acres. The proposed configuration of the LEP preservation site is based on input from TPWD and the identification of in-kind aquatic resources. The LEP preservation site will directly abut the SpaceX mitigation site and the Lower Rio Grande Valley National Wildlife Refuge.

The LEP preservation site is part of the larger, approximate 4,400-acre BND property that is currently under lease to the USFWS until 2023.

Of all the parcels identified for potential preservation-only mitigation, the LEP is:

- The closest off-site mitigation option identified in relation to the proposed wetland impact areas at the proposed Terminal site;
- The largest contiguous parcel of all the potential preservation-only mitigation parcels identified;
- Similar to the Terminal site in regards to the types of habitats within the boundaries of the parcel (in-kind); and
- Available for preservation in perpetuity through a conservation easement.

Additionally, the preservation of habitats at the LEP preservation site would not only help mitigate for Terminal aquatic resource impacts but also help mitigate for any potential impacts to protected species as a result of the proposed Project. The mudflats within the LEP preservation site support USFWS-designated critical habitat for federally listed piping plover (USFWS 2009). The expansive shallow sub-tidal habitats also provide suitable foraging habitat for shorebirds, wading birds, and waterfowl.

## 6.0 Site Protection

### 6.1 MMS Site

Ecosystem Investment Partners III LLC will purchase, in fee, the property and will lease the properties to the Sponsor, EIP III Credit Co., LLC.<sup>3</sup> Upon approval of the Mitigation Plan, the Sponsor will encumber the required MMS acreage with a conservation easement held by The Texas Land Conservancy. There are no liens, mortgages, or security interests on the property.<sup>4</sup> To ensure that the conservation easement is conveyed without encumbrances that would affect the viability of the site, the Sponsor has or will provide the following:

- A title abstract, including a 60-year title search with an attorney's Opinion of Title and a Survey with legal description of the site showing all existing easements and encumbrances, if any, as identified in the title document.

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<sup>3</sup> Ecosystem Investment Partners III, LP (EIP) owns and manages both Ecosystem Investment Partners III LLC (the entity used to contract for the purchase of real estate) and EIP III Credit Co., LLC (the entity which operates EIP's mitigation projects).

<sup>4</sup> A wind lease exists; EIP is in-process of extinguishing this lease.

- Any liens, mortgages, or security interests of any type on the property must be subordinated to the conservation easement
- A copy of the filed publicly recorded executed conservation easement will be provided to the USACE.

The subsurface mineral rights for the property are not currently owned by Ecosystem Investment Partners III LLC. Surface landowners in the State of Texas cannot wholly control a subsurface mineral holder's access to those minerals. The exploration, production, and transportation of subsurface mineral resources beneath the MMS are acceptable provided that ground-disturbing activities are avoided and minimized to the greatest extent practicable. The Sponsor shall notify the USACE as soon as practicable prior to any attempt to develop any subsurface mineral resource from under the site. To minimize that impact, the Sponsor, the Texas Land Conservancy and the mineral holder have developed an agreement to manage activities on the property that includes:

- All drilling activities must be conducted in a manner that minimizes adverse environmental impacts. The mineral rights holder will be required to develop a written best management practices plan for the drilling operations.
- All drilling activities shall comply with applicable regulatory requirements including those under Section 404 of the Clean Water Act.
- Any drilling equipment will be limited to existing access roads and a 2.5-acre, reserved drill pad site within the site.
- If the above drill pad site and access roads are unacceptable to the mineral rights holder, the mineral rights holder will work in coordination with the Sponsor and adjacent landowners to reach a mutually agreeable drilling site and access route.
- All impacted areas must be restored to pre-existing conditions as soon as practicable following initiation of drilling activities.
- A Remoteness Opinion (minerals report).

In addition, the Sponsor will establish a long-term monitoring and maintenance fund for the properties to provide for the long-term quality and viability of the restored ecosystems.

## 6.2 LEP Preservation Site

The RG Developers have secured an agreement with BND for the conveyance of a perpetual conservation easement for the proposed 1,325.5-acre LEP preservation site to TPWD. Oversight by TPWD will ensure the long-term protection of the LEP preservation site.

## 7.0 Baseline Information

### 7.1 MMS

The MMS lies within the Level III Ecoregion, Western Gulf Coastal Plain and in the Level IV Ecoregion, The Lower Rio Grande Valley. It is within the Tidal Segment of the Arroyo Colorado Watershed that extends from just south of Harlingen and ends downstream where the dredged navigation channel enters the Lower Laguna Madre.

The Western Gulf Coastal Plain is defined as a relatively flat strip of land, generally 50 to 90 miles wide, adjacent to the Gulf of Mexico, and is distinguished by its flat topography and mainly grassland natural vegetation.

### 7.1.1 Historical Ecological Characteristics of the Site

Historically, the site was a mosaic of Tamaulipan thornscrub, coastal prairie, and depressional wetlands characteristic of the eastern half of the Tamaulipan Biotic Province (Jahrsdoerfer & Leslie, 1988). In the early 18th century Spanish settlers moved into the region and this site was used for cattle ranching (Pierce, 1917). After Mexico gained independence in 1821, this site fell within the Potrero del Espiritu Santo grant and continued to be used for cattle ranching (Pierce, 1917). Over time this original land grant was continuously partitioned, yet the mainland-use continued to be ranching. However, once this property (MMS) became its current size in the early 20th century, the intensity of native habitat disturbance, ranching, and land alteration accelerated. The MMS has been continually developed for agriculture for at least nine decades. Much of this work was to efficiently drain the property of the rainfall that had created and supported the PEM wetlands on the MMS. The following historical account are excerpts from the MMS draft Delineation Report completed in June 2019. The historic aerials described below are also included in that report.

**1947:** A historical aerial image in 1947 indicated that the site appears to have seven natural wet areas and seven livestock dugouts. Structures can be seen on the south portion of the property. It appears the livestock dugouts with radiating drainage swales were placed in low lying areas throughout the property. Drainage ditches appear to be situated along the western and eastern boundaries of the site.

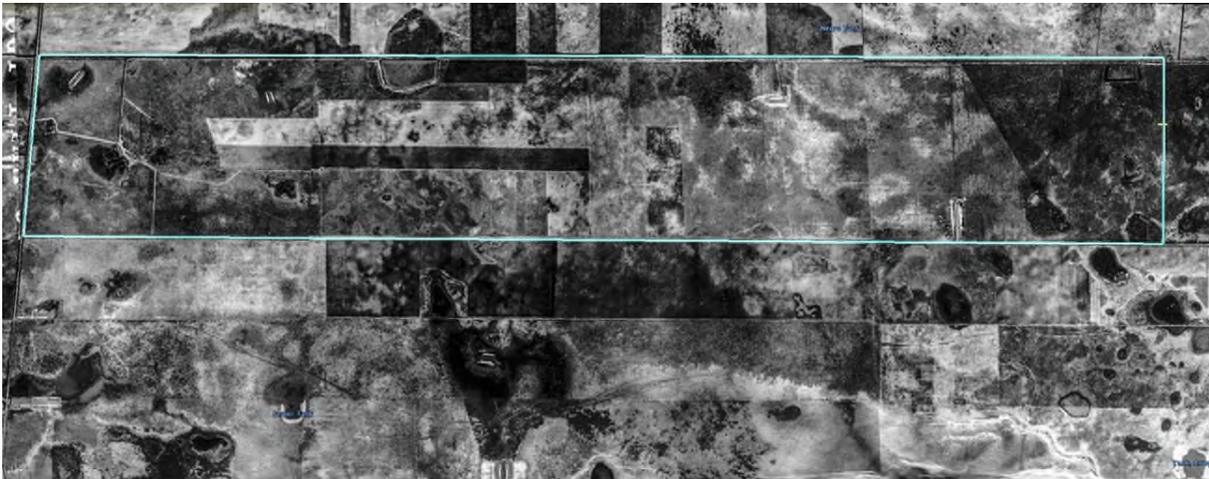
**1950:** A 1950 image indicates that by then most areas within the project property and surrounding lands have been converted for agricultural use or remain undeveloped. Dried and ponded depression areas are visible to the east and northeast of the project site and appear to be relict depressional wetlands related to the Arroyo Colorado. Four dugout areas which appear to be related to ranching activities are visible on the property's western boundary. Inundation also appears to be visible in two natural depression features located at the northeastern area of the property. A large ponded area containing a similar ranching-related structure is also visible near the southeastern corner of the property. The area appears to be ponded and is located adjacent to an apparent road.

**1962-1977:** In the 1962-1977 images, the northernmost areas of the property appear to be unmaintained in the 1962 aerial image); however, central areas of the property appear to have been modified, presumably for agricultural or ranching purposes. The property located immediately to the west appears to have been similarly modified between the 1950 and 1960. The four dugout areas along the property's western boundary remain visible between 1962 and 1977. In addition, a fifth, smaller dugout structure is apparent near the southwestern area of the property during this time. A larger dugout area is also apparent along the property's northeastern boundary between 1962 and 1977. The dugout is located to the south of the two natural depression areas in the property's northeastern corner. Ponding at natural depressions and dugout areas appears to be visible in the 1970 aerial photograph.

**1989-2004:** By 1989, additional water features (drainage ditches) had been constructed at the southern, central, and northern areas of the property. Dugout features along the property's western boundary appear to have been removed by 1989. Adjacent properties to the west and north of the property appear to have been developed by 1989, and by 1995 aquaculture farms are visible in these areas. Some of the constructed ponds at the aquaculture facility appear inundated in the 1995 photograph. The 2004 aerial image indicates expansion of the adjacent aquaculture farm toward the south along the property's western boundary. Inundation of the newly constructed aquaculture ponds and a north to south oriented drainage ditch can be observed in the photograph.

**2005-2010:** Ponding is apparent at a dugout area located along the drainage canal in the northern portion of the property. One remnant depression area in the northeastern corner of the property also appears to contain water. The aquaculture farm located to the west of the site no longer appears to be active in the 2010 aerial image. No additional modifications to the project property or adjacent properties were apparent between 2005 and 2010.

**2012-2016:** Aerial photos from 2015 and 2017 indicate this time period did not include any improvements on the site, but all site developments and agricultural operations continued.



1962 Aerial of the Miradores Mitigation Site



2017 Aerial Photo of the Miradores Mitigation Site

Site work will include removal of existing agricultural ditches, livestock, and crop production and the restoration of historic site hydrology and topography. This will enhance and create PEM wetlands and native coastal prairie and thornscrub habitat. Work will also include exotic plant species eradication, erosion control, native plant restoration, and long-term maintenance and management of the MMS.

The work will restore historic ecological functions to the site by capturing rainfall and overflow from high water events in the drainage ditches surrounding the site. Work at MMS will also enhance existing valuable wetland and aquatic resources on the site including a duckpond and two depressional wetlands. In addition, the proposed MMS also includes the placement of a conservation easement.

