Occidental Chemical Corporation (OxyChem) Ethane Cracker, Markham Ethylene Pipeline, and San Patricio Pipeline Project

Biological Assessment

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LIST OF ACRONYMS AND ABBREVIATIONS

ADFG	Alaska Department of Fish and Game
AERMOD	American Meteorological Society (AMS)/US Environmental Protection Agency Regulatory Model
ANSI	American National Standards Institute
ANWR	Aransas National Wildlife Refuge
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ATWS	Additional Temporary Work Space
AWBNP	Aransas-Wood Buffalo National Park
BA	Biological Assessment
BACT	Best Available Control Technology
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practices
BPIP	Building Profile Input Program
C_3/C_4	Organic hydrocarbon molecules containing either 3 or 4 carbon atoms
C_5^+	Organic hydrocarbon molecules containing 5 or more carbon atoms
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2e	Carbon Dioxide Equivalent
CWS	Canadian Wildlife Service
DDT	Dichlorodiphenyltrichloroethane
DMS/DMDS	Dimethyl Sulfide/Dimethyl Disulfide
DOI	Department of the Interior
DOT	Department of Transportation
DRE	Destruction/Removal Efficiency
EFH	Essential Fish Habitat
EPN	Emission Point Numbers
ESA	Endangered Species Act
ESD	Emergency Shut-down
ESL	Effects Screening Levels
EW	Extinct in the Wild
F	Fahrenheit
FERC	Federal Energy Regulatory Commission
FFWCC	Florida Fish and Wildlife Conservation Commission
FM	Farm to Market
Gal	Gallon
GHG	Greenhouse Gas(es)
GIS	Geographic Information System
gpm	gallons per minute
HDD	Horizontal Directional Drill
Hp-HR	Horsepower-Hour
KO	Knock Out
LANWR	Laguna Acosta National Wildlife Refuge
Lbs	Pounds
Lbs/Hr	Pounds per Hour
LEL	Lower Explosive Limit
LPG	Liquefied Petroleum Gas
M&R	Measurement and Regulation
MAOP	Maximum Allowable Operating Pressure
MBTA	Migratory Bird Treaty Act
MEP	Markham Ethylene Pipeline
mg/l	milligrams per liter

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

MHW	Mean High Water
MLLW	Mean Lower Low Water
MLW	Mean Low Water
MMBtu	Million British Thermal Unit
MMPA	Marine Mammal Protection Act
MP	Milepost
m/sec	meters per second
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSS	Maintenance, Start-up and Shutdown
NAAQS	National Ambient Air Quality Standards
NDE	Nondestructive Examination
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NMFS	National Marine Fisheries Service
NMFS-HCD	National Marine Fisheries Service Habitat Conservation Division
NMFS-PRD	National Marine Fisheries Service Protected Resource Division
NNSR	Nonattainment New Source Review
NOAA	National Oceanic and Atmospheric Administration
NO_x	Nitrogen Oxides
NRCS	Natural Resource Conservation Service
NSR	New Source Review
NWP	Nationwide Permit
O_3	Ozone
OD	Outside Diameter
OxyChem	Occidental Chemical Corporation
Pb	Lead
PI	Points of Inflection
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter less than 2.5 microns in diameter
PM_{10}	Particulate Matter less than 10 microns in diameter
PSD	Prevention of Significant Deterioration
PSIG	Pounds per Square Inch Gauge
PTE	Potential to Emit
ROW	Right-of-Way
SH	State Highway
SIL	Significant Impact Levels
SIL/ESL	Significant Impact Levels/Effect Screening Levels
SO_2	Sulfur Dioxide
SPP	San Patricio Pipeline
STCPL	Society of Tympanuchus Cupido Pinnatus, Ltd
T&E	Threatened and Endangered
TAAQS	Texas Ambient Air Quality Standards
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TMMSN	Texas Marine Mammal Stranding Network
TPDES	Texas Pollution Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TPY	Tons per Year
TRRC	Texas Railroad Commission
TXNDD	Texas Natural Diversity Database
$\mu g/m^3$	One Millionth of a Gram per Cubic Meter

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

US	United States
USACE	US Army Corps of Engineers
USC	United States Code
USDA/NRCS	US Department of Agriculture Natural Resource Conservation Service
USDOT	US Department of Transportation
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	United States Geological Survey
VCM	Vinyl Chloride Monomer
VOC	Volatile Organic Compounds
WMA	Wildlife Management Area
WUS	Waters of the US

EXECUTIVE SUMMARY

Pursuant to the Federal Clean Air Act (CAA) (42 United States Code [USC] §§ 7401 et seq.), Occidental Chemical Corporation (OxyChem) is seeking a permit under the United States Environmental Protection Agency (USEPA) Prevention of Significant Deterioration (PSD) Program to construct and operate a new ethylene plant. The project will involve the construction and operation of the following facilities:

- Ethane Cracker Facility: Five cracking furnaces, two thermal oxidizers, a high pressure ground flare, an emergency generator, a firewater pond, a five cell cooling tower, and sixteen storage vessels (4 – pressure vessels, 10 – low pressure vessels, and 2 – atmospheric tanks), hereafter referred to as the Ethane Cracker Facility;
- Markham Ethylene Pipeline (MEP) Corridor: An approximately 114.5-mile-long, 100-foot-wide (50-foot-wide permanent and 50-foot-wide temporary construction) right-of-way (ROW), hereafter referred to as the MEP Corridor, comprised of one 8-inch-diameter pipeline to serve as an ethylene send-out and feed pipeline; and
- San Patricio Pipeline (SPP) Corridor: An approximately 18.5-mile-long, 100-foot-wide (50-foot-wide permanent and 50-foot-wide temporary construction) ROW, known and hereafter referred to as the SPP Corridor, comprised of an ethane pipeline that will serve as supply.

Taken collectively, these actions and facilities comprise the Proposed Action, which is referred to in this Biological Assessment (BA) as the Project. The Ethane Cracker Facility is located approximately two miles west of Ingleside, Texas in San Patricio County. The MEP Corridor extends from the Ethane Cracker Facility to the north and northeast and spans Aransas, Calhoun, Jackson, Matagorda, Refugio, San Patricio, and Victoria Counties, Texas. It terminates approximately 0.25 miles west of Clemville in Matagorda County, Texas. The SPP Corridor extends from the Ethane Cracker Facility to the north and northwest and terminates approximately 3.8 miles east of Sinton in San Patricio County, Texas.

The Project is subject to PSD review for oxides of nitrogen (NO_x), carbon monoxide (CO), ozone (O_3) review triggered based on emissions of NO_x and volatile organic compounds (VOC), particulate matter (PM) less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and greenhouse gases (GHGs).

Currently, the Texas Commission on Environmental Quality (TCEQ) has been delegated authority for the issuance of the PSD permits for criteria pollutants, whereas the USEPA retains authority for permitting major sources of GHGs. As the USEPA is responsible for conducting the review and issuance of the GHG PSD permit they will also act as the Federal Lead Agency regarding the Proposed Action (Project). As the Federal Lead Agency, USEPA has the regulatory responsibility to ensure the Project complies with the Endangered Species Act (ESA) of 1973 (16 USC §§ 1531-1544), as amended. Specifically, Section 7 of the ESA requires federal agencies to ensure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of any endangered or threatened species or protected species habitat, or result in the destruction or adverse modification of designated critical habitat. Consultation or informal consultation with the United States Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) is required to ensure actions do not adversely affect federally-listed threatened and endangered (T&E) species. The BA is an analysis of the potential effects the Project might have on federally-listed T&E species and/or their habitat. Protected species evaluated in this document include T&E species promulgated/protected by the USFWS under the ESA, the Migratory Bird Treaty Act (MBTA), and Bald and Golden Eagle Protection Act (BGEPA) and NMFS Protected Resources Division (NMFS-PRD) regarding species protected

under the ESA (NMFS 2013a). NMFS also oversees the protection of Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). A separate report documenting the Project will not affect EFH has been provided to USEPA for coordination with NMFS Habitat Conservation Division (NMFS-HCD).

The BA includes the results of the pedestrian T&E species survey and habitat evaluation in the area identified as the Project Action Area. A Project Action Area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the "action" (50 Code of Federal Regulations [CFR] § 402.02). The Action Area for the proposed Project includes: the Ethane Cracker Facility Site; the 114.5-mile-long, 100-foot-wide (50-foot-wide permanent corridor, 50-foot-wide temporary construction corridor) MEP Corridor; the 18.5-mile-long, 100-foot-wide (50-foot-wide permanent corridor, 50-foot-wide temporary construction corridor) SPP Corridor; additional temporary work space (ATWS) of up to approximately 200-feet by 200-feet at crossings and at Horizontal Directional Drill (HDD) and conventional bore locations; ATWS necessary for construction staging areas and pipe laydown/drawback areas; and Measurement and Regulation (M&R) and Electric Driven Booster Stations.

The BA also provides an evaluation of potential direct and indirect impacts to federally-listed T&E species from air emissions, water discharge, construction activities, operation and maintenance, construction noise levels, and conversion of habitats associated with the Project. Preliminary air quality modeling of potential emissions from the Ethane Cracker Facility indicate air contaminant concentrations will remain below established Significant Impact Level (SIL) at locations along and beyond the Ethane Cracker Facility Site boundary. Therefore, the Project's Action Area will be restricted to the Ethane Cracker Facility Site proper. An addendum to this assessment will be prepared in the event the final modeling of the Project identifies impacts higher than SIL at any off-site location.

This BA is based on the best science available, review of the proposed Project, review of pertinent literature, and pre-application meetings with USFWS and NMFS, along with biological field investigations to determine the presence or absence of suitable habitat for protected species within the Project Action Area. Based on the review of the USFWS's (USFWS 2012a) and Texas Parks and Wildlife Department's (TPWD) (TPWD 2013a) current lists of T&E species (internet websites last accessed February 2013), habitat types found in the Project and surrounding area, and the February 2013 meeting with USFWS and NMFS, November 21, 2013 coordination with USEPA, and November 22, 2013 meeting with USFWS, specific animal and plant species listed as endangered (LE), threatened (LT), or candidate (C) were considered to potentially occur in the Project Action Area.

The ESA federally-listed (endangered, threatened, and candidate) species under the promulgation of USFWS and NMFS-PRD that might occur in the Project Action Area are listed below. Based on the information gathered for this BA, Tetra Tech, Inc. (Tetra Tech), on behalf of OxyChem, recommends the following effect determinations for these listed species.