The restoration benefits are as follows:

- Enhance 21.9 acres of existing PEM wetlands;
- Create 350 acres of PEM wetlands; and
- Enhance and create 1,186 acres of coastal prairie and thornscrub habitat.

### 7.1.2 Current Ecological Characteristics of the Site

The proposed MMS encompasses 1,558 acres (see Table 1) and currently contains 13.8 acres of freshwater emergent wetland, 3.0 acres of freshwater ponds, 15.4 acres of riverine wetland habitat, 0.2 acres of non-jurisdictional freshwater ponds, 344.4 acres of sea ox-eye daisy habitat, 755.8 acres of cattle pasture, 36.3 acres of mesquite, 287.8 acres of row crops, and 1.3 acres of roads. A full wetland delineation of the site was completed in June 2019. The acres described above were determined from this report.

**Table 1. Current Habitat Types and Land use.**

Table:1 Current Habitat Types and Land Use				
Current Land Use	Wetland Determination	Proposed Habitat Type	Proposed Habitat Type	Acreage Total
Freshwater Emergent Wetlands	Wetland	PEM	13.8	13.8
Freshwater Pond	Wetland	PEM	3	3
Riverine	Wetland	PEM/Upland	5/10.4	15.4
Freshwater Pond Non-Jurisdictional	Wetland	PEM	0.2	0.2
Sea Ox-eye Daisy	Not-Wetland	PEM/Upland	200/147.4	347.4
Cattle Pasture Non-Wetland 112.5	Non-Wetland	PEM/Upland	100/655.8	755.8
Native Invasive Mesquite	Non-Wetland	PEM/Upland	25/111.3	136.3
Row Crops	Non-Wetland	PEM/Upland	25/262.8	287.8
Low Intensity Urban and Roads	Non-Wetland	PEM/Upland	.8/5	1.3
			1558	1558.0

The segment of the Arroyo Colorado north of the MMS is dredged and maintained as a navigable waterway and is 26 miles long. Most of the land in this stretch of the Arroyo Colorado is in use for agricultural crop production and ranching. The area supports suitable habitat to support an abundance of neotropical migratory songbirds, mammals, snakes, lizards and salamanders. It also supports potential habitat for several state and federal listed threatened and endangered species including the ocelot and jaguarundi (Table 2). Restoration of the MMS will create habitat that may be used by these species.

**Table 2. Threatened and Endangered Species Benefitting from the MMS**

Common Name	Scientific Name	(TPW)	(FWS)
Ocelot	<i>Leopardus pardalis</i>	E	E
Jaguarundi	<i>Herpailurus yagouaroundi cacomiti</i>	E	E
Northern Aplomado Falcon	<i>Falco femoralis septentrionalis</i>	E	E
Peregrine Falcon	<i>Falco peregrinus</i>	T	
Northern Beardless-Tyrannulet	<i>Camptostoma imberbe</i>	T	
Reddish Egret	<i>Egretta rufescens</i>	T	
Texas Botteri's Sparrow	<i>Aimophila botterii texana</i>	T	
White-faced Ibis	<i>Plegadis chihi</i>	T	
Wood Stork	<i>Mycteria americana</i>	T	
Black-striped Snake	<i>Coniophanes imperialis</i>	T	
Indigo Snake	<i>Drymarchon corais</i>	T	
Texas Horned Lizard	<i>Phrynosoma cornutum</i>	T	
Black-spotted Newt	<i>Notophthalmus meridionalis</i>	T	
Sheep Frog	<i>Hypopachus variolosus</i>	T	
South Texas Siren	<i>Siren imtermedia spp.</i>	T	

### 7.1.3 Current Site Vegetation

The MMS is composed of the following vegetative habitat types as described in *Descriptions of Systems, Mapping Subsystems, and Vegetation Types for Texas* (Lee, 2014). Vegetative species present are listed in Table 3.

**PEM – Freshwater Emergent Wetland:** Classified as a Palustrine system because it is a non-tidal wetland with trees, shrubs, and persistent emergent vegetation and is further classified into the subsystem emergent wetland because of the herbaceous cover. Then it falls within the subclass persistent because the vegetation will persist up to the next growing season (Cowardin et al. 1979). This habitat is called South Texas Floodplain Herbaceous Wetland (Ecological Mapping Systems of Texas ID 7417) and the Tamaulipas Floodplain Herbaceous Wetland (NatureServe Number = CES301.990.17). PEM in the MMS consists of a mixture of obligate, facultative wet, and facultative wetland species such as common threesquare (*Schoenoplectus pungens*), jointed umbrella sedge (*Cyperus articulatus*), common burhead (*Echinodorus berteroi*), and many other sedges and forbs.

**PEM – Freshwater Pond:** Classified as a Palustrine system because its non-tidal wetland with trees, shrubs, and forbs. It is further classified as persistent emergent vegetation because of the herbaceous cover and the fact that vegetation will persist up to the next growing season (Cowardin et al. 1979). This habitat is called the South Texas Pond Shore Herbaceous Vegetation (Ecological Mapping Systems of Texas ID 10007; NatureServe number CES301.197.3) and is characterized by having a stratified vegetation gradients with straggler daisy (*Calyptracarpus vialis*) and bermudagrass (*Cynodon dactylon*) in the drier upper boundary and duckweed (*Lemna sp.*) in the wettest portion of the pond. Shrubs consist of vegetation such as retama (*Parkinsonia aculeata*), Carolina wolfberry (*Lycium carolinianum*), and rattlebox sesbania (*Sesbania drummondii*).

**Riverine (Cowardin et al. 1979) and further classified (Lee, 2014):** Habitat classified as a wetland having trees and that falls in the intermittent subsystem (Cowardin et al. 1979). This habitat is classified as South Texas Ramadero Dense Shrubland (Ecological Mapping Systems of Texas ID 7605) or Tamaulipan Ramadero Dense Shrubland (NatureServe Number = CES301.992.5). This is a habitat consisting of a narrow band of vegetation along upland drainages. A diverse number of small tree species can be present including retama (*Parkinsonia aculeata*), honey mesquite (*Prosopis glandulosa*), huisache (*Acacia farnesiana*), sugar hackberry (*Celtis laevigata*), granjeno (*Celtis ehrenbergiana*), whitebrush (*Aloysia gratissima*), brasil (*Condalia hookeri*), and lotebush (*Ziziphus obtusifolia*). It is characterized as having canopy covers at 100% with vegetation between 0.5 – 3 meters high. The herbaceous species include Rio Grande false mallow (*Malvastrum americanum*), plains bristlegrass (*Setaria leucopila*), buffalograss (*Bouteloua dactyloides*), and hooded windmillgrass (*Chloris cucullata*).

**Non-Jurisdictional Waters:** An ephemeral area considered to be non-jurisdictional water because it is not connected to any waters that are classified as WOUS. This area is similar to marsh (Ecological Mapping Systems of Texas ID 9007) and consists of species including spike rush (*Eleocharis spp.*) and hooded windmillgrass (*Chloris cucullata*). The berms around this site have *Opuntia evermannii* and *Prosopis glandulosa*.

**Non-Wetland – Sea Ox-Eye Daisy:** Habitat containing native invasive *Baccharis* shrubland (Ecological Mapping Systems of Texas ID 9116), which consists of sea ox-eye daisy (*Borrchia frutescens*), swamp privet (*Forestiera acuminata*), saltgrass (*Distichlis spicata*), honey mesquite (*Prosopis glandulosa*), and shrubby sumpweed (*Iva frutescens*). If cattle did not disturb this habitat it would be classified as Gulf Coast: Salty Prairie (Ecological Mapping Systems of Texas ID 2207) Sea ox-eye flats (5605) and Texas Saline Coastal Prairie (NatureServe Number = CES203.543).

**Non-Wetland – Pasture:** Habitat classified as South Texas: Disturbed Grassland (Ecological Mapping Systems of Texas ID 9187) by NatureServe in the Anthropogenic category and is called CRP/Other Improved Grassland by the Ecological Mapping Systems of Texas ID 9327. These grasslands exhibit heavy grazing and are managed exotic pastures. The dominant grasses include bermudagrass (*Cynodon dactylon*), buffelgrass (*Pennisetum ciliare*), Kleberg bluestem (*Dichanthium annulatum*), and guineagrass (*Urochloa maximum*). Shrub species include mesquite, huisache (*Acacia farnesiana*), and lotebush (*Ziziphus obtusifolia*).

**Non-Wetland Native Invasive Mesquite:** This habitat is Native Invasive Mesquite Shrubland (9106) and Native Invasive Mesquite Woodland (9114). The native invasive mesquite woodland consists of honey mesquite dominated canopy. The native invasive mesquite shrubland can have huisache (*Acacia farnesiana*) mixed within and typically has understories of introduced grasses like buffelgrass (*Pennisetum ciliare*) or in more saline areas native invasive sea ox-eye daisy (*Borrchia frutescens*).



Photo of MMS Non-Wetland Pasture Habitat



Photo of MMS Sea Ox-eye Daisy Habitat



Photo of Site Invasive Mesquite Habitat



Photo of MMS Freshwater Pond

**Non-Wetland Crop Field:** An area consisting of agricultural fields that are active and fields that are fallow for portions of the year (Ecological Mapping Systems of Texas ID 9307). If the field has cover crops for the entire year it might be misidentified as grassland. This site had *Sorghum bicolor* growing in half the field and the fallow portion had bermudagrass (*Cynodon dactylon*) and common sunflower (*Helianthus annuus*).

**Low Intensity Urban:** Areas that have some development but do not consist entirely of impervious cover. They include features such as roads, farm structures, corrals, barns and residential areas (Ecological Mapping Systems of Texas ID 9411).

**Table 3: Current Vegetation Species List**

Scientific Name	Common Name	Wetland Indicator Status	Distribution
<b>Current vegetation within Non-Wet Pasture</b>			
<i>Pennisetum ciliare</i>	Buffelgrass	UPL	NN
<i>Cynodon dactylon</i>	Bermudagrass	FACU	NN
<i>Chloris cucullata</i>	Hooded windmillgrass	-	N
<i>Setaria leucopila</i>	Plains bristlegrass	-	N
<i>Linum hudsonioides</i>	Hudson Flax or Texas Flax	-	N
<i>Bothriochloa ischaemum</i>	Yellow bluestem	-	NN
<i>Helianthus annuus</i>	Common Sunflower	FACU	N
<i>Nicotiana glauca</i>	Tree Tobacco	FAC	NN
<b>Current vegetation within Native Invasive Mesquite</b>			
<i>Baccharis neglecta</i>	Roosevelt Weed or False Willow	FAC	N
<i>Opuntia engelmannii</i> var. <i>lindheimeri</i>	Lindheimer Pricklypear	-	N
<i>Prosopis glandulosa</i>	Honey Mesquite	FACU	N
<i>Parkinsonia aculeata</i>	Retama	FACW	N
<b>Current vegetation within Freshwater Emergent Wetland and Freshwater Ponds</b>			
<i>Cyperus articulatus</i>	Jointed Umbrellasedge	OBL	N
<i>Conoclinium coelestinum</i>	Mistflower	FACW	N
<i>Echinodorus berteroi</i>	Upright Burhead	OBL	N
<i>Eleocharis compressa</i>	Flat-stem Spikerush	FACW	N
<i>Myriophyllum spicatum</i>	Eurasian water-milfoil	OBL	NN
<i>Rumex crispus</i>	Curly Dock	FACW	NN
<i>Myriophyllum aquaticum</i>	Parrot Feather	OBL	NN
<i>Ammannia coccinea</i>	Toothcup or Purple Ammannia	OBL	N
<i>Parkinsonia aculeata</i>	Retama	FACW	N
<b>Current vegetation within Sea Ox-Eye Daisy</b>			
<i>Borrichia frutescens</i>	Sea Ox-eye Daisy	FACW	N
<i>Batis maritima</i>	Seaside Saltwort	OBL	N
<i>Monanthochloe littoralis</i>	Shoregrass	OBL	N

Key:

FAC - facultative

FACU – facultative upland

FACW – facultative wetland

OBL - obligate wetland

N - Native

NN - Exotic

### 7.1.4 Current Hydrology

Based on analysis of historic aerial photography, LIDAR data, and discussions with the landowners who have managed the land at the MMS for the past 90 years, the site has numerous rain-fed depressions dispersed throughout. These depressional areas, however, have been systematically drained by a network of minor and major ditches within the interior of the site for decades. These interior ditches drain to a larger main ditch that collects drainage from the MMS and surrounding properties and carries these flows south to north along the western perimeter of the site, eventually flowing to the Arroyo Colorado, one mile north of the MMS. Salinity in the water of the site drainage ditches (connected to regional ditches) ranged from 8.9-11 parts per thousand (ppt). Salinity of the water in the ponds and wetlands on the site that are disconnected from the drains and are solely fed by rainwater ranged from .2-.5 ppt.

The MMS currently receives water from two main sources:

**Rainfall:** The MMS receives an average of 27.5 inches of rain annually, with 5.3 inches (or 20%) of the precipitation falling in September (U.S. Climate Data for Harlingen, TX). The two year, 24-hour rainstorm event is 4.1 inches, but this total estimate is likely exceeded in September based on seasonality data (NOAA Atlas 14 Data for Harlingen Rio Grande AP, TX). Based on discussions with the landowners, late August/September storms often inundate the entire site and overwhelm drainage infrastructure, leaving all but the highest ground inaccessible. Some lower areas may hold water for many months after the large rain events subside.

**Ditch Breaches:** Land managers have observed water entering the MMS through breaches in the levee that parallels the main ditch on the western side of the property during larger storm events. Based off a regional regression analysis of the contributing watershed coupled with a 1-D hydraulic analysis, it is estimated that the 5-year peak flow rate would be enough to enter through these breaches (National Streamflow Statistics Software/NRCS Cross Section Analyzer). In addition, it has also been observed by the landowners that water from the Arroyo Colorado can backwater into the site, entering through these same levee breaches.



Photo of Blow Out in Existing West Main Ditch After Large Rainfall Event



Photo of Middle South Drain on Site that Efficiently Drains Rainwater from Site

The landowners stated that if the drainage infrastructure was removed from the site that the soils and topography on the site would be saturated or inundated for periods of time sufficient to support facultative wet and obligate wetland species/plant communities.

### 7.1.5 Existing Soils

The MMS is underlain by a mix of Quaternary clays silts and sands with some Miocene-age sediments of the Goliad Formation at the western edge. Mollisols are extensive, and the soils are deep, mostly clay loams and sandy clay loams. The freeze-free growing season is often over 320 days.

The NRCS Soils Data for the project area indicates that the site is primarily composed of Willamar fine sandy loam with a smaller fraction of Tiocono clay and Sejita silty clay loam present in isolated areas. See Table 4 below and Figures 14 and 15 for more information. Reference samples taken throughout the site showed hydric soil indicators. In July 2019 soil pits were excavated in areas throughout the site where we have designed the PEM wetland restoration. A majority of these soil pits presented clay loam soils within 12 inches of the soil surface. In areas where historic PEM wetlands have existed, then were subsequently drained for agriculture, during the July 2019 field work hydric soil conditions were observed at the estimated level of these historic PEM wetland areas. These areas were established by creating berms around them to capture rainwater, which also helped guide the PEM wetland restoration design. The picture below on the left shows a profile of one of these historic PEM wetland areas. See Appendix B for more information and pictures of the soil sampling areas.



Photo of soil profile at historic PEM



Photo of one of the proposed PEM creation sites

**Table 4: Existing Soils (Per NRCS Soils Map)**

Soil Name	Soil Code	Acreage of Soils on MMS	Percentage of Soils on MMS
Sejita silty clay loam, 0 to 1 percent slopes, occasionally ponded	SE	7.4	0.5%
Tiocano clay, 0 to 1 percent slopes, occasionally ponded	TC	43.6	2.8%
Water	W	2.0	0.1%
Willamar fine sandy loam, 0 to 1 percent slopes	WM	1505.4	96.6%
<b>Totals for MMS</b>		<b>1558.4</b>	<b>100.0%</b>

**7.1.6 Jurisdictional Determination**

The jurisdictional determination (JD) and wetland delineation for the MMS was submitted to the USACE under a separate cover.

**7.2 LEP Preservation Site**

The LEP preservation site is primarily comprised of contiguous mud, with hydrologic connectivity to South Bay. The site is located on the South Texas Coastal Plain, in an area of minimal topographic relief. Elevations within the surrounding area typically range from 0 to 40 feet North American Datum of 1988 (NAVD88). The average elevation within the site is 5 to 10 feet NAVD88, except for the lomas (natural clay dune and clay to sand dune deposits).

**7.2.1 Current Site Vegetation**

The site is comprised of the following habitat types base on June 2019 wetland delineation surveys (E & E 2019):

**Mudflat:** Mudflats at the LEP preservation site do not meet the definition of a wetland as described in the 1987 USACE Wetland Delineation Manual (Environmental Laboratory 1987) because they lack vegetation. Based on tidal influence and a general lack of vegetation, mudflats are classified as estuarine intertidal unconsolidated shore habitats under the Cowardin system. However, mudflats are specifically included as a special aquatic site along with wetlands in the U.S. Environmental Protection Agency Section 404(b)(1) Guidelines (Federal Register 1980). Mudflats within the site are areas that are intermittently to frequently inundated by wind tides or periods of high rainfall, are either devoid of vegetation or very sparsely vegetated, and are frequently saturated at or near the surface.

**High Marsh:** High marsh is described in the Hydrogeomorphic Wetland Classification System - Tidal Fringe Regional Guidebook (Shafer et al. 2002) as occupying the vertical range between the mean daily high-water zone up to the mean annual high-water zone of spring high tides and are infrequently flooded due to the higher elevation and distal location from open bay/estuary waters. High marsh habitats delineated within the LEP preservation

site were dominated by herbaceous, hydrophytic vegetation species such as shoregrass (*Monanthachloe littoralis*), sea ox-eye daisy (*Borrichia frutescens*), glassworts (*Salicornia* spp.), and saltwort (*Batis maritima*) on soils that appeared to be frequently saturated to near the surface but rarely inundated due to elevation. Based on tidal influence, even if infrequent, and dominance by herbaceous vegetation, high marsh habitats are classified as estuarine intertidal emergent wetlands under the Cowardin system (Cowardin et al, 1979).

**Coastal: Mangrove Shrubland:** In the HGM Tidal Fringe Regional Guidebook (Shafer et al. 2002), black mangrove (*Avicennia germinans*) is referred to as a component of low marsh communities. The mangrove communities generally consisted of a small open water center surrounded by dense mangroves with herbaceous species characteristic of estuarine intertidal emergent wetlands fringing the mangroves. Black mangroves persist along the northeast border of the LEP preservation site and mark the western extent of South Bay. Based on tidal influence and dominance by woody vegetation, mangrove habitats are classified as estuarine intertidal scrub-shrub wetlands under the Cowardin system.

**South Texas Loma Grassland:** Grasslands occur in slightly saline and non-saline soils at low elevations around the base of lomas. Dominant herbaceous species include gulf cordgrass, shoregrass, and saltwort. Evergreen shrubs, such as such as mesquite, prickly pear cactus, Spanish dagger (*Yucca gloriosa*), and huisachillo (*Acacia schaffneri*), comprise a smaller component of these communities (Ludeke et al. 2010). Species observed within this habitat type include a variety of grasses, as well as the species previously mentioned.

## 7.2.2 Currently Hydrology

The regional landscape is influenced by coastal winds and proximity to South bay, and dominated by hydric, poorly drained, saline soils, which influence the vegetation communities present. South Bay lies to the northeast of the LEP preservation site. Black mangroves persist along the northeast border of the LEP and mark the western extent of South Bay. Persistent hydrologic connectivity and inundation along most of the east edge of the LEP preservation site allows for vast expanses of algal flats to persist. As you move westward, a mosaic of mud and algal flats exits, until reaching the western boundary of the LEP where estuarine shrubs such as sea ox-eye daisy (*Borrichia frutescens*) and saltwort (*Batis maritima*) dominate.

## 7.2.3 Existing Soils

The NRCS Soils Data for the project area indicate that the site is composed of Barrada clay and Port Isabel clay loam. Barrada clay and similar soils are located within the mud and algal flats of the site, and Point Isabel clay loam and similar soils are located on the lomas.

## 7.2.4 Jurisdictional Determination

RG Developers submitted a Wetland Delineation Report and Approved Jurisdictional Determination Request for the LEP to the USACE Galveston District on July 18, 2019.

## 8.0 Determination of Credits

Based on guidance from the USACE during the July 9, 2019 meeting and subsequent telephone conversations, determination of credits in this CMP is based on an acre-to-acre credit strategy. A USACE recommended that the Interim Hydrogeomorphic Model (iHGM) (USACE 2010) not be used as a type of wetland analysis to measure functional uplift of the MMS as the wetlands at the MMS are depressional. This recommendation was based on the lack of a depressional iHGM model for the wetlands within the MMS and the iHGM model used for the Terminal site would not be comparable to the MMS wetlands since they are out-of-kind.