Common Name	Scientific Name	Federal Status[1]	Determination of Effect	Conservation Measures/Management Practices
Mammals				
Gulf Coast jaguarundi	*Herpailurus yaguarondi cacomitli*	LE	May affect, not likely to adversely affect	• If any lights are used during pipeline construction, they will be directed away from any brush that might be used as a travel corridor (vegetation along creeks or riparian areas) by jaguarundi. • Environmental training to instruct workers to use slow speed on ROW during construction to avoid vehicular collisions.
Ocelot	*Leopardus pardalis*	LE	May affect, not likely to adversely affect	• If any lights are used during pipeline construction, they will be directed away from any brush that might be potentially used as a travel corridor (vegetation along creeks or riparian areas) by ocelot. • Environmental training to instruct workers to use slow speed on ROW during construction to avoid vehicular collisions.
Red wolf	*Canis lupus rufus*	LE	No Effect	---
West Indian manatee	*Trichechus manatus*	LE	No Effect	---
Mammals - Whales				
Blue whale	*Balaenoptera musculus*	LE	No Effect	---
Fin whale	*Balaenoptera physalus*	LE	No Effect	---
Humpback whale	*Megaptera novaeangliae*	LE	No Effect	---
Sei whale	*Balaenoptera borealis*	LE	No Effect	---
Sperm whale	*Physeter macrocephalus*	LE	No Effect	---
Birds				
Attwater's prairie chicken	*Tympanuchus cupido attwateri*	LE	May affect, not likely to adversely affect	• Upon completion of pipeline installation, use a native seed mixture suitable for Attwater's prairie chicken to revegetate the permanent and temporary ROW impact areas in "good core area" (between mileposts [MPs] 44.5 – 48). • Construct pipeline between MPs 44.5 – 48 outside of March 1 – mid-June breeding season.
Bald eagle	*Haliaeetus leucocephalus*	DL	No Take	• No structures suitable for nesting in Project area. • If nest found within 660 feet of construction area prior to or during construction, comply with Bald Eagle Management Guidelines (USFWS 2007a).
Eskimo curlew	*Numenius borealis*	LE	No Effect	---
Interior least tern	*Sternula antillarum athalassos*	LE	No Effect	---
Northern aplomado	*Falco femoralis*	LE	May affect, not likely to	• No structures suitable for

Common Name	Scientific Name	Federal Status[1]	Determination of Effect	Conservation Measures/Management Practices
falcon	*septentrionalis*		adversely affect	nesting in Project area. • Foraging habitat will be allowed to restore to preconstruction conditions.
Piping plover	*Charadrius melodus*	LT	May affect, not likely to adversely affect	• Migratory species. • Foraging habitat (saltmarshes and associated waterbodies) traversed using horizontal directional drill (HDD) technology.
Red knot	*Calidris canutus rufa*	C	Not likely to jeopardize continued existence of species	• Migratory species. • Foraging habitat (saltmarshes and associated waterbodies) traversed using HDD technology.
Sprague's pipit	*Anthus spragueii*	C	Not likely to jeopardize continued existence of species	• Migratory species. • Mow ROW less frequently.
Whooping crane	*Grus americana*	LE	May affect, not likely to adversely affect	• Locate lights throughout Ethane Cracker Facility so new structures are visible during low-light conditions (dawn, dusk, and nighttime hours). • Locate new power lines between and amongst existing and new major aboveground industrial facilities to avoid locating in highly used avian flight path. • New power lines adjacent to existing power lines and in existing and new industrial areas which will be well-lighted so power lines are broadly visible during low-light conditions.
Reptiles				
Green sea turtle	*Chelonia mydas*	LT	May affect, not likely to adversely affect	• HDD technology used to traverse potential habitat. • Compliance with TPDES Permits.
Hawksbill sea turtle	*Eretmochelys imbricata*	LE	May affect, not likely to adversely affect	• HDD technology used to traverse potential habitat. • Compliance with TPDES Permits.
Kemp's Ridley sea turtle	*Lepidochelys kempii*	LE	May affect, not likely to adversely affect	• HDD technology used to traverse potential habitat. • Compliance with TPDES Permits.
Leatherback sea turtle	*Dermochelys coriacea*	LE	May affect, not likely to adversely affect	• HDD technology used to traverse potential habitat. • Compliance with TPDES Permits.
Loggerhead sea turtle	*Caretta caretta*	LT	May affect, not likely to adversely affect	• HDD technology used to traverse potential habitat. • Compliance with TPDES Permits.
Mollusks				
Golden orb	*Quadrula aurea*	C	Not likely to jeopardize	• Guadalupe River in historic

Common Name	Scientific Name	Federal Status[1]	Determination of Effect	Conservation Measures/Management Practices
			continued existence of species	and current distribution of species. HDD Guadalupe River.
Smooth pimpleback	*Quadrula houstonensis*	C	Not likely to jeopardize continued existence of species	• HDD technology used to traverse potential habitat.
Texas fatmucket	*Lampsilis bracteata*	C	Not likely to jeopardize continued existence of species	• Guadalupe River in historic and current distribution of species. HDD Guadalupe River.
Texas fawnsfoot	*Truncilla macrodon*	C	Not likely to jeopardize continued existence of species	• HDD technology used to traverse potential habitat.
Texas Pimpleback	*Quadrula petrina*	C	Not likely to jeopardize continued existence of species	• Guadalupe River in historic and current distribution of species. HDD Guadalupe River.
Plants				
Black lace cactus	*Echinocereus reichenbachii var. albertii*	LE	No Effect	---
Slender rush-pea	*Hoffmannseggia tenella*	LE	No Effect	---
South Texas ambrosia	*Ambrosia cheiranthifolia*	LE	No Effect	---

[1] C = Candidate, LE = Endangered, LT = Threatened.

In addition, the Project is not anticipated to result in the take of bald eagles (*Haliaeetus leucocephalus*) or golden eagles (*Aquila chrysaetos canadensis*). The take of migratory birds is not anticipated as vegetation removal will not occur during migratory bird nesting season (April 15 – August 1). Mowing will not occur during migratory bird nesting season unless required by Texas Railroad Commission (TRRC) or US Department of Transporation (USDOT) for safety purposes. Note: The term "take" represents the more specific language of the BGEPA and MBTA as described in Section 1.3 of this BA.

The above table and conclusion of this BA address the Conservation Measures/Management Practices OxyChem will implement during construction/operation/maintenance of the Project to further ensure the Proposed Action avoids or minimizes potential direct or indirect effects on federally-listed species or their habitat.

1.0 INTRODUCTION

In December of 2012, Occidental Chemical Corporation (OxyChem) submitted a Prevention of Significant Deterioration (PSD) permit application to the United States Environmental Protection Agency (USEPA) under the Clean Air Act (CAA) for authorization to construct an Ethane Cracker Facility, the Markham Ethylene Pipeline, and the San Patricio Pipeline. Under the CAA, the USEPA is currently the PSD permitting authority for major stationary sources of greenhouse gases (GHG) in the state of Texas. PSD permitting requirements apply to new major sources or major modifications of existing major sources for pollutants where the source is located in an area classified as attainment or unclassifiable with regard to the National Ambient Air Quality Standards (NAAQS). Under PSD regulations, a major source is defined, with respect to criteria pollutants as: (1) a source included in the 28 categories listed in 40 Code of Federal Regulations (CFR) § 52.21(b)(1) with the potential to emit (PTE) greater than 100 tons per year (TPY), or (2) a source that is not included in the 28 categories with a PTE greater than 250 TPY. A major source for GHG emissions is a source with a PTE at least 100,000 TPY carbon dioxide equivalent (CO_2e), per 40 CFR § 52.21(b)(49)(v)(a) and a major modification is defined as an increase in 75,000 TPY CO_2e at any existing major stationary source.

The Project will involve the construction and operation of the following facilities:

- Ethane Cracker Facility: Five cracking furnaces, two thermal oxidizers, a high pressure ground flare, an emergency generator, a firewater pond, a five cell cooling tower, and sixteen storage vessels (4 – pressure vessels, 10 – low pressure vessels, and 2 – atmospheric tanks);
- Markham Ethylene Pipeline (MEP) Corridor: An approximately 114.5-mile-long, 100-foot-wide (50-foot-wide permanent and 50-foot-wide temporary construction) right-of-way (ROW), hereafter referred to as the Markham Ethylene Pipeline (MEP) Corridor, comprised of one 8-inch-diameter pipeline to serve as an ethylene send-out and feed pipeline; and
- San Patricio Pipeline (SPP) Corridor: An approximately 18.5-mile-long, 100-foot-wide (50-foot-wide permanent and 50-foot-wide temporary construction) ROW, known as and hereafter referred to as the SPP Corridor, comprised of an ethane pipeline that will serve as supply.

Taken collectively (as more fully described in Section 2.0), these facilities are all part of the proposed Project and are relevant in considering the potential impact of the Proposed Action. The new Ethane Cracker Facility will be located within an existing industrial complex owned and operated by OxyChem (hereafter referred to as the OxyChem Facility). Also situated within the OxyChem Facility and near the Project are certain industrial operations owned and operated by E.I. du Pont de Nemours and Company. The OxyChem Facility is located approximately two miles west of Ingleside, Texas in San Patricio County. The property is bound to the south by the La Quinta Channel which adjoins Corpus Christi Bay; to the north by Sherwin Alumina Company, San Patricio Municipal Water District, and State Highway (SH) 361 (primary access route to site); to the west by Sherwin Alumina Company; and to the east by the existing OxyChem and DuPont Facilities.

The MEP Corridor will begin at the Ethane Cracker Facility and traverse north and northeast to its terminus approximately 0.25 miles west of Clemville and approximately 5.9 miles northwest of Markham, Texas in Matagorda County. The SPP Corridor extends from the Ethane Cracker Facility to the north and northwest and terminates approximately 3.8 miles east of Sinton in San Patricio County, Texas (see Figure 1-1 for the location of the Project).

Source: World Street Map and County Boundaries from ESRI online mapping services. Available at http://services.arcgisonline.com/arcgis/services

LEGEND

- County Boundary
- Ethane Cracker Site
- San Patricio Pipeline
- Markham Pipeline

0 10 20 30 40 50 Miles

Scale = 1:1,000,000

Sheet 1 of 1

Figure 1-1. General Location Map for the OxyChem Ethane Cracker, Markham Ethylene Pipeline, and San Patricio Pipeline Corridor, Texas.

Prepared For: Occidental Chemical Corporation

Prepared By: TETRA TECH

Date: 6/13

P:GIS/projects/OxyPhaseII/MXD/BiologicalAnalysis/Figure11.mxd

1.1 Project Purpose and Need

The purpose of the Project is to meet the growing market demand for ethylene, a chemical that is used as raw material in production of many plastic products. The Project involves the addition of five ethane cracker furnaces which will create ethylene. Ethylene will then be transported via pipeline to the adjacent OxyChem Vinyl Chloride Monomer (VCM) Plant or to other markets (via the MEP Corridor) where it will be used to produce a variety of products.

The MEP Corridor will connect the proposed Ethane Cracker Facility and VCM Plant to the existing Markham Storage Hub in Matagorda County. Initially, the MEP Corridor is necessary as a feed-stock line (from Markham Hub to Ethane Cracker Facility) for start-up of the Ethane Cracker Facility. Thereafter, it is necessary as a send-out line (from Ethane Cracker Facility and VCM Plant to Markham Hub) to serve the needs of the ethylene market and for storage (when necessary), respectively. Accordingly, the MEP will have the capability to flow in both directions.

The SPP Corridor is necessary for supply of ethane to the Ethane Cracker Facility.

1.2 Purpose and Objective of Biological Assessment

The purpose of this Biological Assessment (BA) is to research, evaluate, and document the potential for direct and indirect effects of the Project/USEPA's issuance of the GHG PSD permit on: federally-listed threatened and endangered (T&E) species listed under the Endangered Species Act (ESA) in Aransas, Calhoun, Jackson, Matagorda, Refugio, San Patricio, and Victoria Counties, Texas; migratory birds protected under the Migratory Bird Treaty Act (MBTA); and bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos canadensis*) protected by the Bald and Golden Eagle Protection Act (BGEPA). This BA includes species assessments for those species protected by the ESA under the jurisdiction of the US Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS).

NMFS Habitat Conservation Division (NMFS-HCD) oversees the protection of Essential Fish Habitat (EFH) as designated per the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). A separate report regarding EFH has been provided to USEPA, as requested, for USEPA's coordination with NMFS-HCD.