The planned MMS will create 350 acres of palustrine emergent wetlands and enhance 21.9 acres of palustrine emergent wetlands (see Table 5) which equates to a 3.5:1 ratio for out-of-kind wetlands (371.9/107.7). The LEP preservation site (1,500-acres) will preserve 1,241.1 acres of mudflats, 76.2 acres of mangrove shrublands, and 7.9 acres of high marsh which equates to a 15:1 ratio for in-kind wetlands (1,325.5/88.1). The MMS created and enhanced depressional wetlands will provide additional flood storage, water filtration, recharge local groundwater, and greatly improve the chemical and biological processes of the currently degraded site. In addition, it will provide habitat for the Aplomado Falcon, Ocelot, over 500 bird species, and an abundance of mammals, snakes, lizards and salamanders that occur in the Lower Rio Grande Valley. As this depressional system will be created from rainwater salinities, the depressional wetlands will be much lower in salinity than the surrounding brackish drainage waters which will create and support freshwater emergent wetlands and the species that depend on them. Agricultural pond areas on the site have water salinities as low as 0.5 ppt. As discussed within this CMP, the LEP preservation site offers unique in-kind mitigation that serves as a significant feature within the Laguna Madre system. The mudflats, mangroves, and high marsh proposed for preservation provide similar physical, chemical, and biological functions as the wetlands at the Terminal.

**Table 5: Rio Grande LNG Wetland Impacts and Mitigation**

Wetland Type	Terminal and Pipeline Impacts (acres)	MMS (Restoration and Enhancement) <sup>1</sup>	LEP (Preservation) <sup>2</sup>
Low Marsh	24.9	--	--
Saltflat	68.2	--	--
Ditch	1.2	--	--
Forested Wetland	9.9	--	--
Palustrine Shrub-scrub	3.5	--	--
<b>Total</b>	<b>107.7</b>	<b>371.9</b>	--
High Marsh	20.6	--	7.9
Mudflat	47.7	--	1,241.4
Mangrove	19.8	--	76.2
<b>Total</b>	<b>88.1</b>	--	<b>1,325.5</b>
<b>Grand Total</b>	<b>195.8</b>	<b>371.9</b>	<b>1,325.5</b>
<b>Mitigation Ratio</b>		<b>3.5:1</b>	<b>15:1</b>
<b>Other Habitats Included in each Mitigation Site</b>			
Uplands <sup>3</sup>		1,186.0	174.5
<b>Total Acres</b>		<b>1,557.9</b>	<b>1,500.0</b>

Key:

<sup>1</sup> MMS includes 21.9 acres of enhancement and 350 acres of restoration at a 3.5:1 ratio (371.9/107.7).

<sup>2</sup> The LEP preservation site compensates for in-kind wetlands at a 15:1 ratio (1,325.5/88.1).

<sup>3</sup> Uplands includes acres within the mitigation site boundary that are not included as compensation of Project impacts.

## 9.0 Mitigation Work Plan

There are no restoration, enhancement, or establishment activities proposed at the LEP preservation site; therefore, this section only address mitigation work proposed at the MMS.

When completed the MMS will enhance 21.9 acres of PEM wetlands, create 350.0 acres of PEM wetlands, and create and enhance 1,186.1 acres of thornscrub and coastal prairie habitat quality PEM. The entire site is located within 1,300 feet of the LANWR and it will expand upon the largest stand of contiguous habitat within the Lower Rio Grande ecoregion.



MMS Existing Site Conditions



Reference Site in LANWR of Desired Ecological Uplift

## 9.1 Hydrologic Restoration

The primary goal of the project is to restore the hydrology of the MMS by eliminating interior drainage infrastructure and enhancing or restoring depressional micro-topography to better harvest and capture rainfall. In addition, measures will be implemented to harvest water from the main drainage ditch running along the western perimeter of the site during high flow/flooding events with the ancillary benefit of potentially improving the water quality of drainage running to the Arroyo Colorado. Based off seasonal rainfall patterns, soil characteristics, and 90 years of institutional knowledge conveyed by the landowners, restoring site hydrology will promote saturated/inundated periods sufficient to support facultative and obligate wetland species within the restored and enhanced depressional areas. The restoration elements include:

- Drainage Ditch Removal – Internal ditches that currently drain low areas of the site will be decommissioned and backfilled.
- Depressional Re-contouring – Existing depressional areas will be excavated to expand and optimize shallow marsh habitat.
- Berm/Loma Construction – Overburden from depressional re-contouring operations will be used to construct 12 to 18-inch high berms or lomas with 20:1 slopes, on the downstream edge of depressions to optimize water harvesting and provide elevated planting zones for thornscrub, yucca, and other loma habitats.
- Distribution Swale – Construct wide shallow swales to connect, collect, and convey runoff throughout the site.
- Berm Breaches – Construct wide breaches along the levee of the western ditch to allow high flow from floods to enter the site. The source of water for the western ditch is the farmlands and areas surrounding the site, it's a regional drainage ditch. Creation of these depressional wetlands is not a groundwater driven system it's mostly dependent on surface water groundwater (7-20' deep on the MMS site). If the adjacent shrimp farms are developed, they would affect groundwater salinities but should not affect the success of the depressional/potholes wetlands on the MMS site.

## 9.2 Native Plant Community Restoration

Both passive and active native plant restoration will occur in the vegetative restoration of the PEM wetlands and Thornscrub and Coastal Prairie Habitats at the MMS. Initially herbicide application to exotics will occur throughout the entire site. Prescribed fire will follow initial herbicide application to burn off exotics and woody vegetation. Burning and herbicide spot treatments will be implemented throughout construction of the project. Thereafter, burning will occur on an as needed basis to accomplish the ecological uplift goals. Burning will be conducted to select for fire tolerant native herbaceous species and to control woody encroachment of exotic species. Controlled burning will occur during favorable conditions for safety and smoke management (e.g., wind direction, wind speed).

Mechanized clearing will involve erasing and filling all of the secondary ditches on the sites and removing exotic and invasive woody vegetation. Grading will involve cutting soil from the PEM wetlands areas and creating a series of catchment berms and conveyance swales throughout the site to catch rainwater. A series of three breaches will be installed along the western main ditch of the site, these will direct high ditch flows and rainfall into the PEM depressional wetlands and conveyance channels. Improvements will also be made to the southernmost ditches of the site to direct flows into the MMS. This network of depressional wetlands and ditches will effectively capture rainwater and high drainage ditch flows into the PEM wetland areas of MMS. Plant community re-establishment will occur naturally via native seed. Seeding of native PEM wetland species will be done where natural recruitment does not occur within two years of establishment. Typical species to be seeded are shown in Table 6. Exotic species will be spot treated as necessary during the initial, interim, and long-term periods. After site clearing and grading, a cover crop will be planted to help stabilize the site during native plant community establishment. These areas will be treated with herbicide, burned, then retreated with herbicide to control exotics on the site. The same methods described above will be used in the thornscrub and coastal prairie restoration areas.

The Sponsor will select a Certified and Insured Commercial Burn Manager (Burn Manager) that is licensed by the Texas Department of Agriculture.

**Table 6: Potential Native Species List**

Scientific Name	Common Name	Wetland Indicator Status
<b>Freshwater Emergent Herbaceous Wetlands</b>		
<i>Schoenoplectus pungens</i>	Three-square, chairmaker's rush	OBL
<i>Cyperus odoratus</i>	Rusty or Fragrant Flatsedge	FACW
<i>Panicum virgatum</i>	Switchgrass, Wand Panic Grass	FACW
<i>Eleocharis compressa</i>	Flat-stem Spikerush	FACW
<i>Juncus torreyi</i>	Torrey's Rush	FACW
<i>Marsilea vestita</i>	Water Clover or Southern Water Fern	OBL
<i>Cyperus elegans</i>	Sticky Flatsedge	FACW
<i>Salix nigra</i>	Black Willow	FACW
<b>South Texas Thornscrub</b>		
<i>Prosopis glandulosa</i>	Honey Mesquite	FACU
<i>Celtis laevigata</i>	Sugar Hackberry	FAC
<i>Acacia rigidula</i>	Blackbrush	-
<i>Celtis Ehrenbergiana</i>	Granjeno	-
<i>Condalia hookeri</i>	Brasil	-
<i>Ebenopsis ebano</i>	Texas Ebony	-
<i>Castela erecta</i>	Amargosa	-
<i>Sporobolus airoides</i>	Alkali Sacaton	FAC
<i>Bouteloua dactyloides</i>	Buffalograss	FACU
<i>Sporobolus wrightii</i>	Big Sacaton	-
<b>Texas Saline Coastal Prairie</b>		
<i>Spartina spartinae</i>	Gulf Cordgrass	FAC
<i>Borrchia frutescens</i>	Sea Ox-eye Daisy	FACW
<i>Batis maritima</i>	Seaside Saltwort	OBL
<i>Distichlis spicata</i>	Saltgrass or Coastal Salt Grass	FACW
<i>Panicum virgatum</i>	Switchgrass, Wand Panic Grass	FACW
<i>Monanthochloe littoralis</i>	Shoregrass	OBL
<i>Sporobolus airoides</i>	Alkali Sacaton	FAC
<i>Schizachyrium scoparium</i>	Little Bluestem	FACU
<i>Lycium carolinianum</i>	Carolina Wolfberry	FACW

Key:

FAC - facultative

FACU – facultative upland

FACW – facultative wetland

OBL - obligate wetland

## 10.0 Maintenance Plan

### 10.1 General Mitigation Maintenance

For the LEP preservation site, RG Developers will arrange for the conservation easement of the preservation site to be transferred to TPWD. RG Developers would therefore not be responsible for the ongoing maintenance of the property.

The MMS will be annually maintained by the Sponsor. Following each monitoring event, reseeding and invasive species control will be implemented as necessary. Furthermore, the Sponsor / Long-term Steward will continue annual monitoring through the entirety of this project. Monitoring efforts that will inform maintenance operations will be focused on:

- Monitoring of invasive species encroachment;
- The percentage of invasive species in the PEM areas;
- The extent and degree of herbivory damage; and
- Erosion of PEM wetland areas, containment berms, and conveyance swales.

### 10.2 Vegetation Maintenance

Vegetative maintenance will focus on both invasive and exotic species control and the establishment of native species.

**Invasive and Exotic Species Control:** Exotic invasive species included in the TPWD Invasives Species List will be monitored and controlled throughout the MMS by the Sponsor/Long-term Steward. The Sponsor will use all prudent efforts (i.e., physical, chemical, or mechanical) to eliminate existing invasive/exotic vegetation present (species currently listed by the Texas Invasive Database ([www.TexasInvasives.org](http://www.TexasInvasives.org))). Once native plant communities are reestablished the Long-Term Steward will maintain the site as needed to maintain the ecological uplift goals of the project.

**Native Vegetation Maintenance:** Natural seed recruitment and establishment of native vegetation will be monitored to inform additional seeding and planting of the site. If the monitoring goals are not being met the Sponsor/Long-term steward will develop a strategy based on regional best management practices to further establish desired native vegetation.