The objective of this BA is to: analyze the effects of implementation of the Project and Proposed Action on federally-listed T&E species; ensure the Project and Proposed Action do not jeopardize or adversely modify critical habitat for federally-listed T&E species; and recommend voluntary conservation measures, as necessary, for federally-listed T&E species.

1.3 Permits and Regulatory Requirements

The Project is subject to PSD review for oxides of nitrogen (NO_x), carbon monoxide (CO), ozone (O_3) review triggered based on emissions of NO_x and volatile organic compounds (VOC), particulate matter (PM) less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and GHGs. The Texas Commission on Environmental Quality (TCEQ) is responsible for issuance of the PSD permit for the designated criteria pollutants. Currently, the USEPA is responsible for the GHG PSD permit and is the Federal Lead Agency regarding the Project. CAA authorizations are not discretionary and therefore are Categorical Exclusions under the National Environmental Policy Act (NEPA) (Subpart D of 10 CFR 1021).

However, USEPA still has the statutory responsibility to ensure that issuance of the PSD Permit will be in compliance with the ESA, MBTA, BGEPA, Marine Mammal Protection Act (MMPA), and MSFCMA. Specifically under Section 7 of the ESA, federal agencies, through consultation, must ensure that any action authorized or carried out by the agency is not likely to jeopardize the continued existence of any T&E species, protected species habitat, or result in the destruction or adverse modification of designated critical habitat. These statutes have been taken into account in preparation of this BA and through prior coordination with the involved regulatory agencies.

In addition to the federal permit requirements and consultations, the Project is subject to the permitting requirements of the state of Texas (30 Texas Administrative Code [TAC] 116). The major permits, approvals, and consultations required for the Project are identified in Table 1-1. The remainder of this section provides a discussion regarding the federal permitting requirements, regulatory requirements, and consultations necessary for the Project.

1.3.1 Clean Air Act

Under authority of the CAA, USEPA has promulgated NAAQS to protect human health and welfare. The NAAQS include primary standards, which are designed to protect human health, including the health of sensitive subpopulations such as children and those with chronic respiratory problems. The NAAQS also include secondary standards designed to protect public welfare, including economic interests, visibility, vegetation, animal species, and other concerns not related to human health.

Currently, NAAQS have been promulgated for NO_2, CO, O_3, SO_2, PM_{10}, $PM_{2.5}$, and lead (Pb). Each NAAQS is expressed in terms of a concentration level and an associated averaging period.

In addition to the NAAQS, Project emissions and equipment might be subject to various other federal and state air quality regulations. Federal air quality requirements are set forth in 40 CFR Parts 50 through 99 and 1027 through 1074.

New Source Review (NSR) requires the owners or operators of stationary sources of air pollution to obtain permits before they start construction. NSR is also referred to as pre-construction permitting. There are three primary NSR permitting programs: two for major sources and one for minor sources. A source might have to meet one or more of these permitting requirements depending on its size, in terms of emissions, and geographic location.

Table 1-1 Major Permits, Approvals, and Consultations

Agency	Permit/Approval/Consultation
Federal	
US Environmental Protection Agency (USEPA), Region VI	• Clean Air Act (CAA) Greenhouse Gas (GHG) Prevention of Significant Deterioration (PSD) permit for new major sources located in an area designated as attainment or unclassifiable. • Short Form C for Hydrostatic Test Water Discharge Notification.
US Army Corps of Engineers (USACE), Galveston District, Corpus Christi Regulatory Office	• Authorizations to discharge dredged or fill material into waters of the US (WUS) under Section 404 of the Clean Water Act (Nationwide Permit – NWP 12, Utility Line Activities). • Authorizations to cross navigable WUS under Section 10 of the Rivers and Harbors Act (Regional General Permit – RGP SWG-1998-02413). • Coastal Zone Management Act (CZMA) Consistency Determination.
US Department of Interior, US Fish and Wildlife Service (USFWS)	• Consultation regarding compliance with Section 7 of the Endangered Species Act (ESA); the Migratory Bird Treaty Act (MBTA), and Bald and Golden Eagle Protection Act (BGEPA).
US Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS)	• Consultation with NOAA NMFS Protected Resources Division (NMFS-PRD) regarding compliance with Section 7 of the ESA. • Consultation with NOAA NMFS Habitat Conservation Division (NMFS-HCD) regarding compliance with Section 305 of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA).
Advisory Council on Historic Preservation (ACHP)	• Consultation regarding compliance with Section 106 of the National Historic Preservation Act (NHPA)
State	
Texas Historical Commission (THC)	• Section 106 of the NHPA, Cultural Resources Consultation.
Texas Railroad Commission (TRRC)	• Minor Permit for the discharge of hydrostatic test water.
Texas Commission on Environmental Quality (TCEQ)	• CAA National Ambient Air Quality Standards (NAAQS) PSD permit for new major sources located in an area designated as attainment or unclassifiable. • Modification to Texas Pollutant Discharge Elimination System Permit No. WQ0003083000 (at adjacent OxyChem Facility) to accept discharge of process wastewater from the new Ethane Cracker Facility. • Modification to TPDES Permit No. WQ0001651000 (at DuPont Facility) to accept non-contact stormwater runoff from the new Ethane Cracker Facility.
Texas General Land Office (TGLO)	• If the pipeline crosses state-owned submerged lands, a commercial lease per Texas Natural

Agency	Permit/Approval/Consultation
	Resource Code (TNRC §33) might be required.
Texas Parks & Wildlife Department (TPWD)	• Consultation and clearance regarding state-listed threatened and endangered (T&E) species.
Texas Department of Transportation (TXDOT)	• Road Opening/Access Permit.

Major sources or major modification to existing major sources located in areas designated as attainment or unclassifiable are required to obtain a PSD permit, whereas those located in designated non-attainment areas are required to obtain a Nonattainment New Source Review (NNSR) permit. The Project will be located in an area designated as attainment or unclassifiable for all criteria pollutants; therefore NNSR permitting does not apply. As the proposed Project Facility has the PTE at least one criteria pollutant in quantities greater than the major source threshold it is subject to PSD review.

Table 1-2 Classification of San Patricio County (AQCR 214) for Each Criteria Pollutant

Criteria Pollutant	Area Classification
Oxides of Nitrogen (NO_2) – Annual	Cannot be classified or Better than National Standard
Oxides of Nitrogen (NO_2) – 1-Hour	Unclassifiable/Attainment
Carbon Monoxide (CO)	Unclassifiable/Attainment
8-Hour Ozone (O_3)	Unclassifiable/Attainment
Sulfur Dioxide (SO_2)	Better than National Standard
Particulate Matter (PM_{10})	Unclassifiable/Attainment
Particulate Matter ($PM_{2.5}$)	Unclassifiable/Attainment
Lead (Pb)	Unclassifiable/Attainment
Source: 40CFR81.344, July 1, 2012	

The Ethane Cracker Facility will be constructed at an existing major stationary source. As Project-related emissions of CO_2e, NO_x, CO, VOC, PM_{10}, and $PM_{2.5}$ will exceed the PSD significant emissions increase threshold, it constitutes a major modification of an existing major stationary source. In the state of Texas, USEPA is the permitting authority for GHG, whereas TCEQ is the permitting authority for all other criteria pollutants.

1.3.2 Endangered Species Act

The purpose of the ESA (16 United States Code [USC] §§ 1531-1544, 87 Stat. 884) is to protect and recover imperiled species and the ecosystems upon which they depend (USFWS 2011a). USFWS and NMFS-PRD are responsible for administering the ESA. Under the ESA, species might be listed as either threatened or endangered. A “threatened species” is defined as any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. An “endangered species” is defined as any

species which is in danger of extinction throughout all or a significant portion of its range. The ESA protects T&E species and their habitats by prohibiting the "take" of listed animals. "Take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. A "candidate species", also included in this BA, is identified as a plant or animal species for which the USFWS or NMFS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation has not yet occurred.

1.3.3 Migratory Bird Act

The MBTA of 1918 (16 USC §§ 703-712) protects migratory bird species through the implementation of various treaties and conventions between the US and Canada, Japan, Mexico, and the former Soviet Union. A migratory bird is any species or family of birds that live, reproduce, or migrate within or across international borders at some point during their annual life cycle (MBTA 1918 and as amended). The USFWS is responsible for administering the MBTA (USFWS 2010a). The MBTA makes it unlawful to "pursue; hunt; take; capture; kill; attempt to take, capture, or kill; possess; offer for sale; sell; offer to barter; barter; offer to purchase; purchase; deliver for shipment; ship; export; import; cause to be shipped, exported, or imported; deliver for transportation; transport or cause to be transported; carry or cause to be carried; or receive for shipment, transportation, carriage, or export; any migratory bird, any part, nest, or egg of any such bird; or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof" (16 USC § 703 (a)). There are currently 1,007 species included on the list of migratory birds that are protected under the MBTA.

1.3.4 Bald and Golden Eagle Protection Act

The BGEPA (16 USC 668-668d, 54 Stat. 250 and as amended) of 1940 protects the bald eagle and golden eagle and is administered by the USFWS (16 USC §§ 1801-1884 and 668-668c). The BGEPA makes it unlawful to, without a permit, "take, posses, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import… any bald eagle… or any golden eagle, alive or dead, or any part, nest, or egg thereof" (16 USC § 668(a)). "Take" is defined as: "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest or disturb." "Disturb" is defined as: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (USFWS 2011b).

2.0 PROJECT DESCRIPTION

This Section of the BA provides a description of the Project components as well as a discussion of the direct (impacts expected within the Project footprint) and indirect (impacts in and potentially outside the Project footprint) impacts to the environment. This project description will be used to determine the Action Area in which potential effects to T&E species will be evaluated.

2.1 Existing Shoreline Structures

A ship dock and two barge docks exist along the shoreline of the lands southeast of the OxyChem Ethane Cracker Project Site. Additionally, an approximately 1,700 feet-long bulkhead exists along the shoreline landward of the barge docks. No work is proposed on these structures and they are not part of the Project.

2.2 Project Facilities

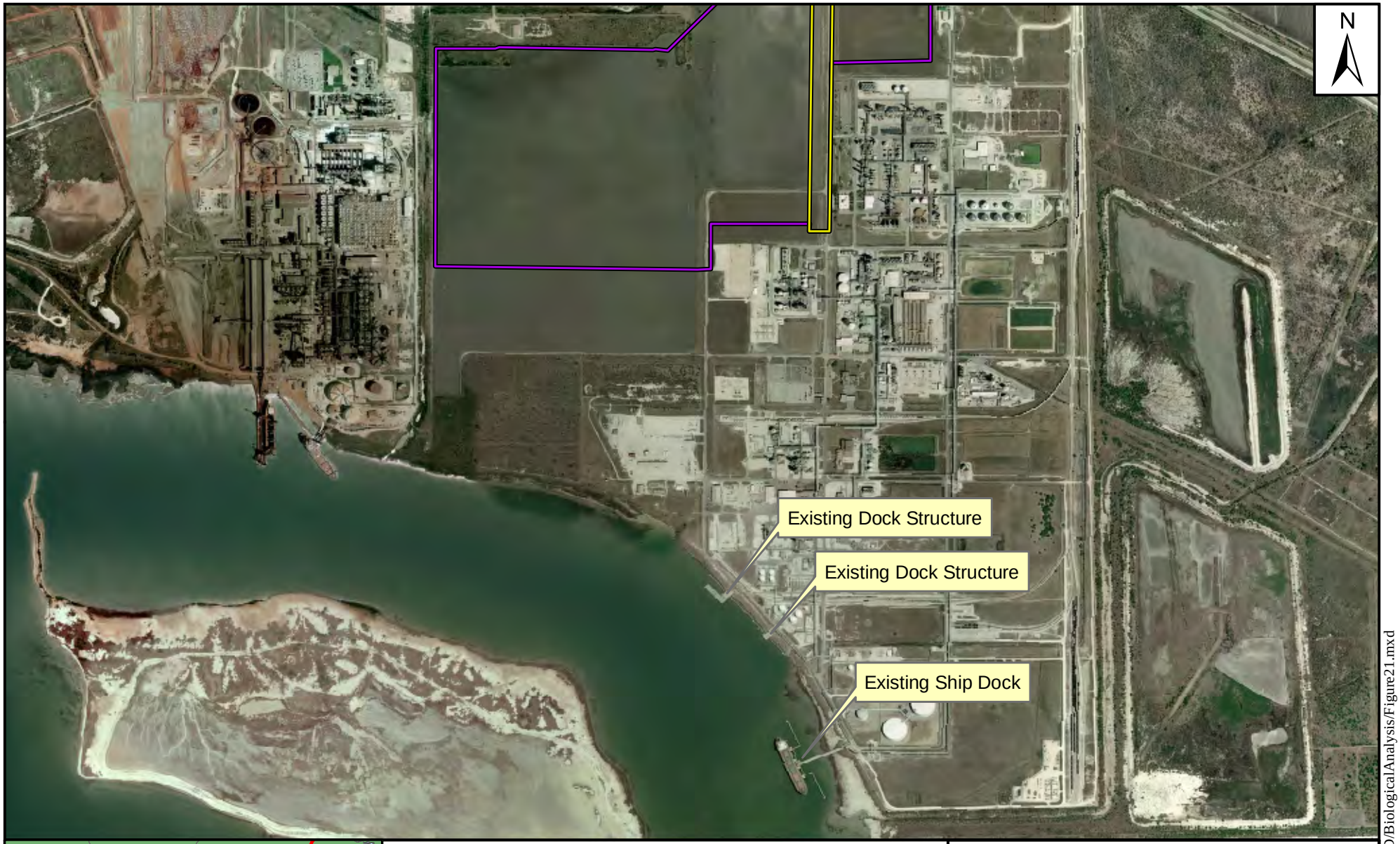
OxyChem proposes to construct and operate a new Ethane Cracker Facility, the Markham Ethylene Pipeline Facilities, and the San Patricio Pipeline Facilities, as detailed in Sections 2.1.1 and 2.1.2.

2.2.1 Ethane Cracker Facility

The planned Ethane Cracker Facility will include:

- five ethane cracker furnaces;
- raw material feed systems;
- quench water system;
- charge gas compression and acid gas removal;
- charge gas drying and regeneration facilities;
- hydrogen compression and purification;
- charge gas chilling,
- front end de-ethanizer, and acetylene converters;
- de-methanizer;
- ethylene fractionation;
- debutanizer;
- C_3/C_4 hydrogenation unit;
- propylene refrigeration system; and
- binary refrigeration system.

Supporting facilities of the Ethane Cracker Facility include a cooling water system, steam and condensate facilities, power supply facilities, fuel gas facilities, plant and instrument air facilities, nitrogen facilities, an emergency enclosed ground flare, storage tanks, and power lines (in one power supply line approximately 800-yards-long, with four levels of lines, and six steel monopoles). The new power lines will be located adjacent to two existing power lines. They will be at the same height or lower than the existing adjacent power lines and located in and amongst existing and new major aboveground industrial facilities (adjacent to existing cogenerator unit). The existing facilities are well-lighted. Substations will be located at each end of the new power lines, further illuminating the area.



Source: Aerials from NRCS Geospatial Data Giveaway, downloaded 2/12. Construction Data, Oxy, 2013.

LEGEND

Markham Pipeline Survey Corridor

Ethane Cracker Site Impacts

0 1,250 2,500 3,750 5,000 Feet

Scale = 1:18,000

Sheet 1 of 1

Figure 2-1. Existing Structures Along Shoreline Adjacent to OxyChem Ethane Cracker Project, Texas.

Prepared For: Occidental Chemical Corporation

Prepared By: TETRA TECH

Date: 06/13

P:GIS/projects/OxyPhaseII/MXD/BiologicalAnalysis/Figure21.mxd

The Ethane Cracker Facility will use the adjacent OxyChem Wastewater Treatment Unit (Texas Pollutant Discharge Elimination System [TPDES] Permit No. WQ0003083000). Stormwater will be routed to an existing outfall.

The Ethane Cracker Facility will be designed to produce 1.2 billion pounds per year of ethylene by the thermal cracking of ethane. The facility will include equipment needed to process the ethane feedstock into polymer grade ethylene, fuel gas, and C_3/C_4 and C_5+ liquid as by-products.

The cracking processes will crack the ethane into various product streams for further processing, storage, and transport, as specified below.

- Ethylene will be fed to the adjacent OxyChem Ingleside Vinyl Chloride Monomer (VCM) Plant. During times of low demand, ethylene will be sent via the Markham Ethylene Pipeline to the existing Markham Storage Hub approximately 114.5 miles northeast of the Ethane Cracker Facility.

- Fuel gas will be produced as hydrogen and methane off gas. Fuel gas will be consumed in the Ethane Cracker Facility.

- C_3/C_4 liquid will be sent from the C_3/C_4 hydrogeneration unit, downstream of the debutanizer at the Ethane Cracker Facility to the proposed Fractionation Facility for separation or transported off site to market.

- C_5+ liquid, a product of the debutanizer, will be cooled and sent off site to market.

A portion of the hydrogen-rich tail gas from de-methanizer will be compressed and purified for use in the C_3/C_4 hydrogenation unit. A second portion of the hydrogen-rich tail gas will be used for acetylene hydrogenation and sent to the fuel gas knock out (KO) drum. The remaining portion of hydrogen-rich tail gas will be sent directly to the fuel gas KO drum by pressure control. The combined hydrogen-rich gas and methane will be sent to the fuel gas KO drum and used as fuel for the cracking heaters.

The C_3/C_4 hydrogenation unit shall be designed to treat the C_3 and C_4 by-products from the ethylene unit. The hydrogenated C_3/C_4 product from the debutanizer will be sent to the proposed Fractionation Facility for separation or off site to market. The C_5+ bottoms product from the debutanizer will be transported by truck to market.

The Ethane Cracker Facility will also include a dedicated firewater system as well as a five cell cooling tower. The firewater system will be designed to comply with relevant standards. Make-up water for both the firewater system and cooling tower will be supplied directly from the utility water supply line (from San Patricio Municipal Water District). The cooling tower will be equipped with drift eliminators to reduce emissions of particulates.

2.2.1.1 Thermal Oxidizers

Low pressure discharges from process equipment and storage vessels will be collected in dedicated headers and transferred to the thermal oxidizers to produce steam from the combustion of the vent gas. The two thermal oxidizers are designed to have a 99.9%

destruction/removal efficiency (DRE). The units are supplied with natural gas to ensure complete combustion while minimizing CO production.

Process wastewaters, contaminated stormwater, surface wash down and other wastewaters are collected in process area sumps which pump to wastewater storage tanks. The wastewater storage tank will be vented to the thermal oxidizers. Wastewater from the wastewater storage tank will be sent to the wastewater steam stripper to remove volatile organic compounds prior to treatment in an activated sludge treatment system within the VCM Plant.

2.2.1.2 Emergency Ground Flare

An emergency relief collection and transfer system discharges to a multi-point low profile, high pressure ground flare with a staged burn control system. The various pilots of the unit will be supplied with natural gas, provided to ensure that any emergency relief will be ignited

2.2.1.3 Material Storage

During times of low demand, ethylene will be transported via the Markham Ethylene Pipeline to the Markham Storage Hub for storage. During periods of high demand, the ethylene will be transported in reverse back to the OxyChem VCM Plant.

The following storage vessels will be added to the Ethane Cracker Facility to support production operations:

Pressure tanks:

- 1 - 90,000 gallons (gal) propylene tank;
- 2 - 600,000 gal C_3/C_4 tank;
- 1 - 10,000 gal anhydrous ammonia tank; and
- 1 - 10,000 gal dimethyl sulfide/dimethyl disulfide (DMS/DMDS) tank

Low pressure tanks (venting to the oxidizers):

- 3 - 1,100,000 gal contaminated water tanks;
- 2 - 150,000 gal pyrolysis gasoline tanks;
- 1 - 50,000 gal heavy oil tank;
- 1 - 150,000 gal collected oil tank;
- 1 - 20,000 gal wash oil tank; and
- 2 - 150,000 gal spent caustic tanks

Atmospheric tanks (permitted separately):

- 1 - 10,000 gal methanol tank (PBR 106.473); and
- 1 - 10,000 gal sulfuric acid tank (PBR 106.472)

2.2.1.4 Staging Areas

The remainder of the Ethane Cracker Facility Site will be used as temporary staging areas during construction. These areas are primarily located on lands disturbed by previous human uses (agriculture croplands) and will be used for storage of construction or component equipment and/or materials, pipe storage yards, for construction of components necessary for the Ethane Cracker, and contractor or warehouse sites.

2.2.1.5 Wastewater Management

Sources of wastewater generated by the Ethane Cracker come from the saturator blowdown, spent caustic, boiler and cooling tower blowdowns, TLE hydrojet water, and process contact stormwater. Wastewater streams that have the potential to contain hydrocarbons will be steam stripped then routed to the existing biological wastewater treatment system to remove the residual organic contaminants. The existing wastewater treatment system is located in the existing OxyChem VCM Plant process unit (TPDES Permit No. WQ0003083000). The biological wastewater treatment system uses activated sludge (bacteria) to metabolize organic materials in the wastewater. The wastewater is then clarified and filtered after the biological treatment to remove solids prior to discharge. The wastewater treatment system is designed to ensure that the water quality based effluent limits of the TPDES permit are not exceeded. Wastewater is discharged to an existing outfall diffuser (Outfall 001) as required by the TPDES permit.

2.2.1.6 Stormwater Management

Uncontaminated stormwater from the site will be segregated from contaminated stormwater. Uncontaminated stormwater will be routed through earthen trenches and discharged in accordance with standards established via TPDES permitting. The trenches will direct stormwater to an existing stormwater outfall. The outfall structure has gates to contain the stormwater until analysis can be conducted to ensure the stormwater meets the TPDES permit limitations. Water discharges are monitored for several water quality parameters and outfall discharges into La Quinta Channel will meet state water quality standards, thereby avoiding degradation of water quality in waters potentially used by T&E and protected species. The use of the existing outfall structures also eliminates the need for new outfall structures along the Ethane Cracker Site shoreline, thereby avoiding impacts to EFH and marine species habitat.

2.2.2 Pipelines

2.2.2.1 Pipelines

The approximately 114.5-mile ethylene pipeline will be designed to transport ethylene from the OxyChem Ingleside VCM Plant to the OxyChem Markham Storage Hub. The pipeline is needed to start up the Ethane Cracker Plant as well as to send excess ethylene to the Markham Storage Hub at times of low need. The ethylene pipeline can also be used to supply the VCM process at times when the ethylene plant is down.

The send-out pipeline in the approximately 18.5-mile San Patricio Corridor may be used for ethane supply.

2.2.2.2 Measurement and Regulation Stations

Measurement and regulation (M&R) Stations will be located where the proposed pipeline ties-in with existing transmission lines for transport to other markets.