### 10.3 Hydrology Maintenance

The containment berms, conveyance swales, and ditch overflow breaches will also be continually monitored and maintained. This will involve monitoring these areas as needed throughout the duration of the project. If erosion and damage occurs, it will be repaired immediately to maintain the desired hydrologic function of the site.

## 11.0 Ecological Performance Standards

No performance standards are proposed for the LEP preservation site as no restoration or enhancement activities are proposed. The conservation easement for the preservation site will be donated to and maintained by TPWD; therefore, RG Developers would not be responsible for developing or tracking mitigation performance standards.

At the MMS, the project sponsor will restore and enhance the wetlands to the defined success criteria and maintain the project for the rest of its easement length. The SWG will validate that the success criteria are met at the MMS by reviewing and commenting on three intermediate reports and one final report provided by EIP, that will occur respectively after the construction phase and then the first, third, and fifth year from post-construction of project as detailed in Section 10. The SWG will evaluate, comment, and provide guidance of all plans, reports, contingency plans, and permits necessary for the MMS to achieve the success criteria and are required by the Rule (33 CFR §332.4(c)(9)).

## 12.0 Monitoring Requirements

There are no restoration, enhancement, and establishment activities proposed at the LEP preservation site; therefore, no success criteria or monitoring requirements are proposed for the site. The conservation easement for the preservation site will be donated to and maintained by TPWD; therefore, TPWD will be responsible for ongoing monitoring of the LEP preservation site.

The construction phase of the MMS project will include the use of prescribed burns, herbicide treatments, earth movement, and heavy machine work to prepare the site for establishment and enhancement of existing wetland at the MMS. After the site is prepared and sufficient rainfall, active out-planting and seeding of native hydrophytic vegetation will commence. During the establishment of this vegetation, natural rainfall and overflow from adjacent drainage ditches during high rainfall events will create retention of hydrophytic vegetation. Herbicide treatments and prescribed burning will be the predominant means for EIP to combat exotic species that invade the site. Native upland sites will be voluntarily re-established and enhanced with seeding and planting of native propagules. EIP will promote and facilitate, to the maximum feasible extent, the natural recruitment of native wetland, riparian, and upland species on an opportunistic basis.

Monitoring and reporting requirements are to be in accordance with USACE Regulatory Guidance Letter (RGL) 08-03 "Minimum Monitoring Requirements for Compensatory Mitigation Projects Involving the Restoration, Establishment, and / or Enhancement of Aquatic Resources." Reports presenting documentation of monitoring findings will be submitted to the USACE annually, until all Performance Standards are met.

At a minimum, monitoring reports will include the following:

- Provide digital images of Wetland Assessment Area's (WAA's) at ground level and at other locations throughout the Site to document overall conditions and observations of the plots and Site (Cook et al. 1995);
- Provide a description of seedling condition, species survival, wetland indicator status, and the potential cause(s) of mortality within the WAA;

- Provide a description of naturally regenerating species observed on the WAA;
- Provide a description of exotic/invasive species distribution observed on the WAA and Site;
- Identify measures to eradicate exotic/invasive species and document results of these efforts;
- A description of the condition of any applicable hydrology altering features; and
- A general description of wildlife usage at each monitoring station, including any herbivory problems if applicable.

### **Initial Success Criteria (Year 1)**

By the end of the first year, the hydrology of the established and enhanced wetlands will be able to maintain water for at least 20 non-consecutive days within a normal year. To assess hydrologic improvements, continuous water level recorders will be installed, maintained, and monitored at the MMS throughout the first five years. The combined out-planting and seeding of native wetland and riparian vegetation along with natural recruitment of wetland and riparian species will lead to the establishment of an average minimum of 30% hydrophytic vegetation (facultative or wetter as stated on the USDA website) cover by the end of the first year's growing season with all WAAs. The soils at these newly created wetland sites are not expected to exhibit hydric conditions until the end of the fifth year but soil monitoring will take place at test plots with the WAA to document the change in soil properties. All of the stated first year criteria for the MMS will be assessed using 1/10<sup>th</sup> acre sample plots with a minimum number of four plots for a given WAA of similar wetland classification according to the Cowardian classification system. The only exception will be given to wetlands habitats where the total acreage is less than 20 acres at the MMS and where the number of sampling plots can be reduced as long as the number of plots assessed accurately represents the wetland.

### **Interim Success Criteria (Year 3)**

By the end of the third year, the hydrology of the established and enhanced wetlands will be present for 30 non-consecutive days within a normal year. A minimum of 50% hydrophytic vegetation cover will be present when all sample plots are averaged for a given WAA. The soils are still not expected to be hydric although initial hydric signs or secondary indicators are expected to emerge. These success criteria will be assessed using the same sampling plot strategy as in the first year.

### **Final Success Criteria (Year 5)**

The conclusion of the fifth year since construction of the wetlands is expected to exhibit hydrology conditions that promote the retention of water for 30 consecutive days in at least 80% of all wetlands as determined by sample plots within the WAA. An average of 70% hydrophytic vegetation cover is expected for WAAs and hydric soils are expected at 70% of WAA sample plots.

## Long Term Monitoring

Once the Final Success Criteria have been met at the MMS and successfully confirmed by a SWG review of the final plan, the management of the restored site will no longer be the responsibility of EIP and will now become the responsibility of the project Sponsor to maintain a long-term conservation easement of the property. The property ownership can change hands to a third party at this time as long as the new owner maintains the long-term easement or the new owner provides a suitable replacement for the long-term easement that last for a sufficiently long time. This long-term easement or suitable replacement must meet the conditions specified in the Rule (33 CFR §332.4(c)(11)).

## 13.0 Long Term Management Plan

Once final success is achieved and the USACE signs off on the mitigation at MMS, the site will be endowed with a fund to ensure long term management. We anticipate that these activities will be minimal because the site will be self-sustaining with management activities limited primarily to monitoring, inspections, invasive species control, and boundary maintenance.

To ensure adequate long-term funding is available for long term maintenance and protection of the site, the Sponsor will establish the "Long-term Land Management and Maintenance (LTMM) endowment in the approximate amount of \$410,000 with the National Wildlife Foundation (NFWF). By the end of Year 5, 100% of the LTMM endowment will be funded by the Sponsor.

Accrued interest of the account shall be used for the administration, operation, maintenance, and/or other purposes that directly benefit the site. The principal will be maintained at the original fully funded amount and shall remain as part of the site's assets to ensure that funds are available should long-term maintenance responsibilities be assumed by a third party.

If the results of the LTMM endowment model are significantly different from the model assumptions, the Sponsor agrees to coordinate with the USACE and NFWF to develop a mutually agreeable model or adjustment to the current model based on the performance of the LTMM endowment. The original fully funded LTMM endowment amount, adjusted by a measure of inflation over the period of time since the final endowment deposit as calculated by the U.S. Department of Labor's Bureau of Labor Statistics' Consumer Price Index – Houston Area CPI Region (1982-84=100), with all accrued interest and earnings, less any authorized annual expenditures, shall be available upon transfer of the long-term management responsibilities from the Sponsor to a successor entity.

The following table is used to calculate the value of the LTMM endowment. We assumed that the fund will generate 3% above inflation. We then assumed the costs to monitoring, inspections, invasive species and erosion control, and boundary maintenance, provide fees to NFWF, and to adjust the plan every five years.

**Table 7: Long Term Maintenance**

Long Term Maintenance	UNIT	Unit Cost	Number	Total
Invasive Species Removal	YR	\$ 3,000.00	1	\$ 3,000.00
Fence and Signage Repair	YR	\$ 500.00	1	\$ 500.00
Erosion Repair	YR	\$ 1,500.00	1	\$ 1,500.00
LTM Review	YR	\$ 4,000.00	0.2	\$ 800
Monitoring	YR	\$ 2,500.00	1	\$ 2,500.00
Admin	YR	\$ 4,000.00	1	\$ 4,000.00
Subtotal				\$ 12,300.00
		Interest-Inflation		3%
<b>Endowment Value</b>				<b>\$ 410,000</b>

The Sponsor shall provide an itemized, LTMM annual funding report to the USACE by March 30<sup>th</sup> of each year the financial assurances are required. The Sponsor and USACE should receive the LTMM annual funding report from the NFWF by March 30<sup>th</sup>, which precludes the Sponsor from an earlier submittal date. The LTMM annual funding report will include a distribution schedule of the long-term account.

A long-term management fund is not proposed for the LEP preservation site as no restoration, enhancement, and establishment activities are proposed at the site. The conservation easement for the preservation area will be donated to and maintained by TPWD; therefore, TPWD will be responsible for the long-term management of the LEP preservation site.

### 14.0 Adaptive Management Plan

An adaptive management plan is not proposed for the LEP preservation site because no restoration, enhancement, and establishment activities are proposed at the site. The conservation easement for the preservation site will be donated to and maintained by TPWD; therefore, TPWD will be responsible for the long-term management of the LEP preservation site.

The Sponsor will be responsible for implementing this mitigation plan at MMS and ensuring that all as-built and performance criteria are met during the monitoring period. In the event the USACE or the Sponsor determines that the site is not achieving the performance standards identified in the Performance Standards Section of this Compensatory Mitigation Plan, a Notice of Deficiency shall be developed by the entity making the determination. The Notice will define the deficiency and propose the adaptive management that is needed or required. The adaptive management will be approved by the USACE in accordance with 33 CFR 332.4 (c) (12) and implemented by the Sponsor as the Adaptive Management Plan. The Adaptive Management Plan will identify specific measures to be taken and a timetable to complete the work to correct deficiencies

## 15.0 Financial Assurances

A Financial Assurance has not been proposed for the LEP preservation site as no restoration, enhancement, and establishment activities are proposed at the site. The conservation easement for the preservation area will be donated to and maintained by TPWD; therefore, RG Developers would not be responsible for financial assurance of the LEP preservation site.

A Financial Assurance will be established for the value of the construction and monitoring of the MMS project to ensure a high level of confidence that the compensatory mitigation project will be successfully completed<sup>5</sup>, in accordance with applicable performance standards. The financial assurance will be in the form of bond (to be sent under separate cover) and will provide the operative language that the surety company will pay necessary funds to a third party to complete the compensatory mitigation obligation. The third party(s) and any solution will be subject to approval by the USACE.

The Financial Assurance will be stepped down as key milestones are met, as the meeting of the milestone will provide additional confidence to the USACE that the compensatory mitigation project will be successfully completed. The cost for construction, maintenance and monitoring for the life of the mitigation project is shown in Table 8.

**Financial Assurances from time of Approval until Construction is Complete:** At the time of approval, the Sponsor shall place a bond for the value of construction and five (5 years) of maintenance and monitoring per Table 8. Once the initial construction is completed and as-built plans have been delivered, the "likelihood that the project will be successfully completed" rises significantly. As a result, the financial assurances should be reduced and focus only on the risk that the remaining activities will not lead to successfully meet final performance standards.

**Financial Assurance from time of Construction to Final Approval:** Each successive year of successful monitoring increases the "likelihood the project will be successfully completed." Therefore, the financial assurance protection should be reduced each time a monitoring report is submitted.

Once the value of the Non-Wasting Stewardship Endowment exceeds the value of the Financial Assurance, the Non-Wasting Stewardship Endowment account shall replace the Financial Assurance instrument as security to ensure the likelihood the project will be successfully completed". However, if the Non-Wasting Stewardship Endowment is utilized during the time the Site is in operation, the Sponsor will replenish the Endowment Account as a condition of, and prior to, Site closure.

Upon Final Approval, since all performance standards are met, the financial assurance requirement will be removed and the Non-Wasting Stewardship Endowment shall become available for use in case of catastrophic loss.

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<sup>5</sup> 33 CFR 332.3 (n) (l) - The district engineer shall require sufficient financial assurances to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with applicable performance standards.

**Table 8 Estimated Project Costs**

<b>Entitlement/ Permitting Bank</b>	<b>UNIT</b>	<b>Unit Cost</b>	<b>Number</b>	<b>Total</b>
Design and Entitlement	LS	\$ 360,000.00	1	\$ 360,000.00
Survey	LS	\$ 75,000.00	1	\$ 75,000.00
Financial Assurance	per year	\$ 4,133,500.00	1%	\$ 41,335.00
Subtotal				\$ 476,335
<b>Construction</b>				
	<b>UNIT</b>	<b>Unit Cost</b>	<b>Number</b>	<b>Total</b>
Clearing and Grubbing	AC	\$ 1,000.00	280	\$ 280,000.00
Mow	AC	\$ 40.00	400	\$ 16,000.00
Burn	AC	\$ 40.00	1,500	\$ 60,000.00
Herbicide	AC	\$ 175.00	1,500	\$ 262,500.00
Earthwork	CY	\$ 3.50	650,000	\$ 2,275,000.00
Rock for structures	TON	\$ 50.00	1,000	\$ 50,000.00
Seeding	AC	\$ 600.00	400	\$ 240,000.00
Woody Planting	EA	\$ 3.50	200,000	\$ 700,000.00
Survey (Layout and As built)	LS	\$ 50,000.00	1	\$ 50,000.00
Supplemental Irrigation	MONTH	\$ 10,000.00	8	\$ 80,000.00
Construction Observation	MONTH	\$ 40,000.00	3	\$ 120,000.00
Subtotal				\$ 4,133,500
<b>YR 1 Monitoring and</b>				
	<b>UNIT</b>	<b>Unit Cost</b>	<b>Number</b>	<b>Total</b>
Monitoring	YR	\$ 60,000.00	1	\$ 60,000.00
Maintenance Support	AC	\$ 35.00	1,500	\$ 52,500.00
Subtotal				\$ 112,500
<b>YR 2 Monitoring and</b>				
	<b>UNIT</b>	<b>Unit Cost</b>	<b>Number</b>	<b>Total</b>
Monitoring	YR	\$ 45,000.00	1	\$ 45,000.00
Maintenance Support	AC	\$ 25.00	1,500	\$ 37,500.00
Subtotal				\$ 82,500
<b>YR 3 Monitoring and</b>				
	<b>UNIT</b>	<b>Unit Cost</b>	<b>Number</b>	<b>Total</b>
Monitoring	YR	\$ 35,000.00	1	\$ 35,000.00
Maintenance Support	AC	\$ 20.00	1,500	\$ 30,000.00
Subtotal				\$ 65,000
<b>YR 4 Monitoring and</b>				
	<b>UNIT</b>	<b>Unit Cost</b>	<b>Number</b>	<b>Total</b>
Monitoring	YR	\$ 25,000.00	1	\$ 25,000.00
Maintenance Support	AC	\$ 10.00	1,500	\$ 15,000.00
Subtotal				\$ 40,000
<b>YR 5 Monitoring and</b>				
	<b>UNIT</b>	<b>Unit Cost</b>	<b>Number</b>	<b>Total</b>
Monitoring	YR	\$ 45,000.00	1	\$ 45,000.00
Maintenance Support	AC	\$ 5.00	1,500	\$ 7,500.00
Subtotal				\$ 52,500

**Table 9 Financial Assurances.**

<b>Event</b>	<b>Financial Assurance to be placed</b>	<b>Value based on</b>
Initial Approval	\$ 4,486,000	Construction plus 5 years of M&M
Approval of As-built	\$ 352,500	5 years of M&M
Approval of 1 <sup>st</sup> year Monitoring	\$ 240,000	4 Years of M&M
Approval of 2 <sup>nd</sup> year Monitoring	\$ 157,500	3 Years of M&M
Approval of 3 <sup>rd</sup> Year Monitoring	\$ 92,500	2 Years of M&M
Approval of 4 <sup>th</sup> Year Monitoring	\$52,500	1 Year of M&M
Final Approval of Mitigation	\$ -	Elimination of need for Financial assurance.

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## 17.0 Appendices

### **Appendix A:** Maps and Figures

Figure 1: Vicinity Map

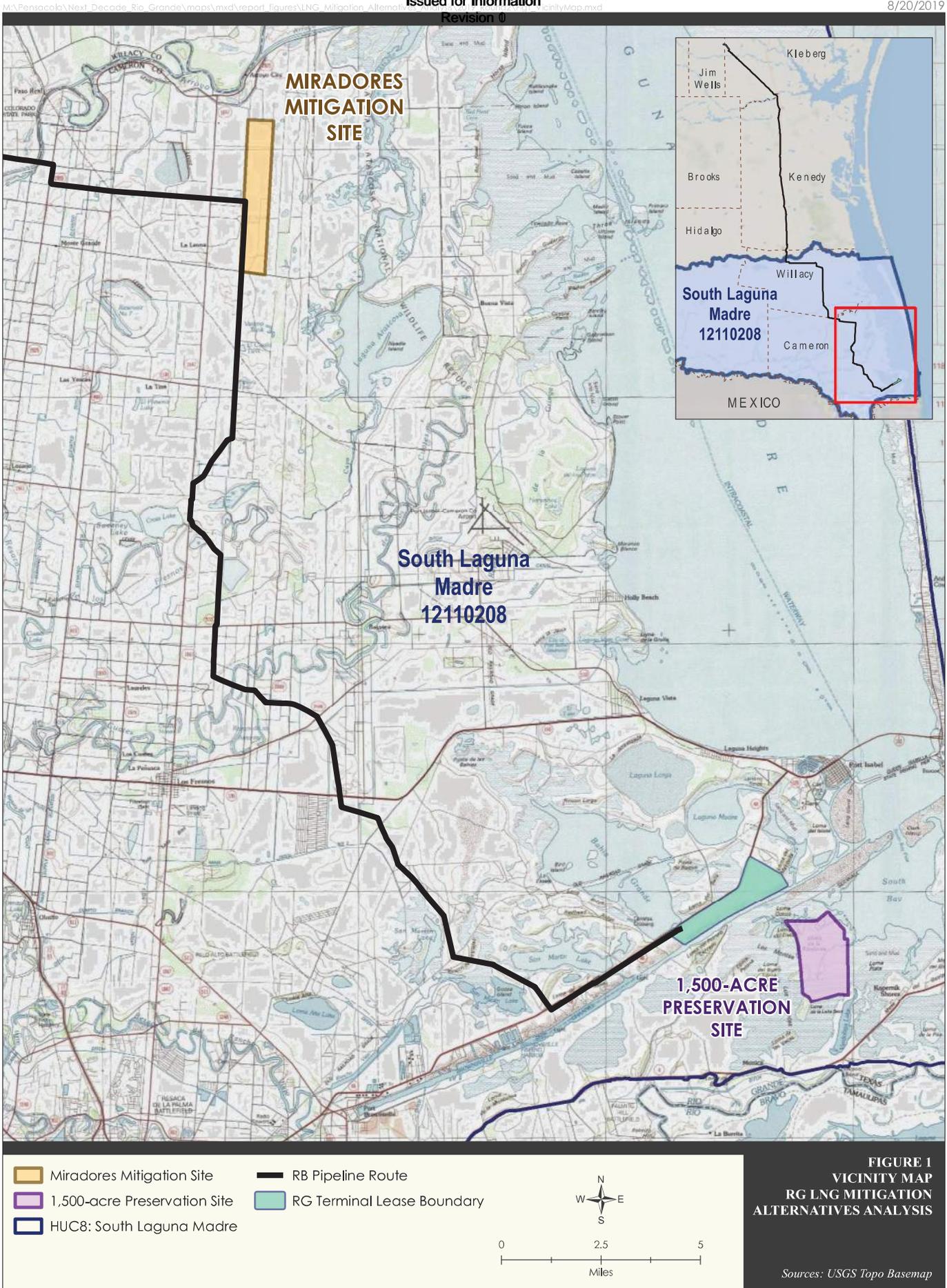
Figure 2: MMS Overview Map

Figure 3. LEP Preservation Site Overview Map

### **Appendix B:** Mitigation Site and Reference Site Photos

# Appendix A

## Maps and Figures



**FIGURE 1**  
 VICINITY MAP  
 RG LNG MITIGATION  
 ALTERNATIVES ANALYSIS

Sources: USGS Topo Basemap

RG-NTD-000-REG-PLN-00004  
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RG-NTD-000-REG-PLN-00004  
 Issued for Information  
 Revision 1

**Legend**  
 Parcel Boundary (Approximate) [1,656 Acres]

Date: 7/18/19  
 0 4000 8000  
 SCALE IN FEET

Figure 2

**Miradores Mitigation Site**

Site Overview Map

Data Sources:  
 • AERIAL & ROADS: Bing Database  
 • PARCEL BOUNDARY: Approximate parcel boundary provided by Rocking K Realty