2.2.2.3 Additional Temporary Work Space and Storage Areas

Additional Temporary Work Space (ATWS) locations are those areas of additional workspace (i.e., in addition to the standard construction ROW width) that are needed to safely construct Project facilities. ATWS will be needed at locations requiring additional excavation, soil

placement requirements, or staging of additional equipment and/or materials. Examples include:

- areas for mobilization and demobilization at each end of the each construction spread;
- for pipe stringing truck turnaround areas;
- on both sides of roads and railroad crossings;
- on both sides of wetland and waterbody crossings;
- areas with steep slopes (> 25 percent) and side hills to allow for grading to level the working ROW;
- areas requiring topsoil segregation;
- areas with potential trench slumping;
- equipment turnarounds and spread move-arounds;
- hydrotest fill and dewatering locations and test locations;
- pipeline crossovers where the pipeline crosses under buried features such as foreign pipelines, utility lines, drain tiles, irrigation systems, etc.; and
- equipment and material staging areas.

The size and configuration of these features are dependent upon their purpose as well as the existing site conditions (e.g., available and/or accessible space, nearby resources) at each proposed work location.

2.2.2.4 Access Roads

OxyChem proposes to use existing roads to provide access to the construction ROW for construction materials and equipment. No temporary access roads, either new or modifications to existing, are anticipated for Project construction.

2.3 Construction

2.3.1 Construction Schedule

Commencement of construction of the Ethane Cracker Facility is planned to begin in the fourth quarter of 2014 with an in-service date in the fourth quarter of 2016. Construction of the pipeline portion of the Project is planned to begin upon obtaining all agency clearances and permits and as soon as feasible thereafter.

2.3.2 Ethane Cracker Facility

2.3.2.1 Construction Elements

The Ethane Cracker Facility will include the following inside the process operation area:

- ethane saturator;
- five new cracking furnaces;
- ethane feed system;
- quench tower and water system;
- charge gas compression and acid gas removal facilities;
- charge gas chilling/drying and regeneration facilities;
- hydrogen compression and purification facilities;
- front end deethanizer;
- acetylene converters (hydrogenation);

- demethanizer;
- ethylene fractionator;
- debutanizer;
- C_3/C_4 hydrogenation facilities;
- propylene refrigeration system; and
- binary refrigeration system.

Supporting facilities for the Ethane Cracker Facility include:

- cooling water system;
- steam and condensate;
- power supply;
- fuel gas;
- plant and instrument air;
- nitrogen;
- emergency flare; and
- storage tanks.

No new process wastewater outfall structure will be required for the Project. See Sections 2.1.1.5 of this report for further detail regarding use of the existing wastewater outfall permitted by TCEQ at the adjacent OxyChem facilities.

2.3.2.2 Ethane Cracker Facility Construction Sequencing

Construction of the Ethane Cracker Facility buildings, installation of major mechanical equipment, process and utility piping, electrical and instrument facilities, and storage tanks will consist of the following steps:

- Construction of foundations for buildings, major equipment, and pipe racks;
- Building construction;
- Major equipment delivered to the site and set on their foundations;
- Installation of piping would commence as soon as the majority of the mechanical equipment is received; and
- Installation of electrical and instrumentation systems.

Final grading and landscaping will be done thereafter. Clean fill required for work in the process areas might be imported from off-site sources. Disturbed ground would be fine graded to the proper elevations required to ensure adequate drainage. Disturbed areas would be reseeded to establish a grass cover to stabilize and prevent erosion of sediments.

2.3.2.3 Ethane Cracker Facility Best Available Control Technology

Per 30 TAC §116.111(a)(2)(c), new facilities must utilize Best Available Control Technology (BACT), with consideration given to the technical practicability and economic reasonableness of reducing or eliminating the emissions from the facility. BACT will be used to construct the Project and ensure emissions are reduced or eliminated to the greatest extent practicable. The following table summarizes the emissions controls for criteria pollutants as described in the PSD permit application submitted to the TCEQ.

Table 2-1 BACT Summary

Emission Source	Control Method	BACT Limit	Comments
Oxides of Nitrogen			
Ethane Cracking Furnaces 5 Units	Low NO_x Burners and Selective Catalytic Reduction	0.01 Lbs NO_x/MMBtu – Annual Basis 0.26 Lbs NO_x/MMBtu – Short-Term Basis Ammonia slip – 10 ppm	Unit will combust high hydrogen fuels which tend to produce larger quantities of NO_x, but will meet proposed limits through a combination of controls.
Thermal Oxidizers 2 Units	Low NOx Burners	0.06 Lbs NO_x/MMBtu	Units will use improved combustion technology to meet or exceed TCEQ standards for BACT.
High Pressure Flare	Combustion Control	0.138 Lbs NO_x/MMBtu	Unit will comply with 40 Code of Federal Regulations (CFR) 60.18.
Emergency Generator	Tier 2 Specifications Combustion Control	0.01108 Lbs NO_x/Hp-Hr	
Carbon Monoxide			
Ethane Cracking Furnaces 5 Units	Combustion Control	0.04 Lbs CO/MMBtu	Proper fuel-to-air ratio and a design provides the necessary residence time, temperature, and turbulence within the combustion zone ensure good proper combustion.
Thermal Oxidizers 2 Units	Combustion Control	0.04 Lbs CO/MMBtu	
High Pressure Flare	Combustion Control	0.2755 Lbs CO/MMBtu	Unit will comply with 40 CFR 60.18.
Emergency Generator	Tier 2 Specifications Combustion Control	0.00097 Lbs CO/Hp-Hr	Proper fuel-to-air ratio ensures good combustion.
Hydrogen Vent	Vent minimization	0.00002 wt% CO in vent	Hydrogen venting will be controlled by fuel gas balancing.
Sulfur Dioxide			
Ethane Cracking Furnaces 5 Units	Low Sulfur Fuel	0.0007 Lbs SO_2/MMBtu	
Thermal Oxidizers 2 Units	Low Sulfur Fuel	0.001 Lbs SO_2/MMBtu	
High Pressure Flare	Low Sulfur Fuel	0.0007 Lbs SO_2/MMBtu	Value reflects pilot fuel only.
Emergency Generator	Low Sulfur Fuel	0.000011 Lbs SO_2/Hp-Hr	
Particulate Matter			
Ethane Cracking Furnaces 5 Units	Combustion Control	0.0032 Lbs PM/MMBtu	
Thermal Oxidizers 2 Units	Combustion Control	0.01 Lbs PM/MMBtu	
High Pressure Flare	Combustion Control	0.0075 Lbs PM/MMBtu	Unit will comply with 40 CFR 60.18. Value reflects pilot fuel only.
PM10/PM2.5			
Emergency Generator	Tier 2 Specifications Combustion Control	0.00063 Lbs PM/Hp-Hr	
Cooling Tower	Drift Eliminators		

Emission Source	Control Method	BACT Limit	Comments
Volatile Organic Compounds			
Ethane Cracking Furnaces 5 Units	Combustion Control	0.0054 Lbs VOC/MMBtu	
Thermal Oxidizers 2 Units	Combustion Control	99.9% DRE 0.035 Lbs VOC/MMBtu	The two thermal oxidizers provide 100% back-up reliability.
High Pressure Flare	Combustion Control	98% Reduction Minimum	Unit will comply with 40 CFR 60.18.
Emergency Generator	Tier 2 Specifications Combustion Control	0.000245 Lbs VOC/Hp-Hr	
Fugitive Emissions	Leak Detection and Repair	28MID	

2.3.3 Pipeline Construction

The pipeline will be constructed in compliance with applicable federal regulations and guidelines and the specific requirements of any applicable permits and approvals. Construction methods will be those that are consistent with industry-recognized practices, company policies, and best management practices (BMPs). OxyChem will implement practices that are consistent with guidelines and recommendations from the United States Army Corps of Engineers (USACE), the US Department of Agriculture, Natural Resources Conservation Service (USDA/NRCS), the TCEQ, the Federal Energy Regulatory Commission's (FERC) *Upland Erosion Control, Revegetation, and Maintenance Plan* (FERC Plan, May 2013 version- FERC 2013a) and FERC's *Wetland and Waterbody Construction and Mitigation Procedures* (FERC Procedures, May 2013 version- FERC 2013b). For areas in which waterbody crossings will occur via Horizontal Directional Drilling (HDD), OxyChem will implement their HDD Monitoring and Contingency Plan (as further discussed in Section 6.2.3) in the event of an inadvertent frac-out during HDD construction. A frac-out is the escape of drilling mud into the environment as a result of a spill, tunnel collapse, or the rupture of mud to the surface. The risk of a frac-out during construction will be avoided through proper geotechnical assessments prior to drilling. In the event that a frac-out occurs, potential impacts will be minimized through the HDD Monitoring and Contingency Plan, which will include provisions for HDD monitoring, staging appropriate response equipment, and response plans to minimize and contain a potential frac-out.

Construction and restoration in upland areas will make use of typical pipeline construction techniques which are discussed in detail below. These procedures are designed to accommodate varying field conditions while maintaining standards for the protection of environmentally sensitive areas.

OxyChem will implement dust control measures during construction as necessary. Dust control measures will primarily involve use of water trucks to dampen the ROW under dry dusty conditions.

Additionally, OxyChem will implement preventive and response procedures to minimize the potential for and impact of uncontrolled releases of petroleum products and other hazardous materials to the environment.

Pipeline construction is typically performed with the use of numerous crews working together along the ROW. The crews will perform tasks in an assembly line fashion following relatively close behind the preceding crew to minimize the size of the active construction zone and complete restoration as soon as practicable.

2.3.3.1 Construction and Sequencing of Soil Disturbing Activities

Typical operations (in sequence) of pipeline construction include the following activities:

- Mobilize and set up pipe storage/contractor yard, including installation of erosion/sedimentation controls, road entrance pads, and proper hazardous material storage;
- Survey and mark the route and approved workspace areas(s);
- Clear the construction ROW;
- Install erosion and sediment controls;

- Grade the construction ROW, including topsoil segregation in active agriculture (cultivated and pasture), residential, and unsaturated wetland areas;
- Excavate a new trench to proper depth for the new pipeline(s);
- Place the new pipe joints along the ditch line within the ROW;
- Bend the new pipe joints, as needed, to follow the pipeline route and contours of the terrain;
- Weld the pipe together;
- Visually and radiographically inspect and test the weld area to verify the integrity of the weld;
- Coat the weld area with an approved coating to provide corrosion protection;
- Place the new pipe section in the trench, tie into previously laid section(s), and backfill;
- Restore the grade of the work area to previous contours;
- Hydrostatic or nitrogen test the pipeline segments to ensure no leaks are present; and
- Conduct final cleanup, restoration, and revegetation of the ROW.

2.3.3.2 Surveying and Staking

Surveys and field staking/flagging will be completed to locate the proposed pipeline centerline, access roads, staging areas, exterior construction ROW limits, and ATWS areas. In addition to centerline and limit surveys, other resources will be flagged and signed along the route. These will include any environmental and archaeological resources, geologic and topographic features, land types and uses, other utility crossings (e.g., pipelines, power lines, railroads, and other wires/cables), waterbodies, drainages, and roads.

2.3.3.3 Clearing and Grading

In areas where conventional methodology (trenching) is used, the pipeline construction ROW will be cleared of vegetation. Heavy equipment will be used to remove large trees (if present), heavy brush, and small trees. Removal of trees and heavy brush (scrub/shrub) will not occur during migratory bird nesting season (April 15 – August 1 of each year). Ground cover (e.g., herbaceous plants) might remain until grading is required. Grading creates a safe working platform to construct Project facilities. Marketable timber cleared will be managed in accordance with the landowners' agreements and other timber might be given back to the landowner or properly disposed of as construction debris (e.g., stacked off the edge of the limits of disturbance, chipped, or hauled to an approved disposal site). Displaced soils are normally stockpiled along the construction ROW to minimize the need and potential impact of additional haul vehicles. However, in locations where the construction ROW is restricted, these soils might be stockpiled at a different location. In areas where topsoil segregation requirements exist, topsoil will be segregated and stockpiled in such a manner that it is conserved and can be returned to the construction ROW.

To manage stormwater surface flow, regular breaks (gaps) in windrowed spoil piles and diversion structures will be used to manage cross-drainage needs. Gaps in windrowed spoil and topsoil piles will allow surface water to migrate across the construction ROW in such a way as to minimize up-gradient flooding and downstream sedimentation. Gaps will be located at regular intervals and/or where appropriate due to site conditions (e.g., depressions in terrain where water would likely concentrate).

2.3.3.4 Temporary Environmental Controls

In tandem with or immediately following ground-disturbing activities (e.g., clearing activities) temporary environmental controls (e.g., erosion and sediment controls) will be installed where necessary and in accordance with an approved construction stormwater permit. Temporary environmental controls primarily consist of installing barriers (e.g., silt fencing, hay bale structures) or diversion structures (e.g., temporary slope breakers) to prevent sediment-laden waters from migrating off approved work areas. Once installed, these controls will be monitored and maintained so they function as intended until the area has been stabilized or permanent environmental controls are installed.

2.3.3.5 Topsoiling

Topsoiling is the segregation of topsoils (e.g., sensitive soils) from subsoils to protect the quality and quantity of topsoil present. In designated areas (e.g., non-saturated wetlands), topsoils are segregated from subsoils during grading activities with heavy equipment. OxyChem will conduct topsoiling in all agricultural areas and wetlands. All topsoiling will be performed as stated in OxyChem's BMPs and in accordance with FERC's Plan and Procedures (FERC 2013a and b).

2.3.3.6 Trenching

Trenching will be accomplished with backhoes and/or mechanical trenching machines. Trench width will vary based on site conditions (e.g., soil types, bedrock, and presence of groundwater). Under typical conditions, the average trench depth will be no less than four feet to accommodate the 8-inch outside diameter (OD) pipeline and 36 inches of cover. Pipeline cover will be a minimum of four feet in pasture lands. In areas where shallow bedrock and/or large boulders are present, specialized construction techniques (e.g., blasting) to remove the rock might be necessary.

Similar to grading activities, considerations for cross-drainage will be made while trenching and where stormwater or existing runoff flows are a concern. Flume pipe (e.g., appropriately sized polyvinyl chloride or steel piping) or diversion berms/ditches might be used where needed to direct stormwater across the trench and away from the construction ROW. Inlet and outlet structures might also be necessary to prevent erosion and scouring. Additionally, on sloping terrain, a combination of trench plugs might be used to prevent water from scouring the bottom of the trench line. Earthen material trench plugs can be characterized as soft or hard. Soft plugs have been excavated and the spoil re-compacted in the trench. Hard plugs have not been excavated. Foam trench plugs can also be used. Foam plugs are typically mechanically blown in, and are environmentally compatible.

2.3.3.7 Pipe Stringing and Bending

Sections of line pipe (joints) are strung along the construction ROW and adjacent to the trench, set on wooden supports (skids), and arranged so they are safely accessible to construction personnel. Joints vary in length and can be individual (i.e., a single length of pipe) or double-jointed (i.e., two lengths of pipe pre-welded offsite). Pipe joints from the mill can vary up to 60 feet in length and can be cut as needed in the field. Depending on construction ROW requirements and restrictions, some pipe bends might be pre-manufactured at the pipe mill (factory bends). For all other bends (field bends), a mechanical pipe-bending machine will bend joints to the desired angle at locations where there are changes in the natural ground contours and at centerline points of inflection (PI).

2.3.3.8 Pipe Assembly and Field Welding

After the stringing and bending are complete, pipe sections are aligned and welded together. All welding shall be performed in accordance with the Project's Welding Procedure Specification (to be developed during design of the Project) and by qualified welders who have passed specified qualifying tests. Welders and welding procedures will be qualified according to applicable American National Standards Institute (ANSI), American Society of Mechanical Engineers (ASME), and American Petroleum Institute (API) standards.

2.3.3.9 Nondestructive Examination, Inspection, and Weld Repair

One hundred percent of welds will be inspected, both visually and by nondestructive examination (NDE). Visual inspection shall be carried out on all welds to check for imperfection(s) that can be seen with the naked eye. Weld imperfections shall be rejected and repaired upon identification (i.e., before NDE). Welds then go through the NDE process (i.e., x-ray examination) for imperfections that are not visible with the naked eye. The NDE acceptance criteria will be API 1104.

Detailed records of all welds, including successful welds, welds that are repaired, and those that are cut-out shall be maintained for each weld as it is completed. The records will include an identification serial number, the location of the weld, the date it was produced, qualified procedure reference number, and welders' names and reference numbers. These records shall be maintained in the Project's permanent files.

2.3.3.10 Pipe Coating, Inspection, and Repair

Line pipe will be coated to protect it from the environment and accelerated degradation. Line pipe is normally mill-coated or yard-coated prior to stringing. However, line pipe also requires a coating at the field-welded joints where bare metal is exposed. Prior to lowering the pipeline segment into the trench, the pipeline coating is visually and electronically inspected to locate and repair coating faults or voids (i.e., "jeeping" the pipe).

2.3.3.11 Lowering-In, Padding, and Rough Backfill

Once the welds and coating have passed inspection, and just prior to lowering-in, the trench will be checked for sharp edges that could damage the pipe and/or its coating during installation (i.e., "crumbing" the line). In areas where the backfill has the potential to damage the coating, the pipe will be wrapped with rock shield material to provide additional protection.

The welded pipe section to be lowered-in typically will be placed into the trench with pipe slings and side-boom tractors. Once the pipe is lowered-in, trench breakers will be installed on sloping terrain and/or at sensitive environmental crossings to prevent the subsurface piping of water, which could create void space and subsidence or drain environmental features. Clean fill (e.g., soil, sand) will be used where needed as padding material to provide protection to the pipe and coating. The material used for padding will be selected in accordance with permit conditions and Project engineering specifications, and under no circumstances shall topsoil be used as padding or backfill material. The trench will then be rough backfilled using backfilling equipment (e.g., bulldozers, track hoes) to protect the pipe until final restoration can be completed. No foreign materials (e.g., construction debris) will be permitted to be used as backfill material. If allowed by permit conditions and landowner agreements, excess rock might be buried onsite within the construction ROW. Excess rock and/or woody debris (e.g., stumps and brush) can be

windrowed along the edge of the construction ROW. Otherwise these materials will be properly disposed of off-site as construction debris.

2.3.3.12 Pressure Testing and Final Tie-ins

Prior to commissioning the pipeline, the pipeline will be pressure tested in accordance with engineering specifications and regulatory approvals. The test can be performed with an inert gas or liquid, with water being the standard. OxyChem will use existing local municipal water sources (not surface waters) or nitrogen to conduct the testing. The pipe will be tested in sections to a pressure in excess of the maximum allowable operating pressure (MAOP) for a specified period of time. Test sections will be determined by pipe wall thickness and elevation changes. Once the test of a section is successfully completed, water will be re-used to the extent possible. The test water will be discharged in accordance with regulatory and permitted requirements.

2.3.3.13 Cleanup, Restoration, and Revegetation

Cleanup of Project activities includes removing construction debris (e.g., un-used and surplus materials), temporary construction structures, and equipment. Restoration consists of returning the construction ROW and areas disturbed by construction activities to pre-existing contours and hydraulic regimes. Final restoration occurs within 10 to 20 days of rough backfilling, conditions permitting. Permanent erosion and sediment controls will be installed and the construction ROW will be re-seeded and/or mulched per permit requirements and landowner agreements. Pipeline markers will be installed. Soil adjuncts and fertilizers might be added where necessary. Temporary erosion controls will be removed once the area has been stabilized in accordance with Project requirements. The revegetation will be monitored for at least two growing seasons following final restoration.

Temporary construction facilities will include staging areas, ATWS, and temporary access roads. Upon completion of construction activities, areas used for temporary construction facilities will be restored to pre-existing conditions.

2.3.3.14 Specialized Pipeline Crossings and Methods

The OxyChem pipeline route was selected to avoid or minimize impacts to wetland/waterbody and road/railroad crossings. However, due to the linear nature and distance of the proposed pipeline, traversing these features could not be avoided. HDD will be used to avoid impacts to road/railroad crossings. Most major wetland and waterbody crossings (including saltmarsh wetland and waterbody complexes) will be traversed using HDD (see Table 3-4 in Section 3.4). Tie-in crews might likely be used to perform these specialized crossings. Tie-in crews are normally self-sufficient crews that work in tandem with the construction spread. They have equipment, welders, and labor to perform a specialized task (e.g., waterbody/wetland crossings, road/railroad crossings). Additionally, tie-in crews will be used in areas that might normally slow-down the main spread or in locations that have been skipped for lack of access.

Wetland/Waterbody – Construction of the pipeline across USACE non-jurisdictional wetlands or waterbodies will be performed in accordance with the FERC's Procedures (FERC 2013b) and applicable permit conditions, unless more stringent regulatory requirements apply. Trenchless construction techniques, such as HDD, will be used for most of the major wetland and waterbody crossings (including saltmarsh wetland and waterbody complexes) to avoid impacts to these areas (see Table 3-4 in Section 3.4). Trenchless methods allow the installation of the pipeline with minimal to no impacts or disturbance to surficial features. HDD might be used

when re-routing alternatives are limited and other trenching and trenchless techniques are not feasible. For areas in which HDD will occur, OxyChem will implement their HDD Monitoring and Contingency Plan (as further discussed in Section 6.2.3) in the event of an inadvertent frac-out during this type of construction.

Road/Railroad Crossings – OxyChem anticipates using boring techniques for road and railroad crossings when these features cannot be disrupted. If open-cut crossing is determined feasible, it will be used in lieu of boring.

Dewatering – Dewatering activities might be necessary to remove excess water from the trench line during periods of excessive precipitation or high water table. Dewatering activities will be performed in accordance with OxyChem's BMPs. Under no circumstances shall heavily silt-laden waters be directly discharged into wetlands or waterbodies. To the maximum extent possible, discharges will occur in well-vegetated upland areas on stable, non-erosive surfaces. If dewatering locations are selected that are not within or immediately adjacent to the construction ROW, they will be sited to minimize off-ROW impacts. If dewatering locations must occur within sensitive areas (e.g., designated wetland areas), multiple sediment controls will be used (e.g., straw-bale structure/silt fencing surrounding a silt bag, turbidity barriers, reduced pumping rates) to prevent adverse impacts.

2.3.3.15 Environmental Training

To address USFWS's concerns regarding potential adverse impacts to federally-listed T&E species during construction, OxyChem will provide environmental training to all on-site construction personnel regarding federally-listed T&E species with the potential to occur in the vicinity of the Project. The training will also include conservation measures/management practices (see Section 6.2 for details) that will be complied with to ensure impacts to federally-listed T&E species are avoided or minimized. In addition, to address USFWS's concerns regarding potential adverse impacts to sensitive snakes, OxyChem will provide environmental training to all on-site construction personnel in accordance with the *Sensitive Snake Education and Management Plan*, as further discussed in Section 6.2.1.