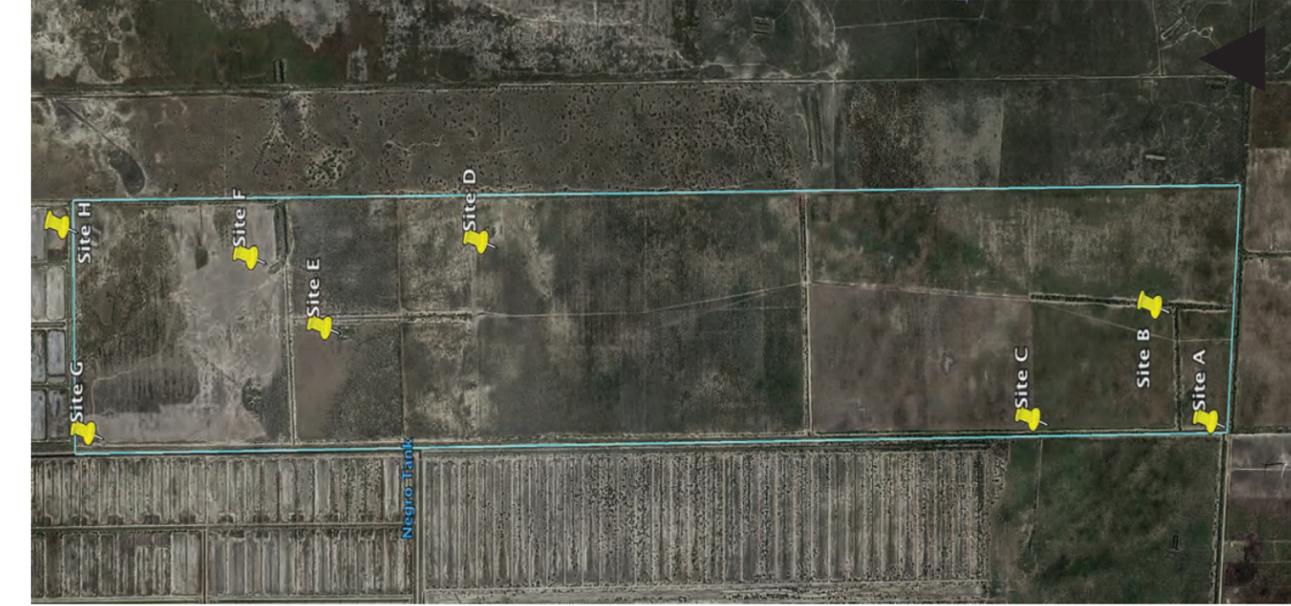
**Ecosystem  
 Investment  
 Partners**



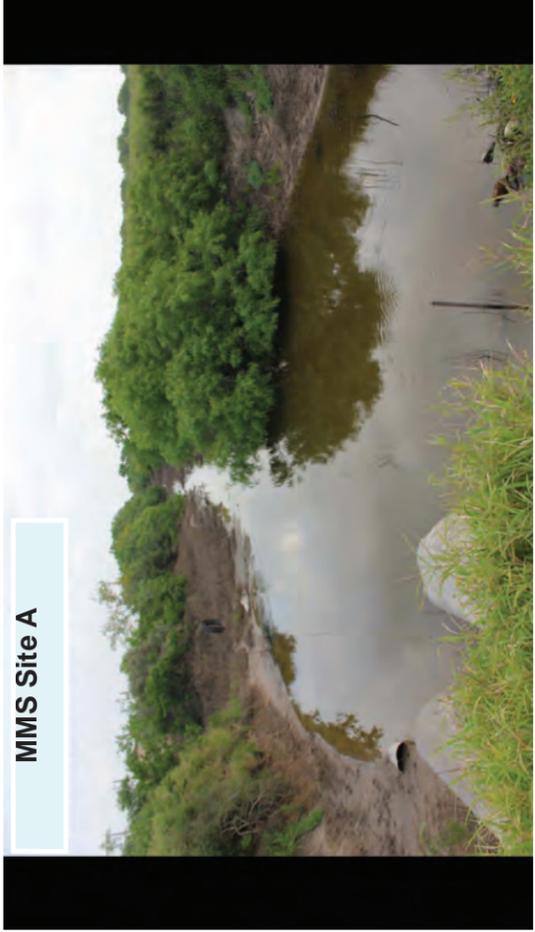


## **Appendix B**

### **Mitigation Site and Reference Site Photos**



Miradores Mitigation Site (MMS)  
(oriented north)



Site A Looking North Up Main Ditch



Site A West Main Ditch



Site B Secondary Drainage Ditch



Site B Soil Profile



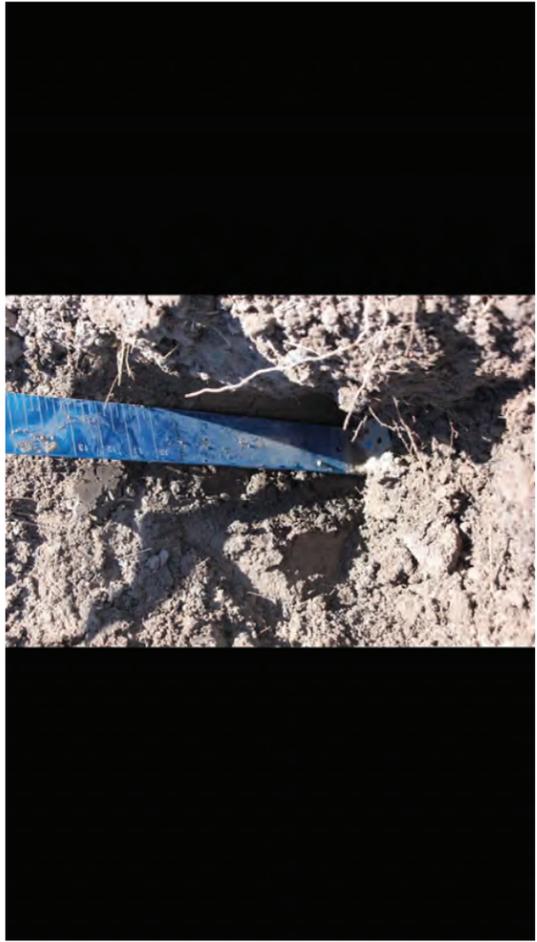
**Ecosystem  
Investment  
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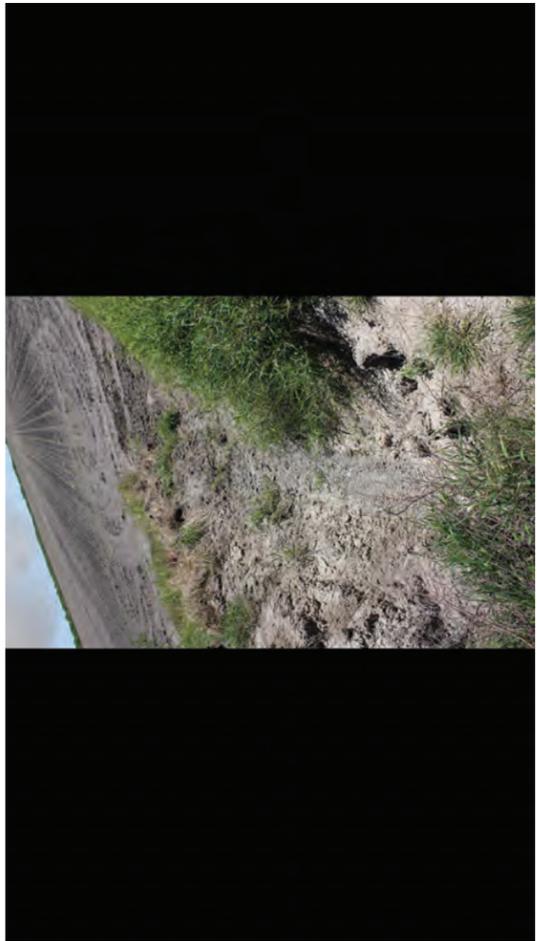
# Miradores Mitigation Site

## Site Photos

## Appendix B Site Photos



Site C Soil Pit



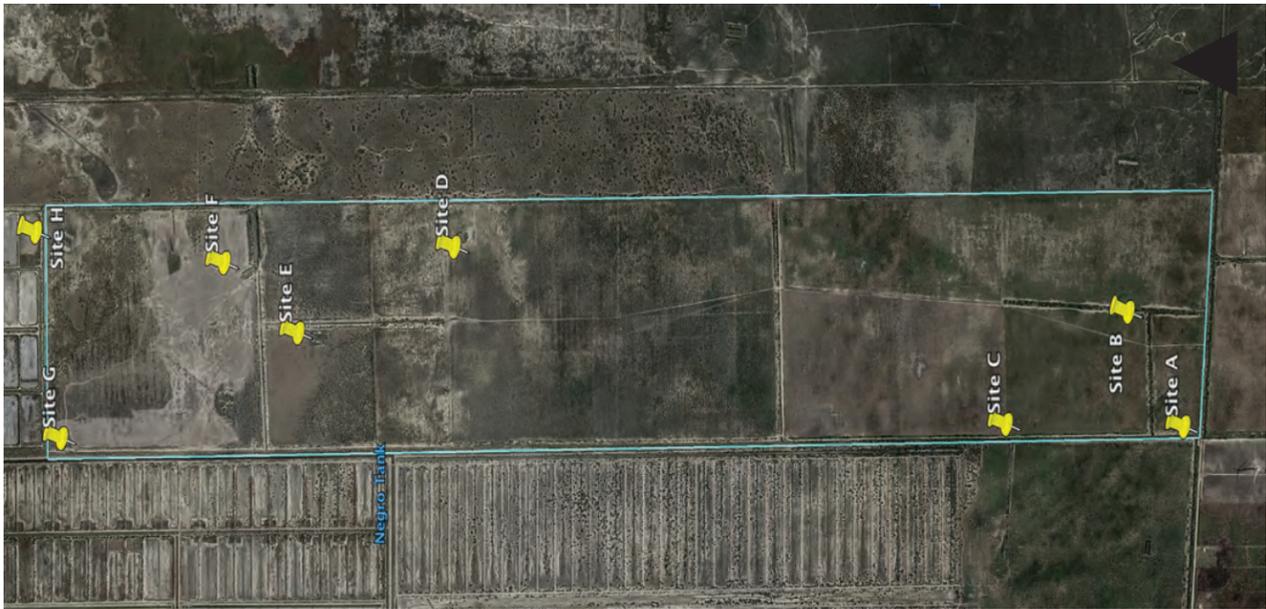
Site C Looking East Into Fields From Blown Out Levee That  
**Drains fields in Large Rain Events**



Site D Soil Profile



Site D Looking North



MMS (oriented north)



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# Miradores Mitigation Site

## Site Photos

### Appendix B Site Photos



**Site E Soil Profile**



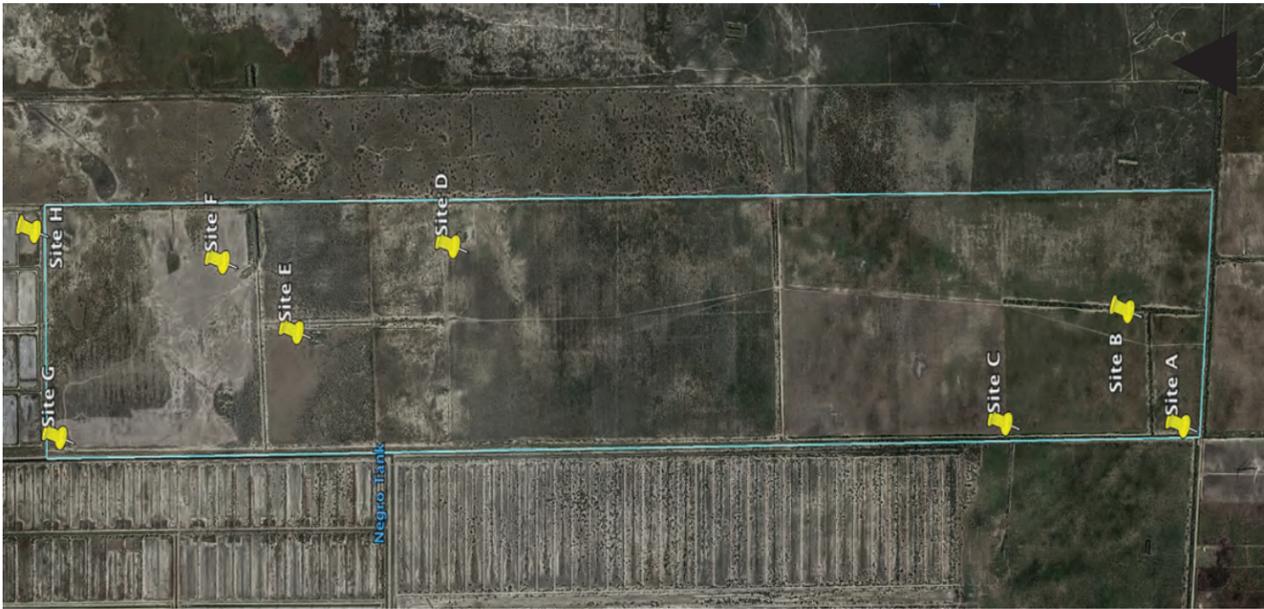
Site E Looking Into Adjacent Farm Pond



**Site F Soil Profile**



Site F Looking North



MMS (oriented north)



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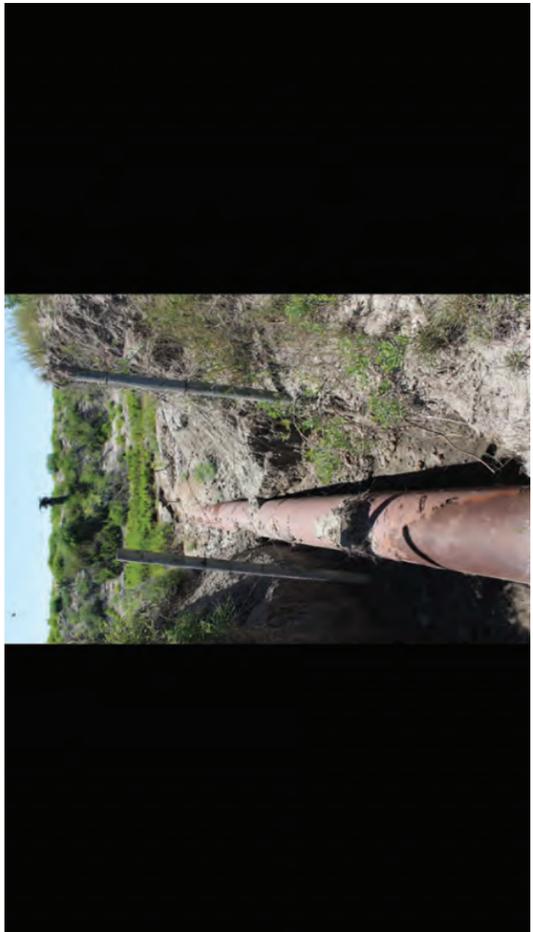
# Miradores Mitigation Site

## Site Photos

### Appendix B Site Photos



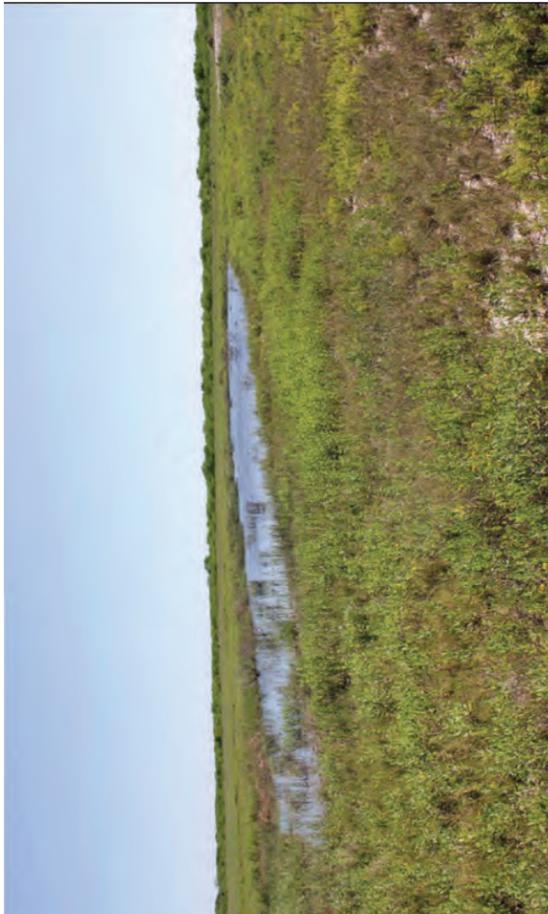
Site G Soil Pit



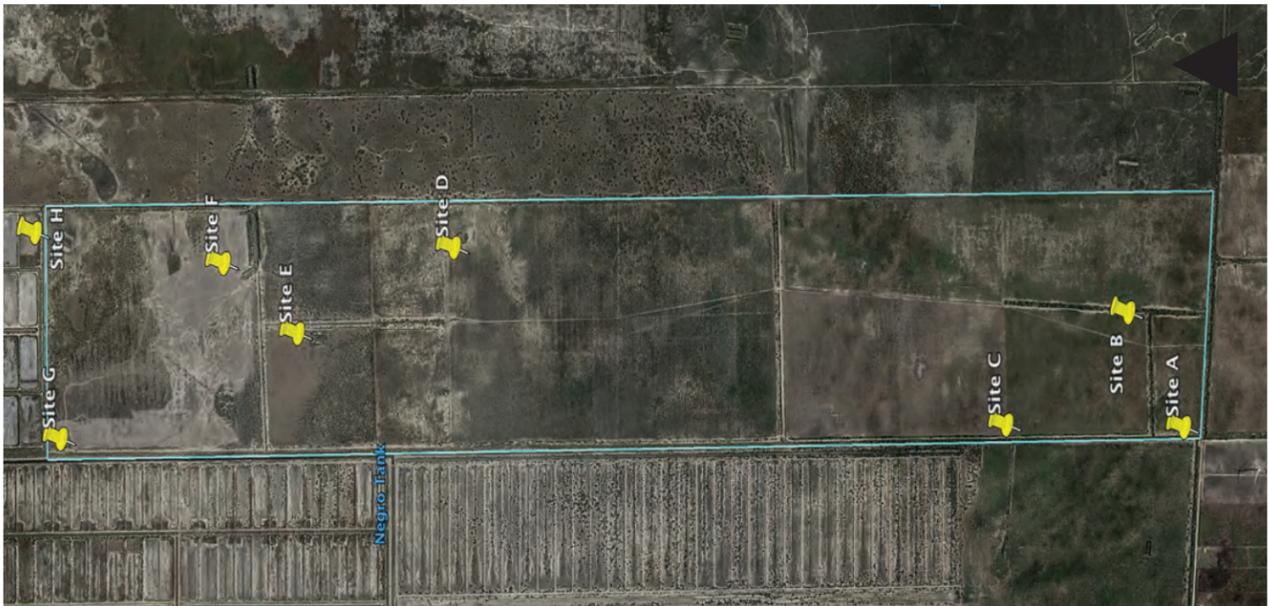
Site G Looking East Through Blown Out Levee Draining Fields



Site H Soil Pit



Site H Looking South



MMS (oriented north)



# Miradores Mitigation Site

## Site Photos

### Appendix B Site Photos



Large Area of the Property is Ecologically Degraded Cow Pasture



A Majority of Initial Sampling Points Had Tight Clay Loam Soils Within 12" of Soil Surface



Tire Ruts With Demonstrating High Clay Content in Soils



Thornscrub Habitat on Fringe of Secondary Drainage Ditches



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# Miradores Mitigation Site

## Site Photos

### Appendix B Site Photos

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2017 Aerial Of Ecologically Degraded MMS

**Aerial Photo of Desired Habitat Reference Site In Laguna  
 Atascosa National Wildlife Refuge**



- \* Photos Are at The Same Scale
- \* Reference site is Five Miles Southeast of MMS



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2017 Aerial Of Ecologically Degraded MMS

**Aerial Photo of Desired Habitat Reference Site In Laguna  
 Atascosa National Wildlife Refuge**



- \* Photos Are at The Same Scale
- \* Reference site is Five Miles Southeast of MMS



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Appendix B Site Photos



**2019 Photo Exiting Row Crops MMS**



**\* Laguna Atascosa National Wildlife Refuge**

**2019 Photo of Desired Habitat Reference Site**

Freshwater Emergent Marsh/South Texas Thorn Scrub



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**Site Photos**

**Appendix B Site Photos**



2019 Photo of Degraded Pastureland MMS



\* Laguna Atascosa National Wildlife Refuge

**2019 Photo of Desired Habitat Reference Site South Texas Thorn Scrub (Adjacent Laguna Atascosa Wildlife Refuge)**

\* Photos Are at The Same Scale



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2019 Photo Of Ecologically Degraded Pasture Land, MMS



\* Laguna Atascosa National Wildlife Refuge

**2019 Photo of Desired Habitat Reference Site, Freshwater Emergent Wetlands/Texas Saline Coastal Prairie (Adjacent Laguna Atascosa Wildlife Refuge)**



**2019 Photo Exiting Row Crops MMS**



**\* Laguna Atascosa National Wildlife Refuge**

**2019 Photo of Desired Habitat Reference Site**

Freshwater Emergent Marsh/South Texas Thorn Scrub



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Site Photos

Appendix B Site Photos



2019 Photo of Degraded Pastureland MMS



\* Laguna Atascosa National Wildlife Refuge

**2019 Photo of Desired Habitat Reference Site South Texas Thorn Scrub (Adjacent Laguna Atascosa Wildlife Refuge)**

\* Photos Are at The Same Scale



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Appendix B Site Photos



2019 Photo Of Ecologically Degraded Pasture Land, MMS



\* Laguna Atascosa National Wildlife Refuge

**2019 Photo of Desired Habitat Reference Site, Freshwater Emergent Wetlands/Texas Saline Coastal Prairie (Adjacent Laguna Atascosa Wildlife Refuge)**