2.3.4 Construction Noise Levels

The Ethane Cracker Facility is located in an industrial area and is situated between Sherwin Alumina Company to the west and by the existing OxyChem Facility and DuPont facility to the east. Noise levels during construction should be comparable to noise levels from the adjacent Facilities. The best available technology will be used to maintain noise levels as minimal as practicable. The construction contractor will implement a Hearing Protection Procedure to protect employees and the surrounding environment from noise pollution to the maximum extent practical. Risk assessments will be performed during the planning stages of construction to identify activities where high and prolonged noise levels can be expected and minimized.

Construction of the pipeline will result in noise levels associated with use of equipment. The noise will be temporary in nature and will be minimized through use of best available technology.

2.4 Operation and Maintenance Information

2.4.1 Ethane Cracker Facility

OxyChem operates its facilities under a maintenance regime that includes monitoring, corrective, and preventative maintenance plans. The plans set out written procedures consistent with corporate policy, procedures and federal standards, including Department of Transportation (DOT) regulations at 18 CFR Part 127.401 and subpart 193(G) of CFR Title 49. The new Ethane Cracker Facility will be owned, operated, and maintained under the same industry standards, applicable federal and state regulations, and will be integrated with the existing adjacent OxyChem Facility.

2.4.2 Pipeline Facilities

The Project will be operated and maintained by appropriately trained and licensed OxyChem employees and/or contracted entities, in accordance with regulatory permit conditions and authorizations, engineering design specifications, recommended manufacturer maintenance practices, and OxyChem's operating policies and procedures. Periodic clearing of trees and shrubs over the 50-foot-wide permanent ROW will occur as necessary.

2.5 Safety Controls

2.5.1 Ethane Cracker Facility

2.5.1.1 Spill Containment

Concrete containment will be provided around the Ethane Cracker Facility area to direct any spill material to the contaminated water storage tank for treatment.

Gasoline product storage tanks will be surrounded by a containment area to contain 110% of a single tank. This design will ensure spill containment, even in the unlikely event the tank fails and spills its entire contents into the secondary containment.

A stainless steel oil reservoir/containment area will be included with electric oil heaters of the process refrigeration compressor oil system.

2.5.1.2 Hazard Detection System

The Ethane Cracker Facility will be equipped with a hazard detection system consisting of separate lower explosive limit (LEL) meters.

2.5.1.3 Fire Protection System

The Ethane Cracker Facility will include a dedicated firewater system. The firewater system will be designed for not approximately 9,000 gallons per minute (gpm) at 150 pounds per square inch gauge (PSIG) of total delivery and will comply with NFPA standards. Make-up water for the firewater system will be supplied directly from the utility water supply line (from San Patricio Water District).

SIS remote isolation valves will be provided where necessary to contain shut-off mechanisms during emergency situations such as fire.

2.5.2 Pipeline Facilities

2.5.2.1 Training and Licensing

The Pipeline Facilities will be operated and maintained by appropriately trained and licensed OxyChem employees and/or contracted entities, in accordance with regulatory permit conditions and authorizations, engineering design specifications, recommended manufacturer maintenance practices, and OxyChem's operating policies and procedures.

2.5.2.2 Corrosion Protection and Detection Systems

During construction of the proposed Pipeline Facilities, OxyChem will install a cathodic protection system to prevent or minimize corrosion of the buried pipeline and aboveground facilities. The cathodic protection system impresses a low-voltage current on the pipeline to offset natural soil and groundwater corrosion potential. The condition of the pipe coating and the effectiveness of the cathodic protection system will be monitored during regularly scheduled cathodic protection surveys in accordance with federal standards and regulations. Cathodic protection surveys usually require walking the pipeline ROW with monitoring instruments. Repairs to the pipe, the pipe coating, or the cathodic protection system will be made as appropriate.

2.5.3 Emergency Response Procedures

The proposed pipelines and aboveground facilities will be designed, constructed, operated, and maintained in accordance with 49 CFR Part 192. The DOT regulations are intended to ensure adequate protection for the public and to prevent gas facility accidents and failures. Part 192 specifies: material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion. Part 192 also prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Under Section 192.615, each pipeline operator will establish an emergency plan that includes procedures to minimize the hazards in a gas pipeline emergency. Key elements of the plan include procedures for:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- making personnel, equipment, tools, and materials available at the scene of an emergency;
- protecting people first and then property, and making them safe from actual or potential hazards; and
- emergency shut-down (ESD) of the system and safe restoration of service.

Part 192 also requires that each operator establishes and maintains a liaison with appropriate fire, police, regulatory, and public officials to learn the resources and responsibilities of each organization that might respond to a gas pipeline emergency, and to coordinate mutual assistance.

3.0 ACTION AREA, SPECIES LIST, AND HABITAT, AIR, AND WATER QUALITY ANALYSIS

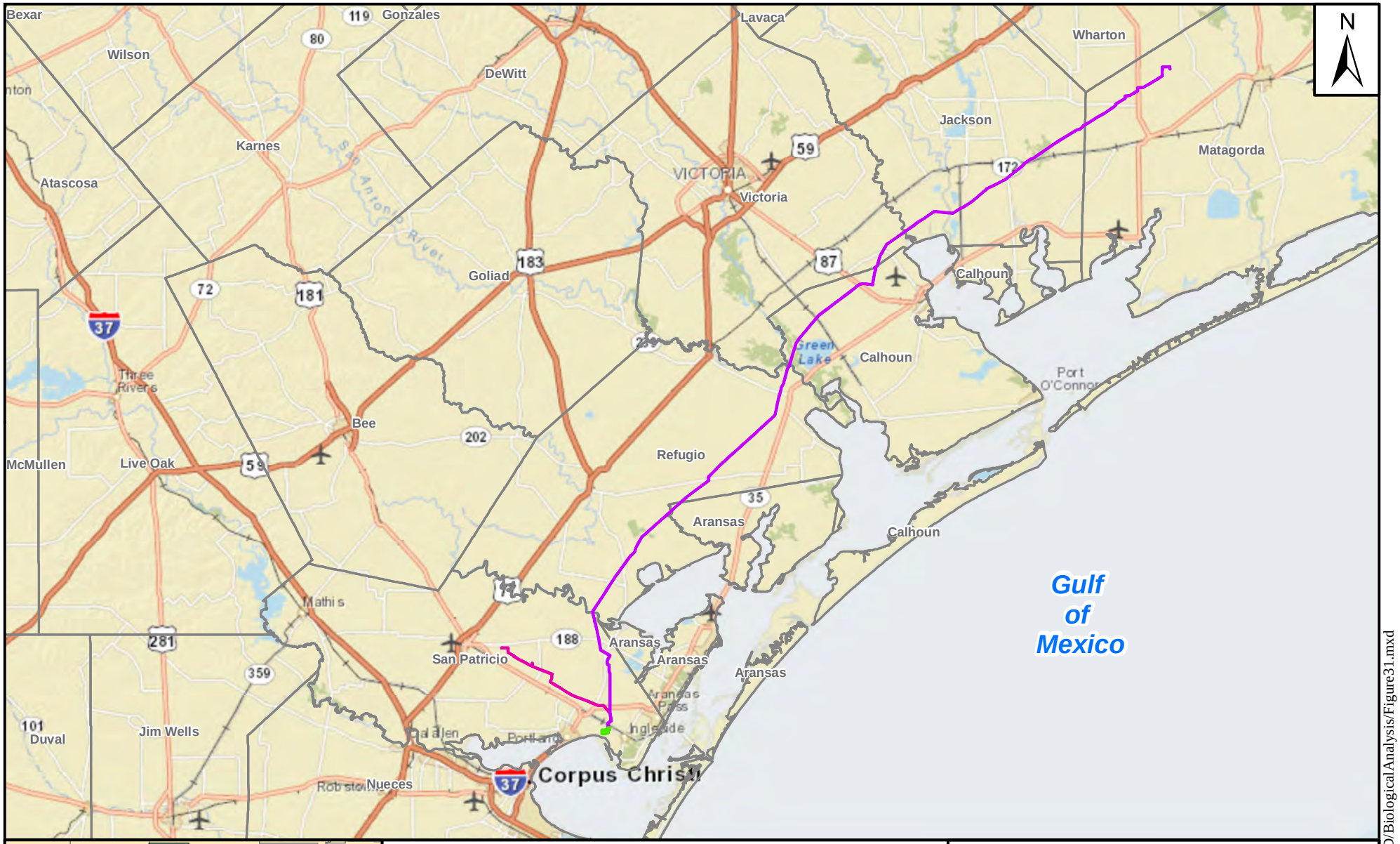
3.1 Action Area

The Project Action Area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the 'action'" (50 CFR 402.02). In determining what constitutes the Action Area for the proposed Project for purposes of assessing potential impacts to T&E species, direct and indirect effects of the proposed Project were considered.

Potential direct and indirect impacts to the environment associated with the Project as described in Section 2.0 include: air emissions, water discharge, construction activities, operation and maintenance, construction noise levels, and conversion of habitats associated with the Project. With implementation of avoidance, minimization, and BMPs also described in Section 2.0, indirect impacts associated with the construction, operation, and maintenance are not expected.

Given that the Project involves an Ethane Cracker Facility, NAAQS criteria pollutant emissions and their effect on ambient air quality were given special consideration in determining the Project Action Area. A preliminary air quality dispersion analysis (see Section 3.5) was conducted on the potential emissions from the Project to determine if significant indirect effects outside the Ethane Cracker Facility Site boundary would occur. The results of the modeling/analysis indicate concentrations of criteria pollutants from the Ethane Cracker Facility Site will be less than the applicable Significant Impact Levels (SILs) at and beyond the property boundary. Because the predicted impacts from the Project are below the SIL at off-site locations, no indirect air quality impacts to surface waters, soils, or vegetation are expected from the Project.

The Project Action Area is defined as the areas within the boundaries of the approximately 264.61-acre Ethane Cracker Facility Site (inclusive of Ethane Cracker Facility and Temporary Impact/Construction Areas), the approximately 1,805.63-acre MEP Corridor, and the approximately 204.54-acre SPP Corridor. Accordingly, this BA focuses on potential effects of the implementation of the proposed Project on T&E species within this defined Action Area. Figure 3-1 shows the limits of the Project Action Area.



Source: World Street Map and County Boundaries from ESRI online mapping services. Available at http://services.arcgisonline.com/arcgis/services

LEGEND

- Ethane Cracker
- County Boundary
- Markham Pipeline
- San Patricio Pipeline

0 10 20 30 40 50 Miles

Scale = 1:1,000,000

Sheet 1 of 1

Figure 3-1. Project Action Area for the OxyChem Ethane Cracker Facility Project.

Prepared For: Occidental Chemical Corporation

Prepared By: TETRA TECH

Date: 6/13

P:GIS/projects/OxyPhaseII/MXD/BiologicalAnalysis/Figure31.mxd

3.2 Species List

The list of federally-listed T&E species having the potential to occur in the vicinity of the Project was developed via review of online and hard copy resources, agency database requests, and agency consultation. Initially, the Texas Parks and Wildlife Department (TPWD) Geographic Information System (GIS) Endangered Species Mapper by County (TPWD 2013a) and the TPWD internet-based service (TPWD 2013b) were reviewed for federally- and state-listed T&E species by county. Similarly, the USFWS county-based internet search engine (USFWS 2012a) was reviewed for species with ESA designations. To further investigate the availability of more site-specific data, a formal request was made to the Texas Natural Diversity Database (TXNDD) for geospatial, tabular, and non-tabular data regarding existing records of federally- and state-listed T&E species in the vicinity of the Project. Additionally, on February 11, 2013 OxyChem and Tetra Tech, Inc. (Tetra Tech) also held a pre-application meeting with USEPA, USFWS, and NOAA NMFS to discuss the Project components, environmental impacts, avoidance and minimization measures, listed species, and the consultation process. Coordination with USEPA occurred on November 21, 2013, and a meeting was held with USFWS on November 22, 2013 to further ascertain information regarding T&E species to be included in this BA.As a result of online resource evaluations and TXNDD's response to a formal information request, TXNDD provided records of listed species and critical habitat within the United States Geological Quadrangle maps that adjoin the Project boundary. In addition to state-listed sensitive species, the TXNDD list also included species under USFWS and NMFS oversight. During the consultation process, the agencies refined the T&E species list developed through online database research and TXNDD response to a list of 28 animal and three (3) plant species that warranted further assessment (Table 3-1).

Table 3-1 Federally-listed Threatened and Endangered Species with Potential to Occur in the Project Action Area as Identified by USEPA and USFWS Coordination

Common Name	Scientific Name	Federal Status[1]
Mammals		
Gulf Coast jaguarundi	*Herpailurus yaguarondi cacomitli*	LE
Ocelot	*Leopardus pardalis*	LE
Red wolf	*Canis lupus rufus*	LE
West Indian manatee	*Trichechus manatus*	LE
Mammals – Whales		
Blue whale[2]	*Balaenoptera musculus*	LE
Fin whale[2]	*Balaenoptera physalus*	LE
Humpback whale[2]	*Megaptera novaeangliae*	LE
Sei whale[2]	*Balaenoptera borealis*	LE
Sperm whale[2]	*Physeter macrocephalus*	LE
Birds		
Attwater's prairie chicken	*Tympanuchus cupido attwateri*	LE
Bald eagle	*Haliaeetus leucocephalus*	DL
Eskimo curlew	*Numenius borealis*	LE
Interior least tern	*Sternula antillarum athalassos*	LE
Northern aplomado falcon	*Falco femoralis septentrionalis*	LE
Piping plover	*Charadrius melodus*	LT
Red knot	*Calidris canutus rufa*	C
Sprague's pipit	*Anthus spragueii*	C
Whooping crane	*Grus americana*	LE
Reptiles		
Green sea turtle[2]	*Chelonia mydas*	LT
Hawksbill sea turtle[2]	*Eretmochelys imbricata*	LE
Kemp's Ridley sea turtle[2]	*Lepidochelys kempii*	LE

Common Name	Scientific Name	Federal Status[1]
Leatherback sea turtle[2]	*Dermochelys coriacea*	LE
Loggerhead sea turtle[2]	*Caretta caretta*	LT
Mollusks		
Golden orb	*Quadrula aurea*	C
Smooth pimpleback	*Quadrula houstonensis*	C
Texas fatmucket	*Lampsilis bracteata*	C
Texas fawnsfoot	*Truncilla macrodon*	C
Texas pimpleback	*Quadrula petrina*	C
Plants		
Black lace cactus	*Echinocereus reichenbachii var. albertii*	LE
Slender rush-pea	*Hoffmannseggia tenella*	LE
South Texas ambrosia	*Ambrosia cheiranthifolia*	LE

[1] C = Candidate, LE = Endangered, LT = Threatened, N/L = Not Listed.
[2] Species under the jurisdiction of National Marine Fisheries Service Protected Resource Division (NMFS-PRD).

Of the 28 animal species identified, 11 species are coastal, including five (5) species of sea turtles, five (5) species of whales, and the West Indian manatee. Habitat for the 11 coastal species is not located at the Ethane Cracker Facility Site or within the SPP Corridor (no USACE jurisdictional wetlands or water features contiguous with Waters of the US - WUS). The five species of sea turtles and the West Indian manatee might occur along the MEP Corridor where it crosses estuarine areas contiguous with WUS. It should be noted that HDD technology will be used at all perennial estuarine waterbodies that are potentially traversable by West Indian manatee and the five species of sea turtles to avoid impacts to these species' habitat. The estuarine areas along the MEP Corridor that are contiguous with WUS are too shallow for use by the five (5) listed whale species.

3.3 Habitat Analysis

On March 4-22, 2013; May 14-18, 2013; June 17-20, 2013; and July 26, 2013 field survey work was conducted on the Ethane Cracker Facility Site, the 114.5-mile-long MEP Corridor, and the 18.5-mile SPP Corridor (survey area included a 200-foot wide corridor encompassing all potential construction workspace). The field survey focused on the identification and characterization of potential habitat for each of the species identified through the internet database search and the February 11, 2013 agency coordination meeting (as listed in Table 3-1).

The general habitat requirements, characteristics, and field signs of the identified T&E species (Table 3-2) were known and if encountered were documented. All habitats encountered were also characterized in regards to land use and vegetation cover for follow-up desktop analysis. The habitat characterizations and quantifications were used to further assess the potential for the Project's habitats to support identified T&E species (Table 3-2). ArcGIS was used in conjunction with georeferenced aerial photographs and results of the field survey to digitize the habitat/land use and calculate the acreages of each. Habitat/land uses in the Project Action Area are shown in Appendix A.

The Ethane Cracker and Pipeline Corridors were located to avoid natural habitat to the maximum extent practical. The majority of the Project Action Area is comprised of lands previously altered by human uses such as cropland, maintained herbaceous areas, maintained areas, and pastureland. These areas total 1,826.90 acres or 80% of the 2,274.78-acre Project Action Area.

OxyChem will use HDD technology at all perennial estuarine wetland/waterbody crossings (including saltmarsh wetland and waterbody complexes) to further avoid impacts to wetlands and habitat for T&E species. The locations of the proposed Ethane Cracker Facility and SPP Corridor completely avoid jurisdictional wetlands or waters as determined by the USACE August 8, 2012 jurisdictional determination. Table 3-3 presents the acreage of permanent and temporary impact by each habitat/land use type. A brief description of each habitat or land use is provided in Table 3-3 which is followed by a more detailed description of each particular habitat/ land use.

Table 3-2 Federally-Listed Threatened and Endangered Species Potentially Occurring in the Vicinity of the OxyChem Ethane Cracker, Markham Pipeline, and San Patricio Pipeline Project

Common Name	Scientific Name	Federal Status[1]	TXNDD Records[2]	County(-ies)	Habitat and Life History Requirements[3]	Habitat Present	Impact Potential	Comment
Mammals								
Gulf Coast jaguarundi	*Herpailurus yaguarondi cacomitli*	LE	4	Aransas Calhoun Refugio San Patricio	Thick brushlands, near water favored; 60 to 75 day gestation, young born sometimes twice per year in March and August, elsewhere the beginning of the rainy season and end of the dry season.	Yes	None	Some thick brushlands present in proposed pipeline ROW, most recent sighting in Texas at Aransas National Wildlife Refuge in 1992 (TPWD and TXNDD 2013).
Ocelot	*Leopardus pardalis*	LE	0	Aransas Calhoun Matagorda Refugio San Patricio	Dense chaparral thickets; mesquite-thorn scrub and live oak mottes; avoids open areas; breeds and raises young June-November.	Yes	None	Habitat present, but size and quality likely to be insufficient, only known populations are in Willacy and Kenedy Counties.
Red wolf	*Canis lupus rufus*	LE	0	Aransas Calhoun Jackson Matagorda Refugio San Patricio Victoria	Extirpated; formerly known throughout eastern half of Texas in brushy and forested areas, as well as coastal prairies.	Yes	None	Prairies and forested areas present, but species extirpated.
West Indian manatee	*Trichechus manatus*	LE	1	Aransas Calhoun Jackson Matagorda Refugio San Patricio	Gulf and bay system; opportunistic, aquatic herbivore.	Yes	None	Habitat will be avoided by use of Horizontal Directional Drilling (HDD) technology. BMPs will be implemented to avoid impacts to this species.

Common Name	Scientific Name	Federal Status[1]	TXNDD Records[2]	County(-ies)	Habitat and Life History Requirements[3]	Habitat Present	Impact Potential	Comment
Mammals - Whales								
Blue whale	*Balaenoptera musculus*	LE	NR	Aransas Calhoun Matagorda	Found worldwide, from sub-polar to sub-tropical latitudes. Although the species is often found in coastal waters, blue whales are thought to occur generally more offshore than other whales.	No	None	Do not occur in shallow waters such as those found in the Project vicinity.
Fin whale	*Balaenoptera physalus*	LE	NR	Aransas Calhoun Matagorda	Found in deep, offshore waters of all major oceans, primarily in temperate to polar latitudes, and less commonly in the tropics.	No	None	Do not occur in shallow waters such as those found in the Project vicinity.
Humpback whale	*Megaptera novaeangliae*	LE	NR	Aransas Calhoun Matagorda	Occur in all the world's oceans. In winter, seek out waters near coastal areas and islands in temperate and tropical areas.	No	None	Do not occur in shallow waters such as those found in the Project vicinity.
Sei whale	*Balaenoptera borealis*	LE	NR	Aransas Calhoun Matagorda	Prefer subtropical to subpolar waters on the continental shelf edge and slope worldwide. They are usually observed in deeper waters of oceanic areas far from the coastline.	No	None	Do not occur in shallow waters such as those found in the Project vicinity.
Sperm whale	*Physeter macrocephalus*	LE	NR	Aransas Calhoun Matagorda	Tend to inhabit areas with a water depth of 1,968 feet or more, and are uncommon in waters less than 984 feet deep.	No	None	Do not occur in shallow waters such as those found in the Project vicinity.

Common Name	Scientific Name	Federal Status[1]	TXNDD Records[2]	County(-ies)	Habitat and Life History Requirements[3]	Habitat Present	Impact Potential	Comment
Birds								
Attwater's prairie chicken	*Tympanuchus cupido attwateri*	LE	5	Aransas Refugio Victoria	Refugio county within historic range; endemic; open prairies of mostly thick grass one to three feet tall; from near sea level to 200 feet along coastal plain on upper two-thirds of Texas coast; males form communal display flocks during late winter-early spring; "booming" grounds important; breeding March through mid-June (USFWS 2013a).	Yes	Low	Proposed pipeline crosses through 1979-1992 historic booming ground, crosses through priority management zone, has been reintroduced to Refugio County as of 2007, reintroduction in Refugio County possibly on hiatus as of 2012 until better populations are established in Colorado County (USFWS 2010c and Toepfer 2011)
Bald eagle	*Haliaeetus leucocephalus*	DL	4	Aransas Calhoun Jackson Matagorda Refugio Victoria	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water.	No	None	No structures suitable for nesting in Project area. If nest found prior to or during construction, comply with USFWS 2007 Bald Eagle Management Guidelines (USFWS 2007a).
Eskimo curlew	*Numenius borealis*	LE	0	Aransas Calhoun Matagorda San Patricio	Historic; nonbreeding: grasslands, pastures, plowed fields, and less frequently, marshes and mudflats.	Yes	None	Habitat appears to be present, adults are mobile enough to flee if necessary, last documented sighting in Texas was 1962 (Alaska Department of Fish and Game 2012).

Common Name	Scientific Name	Federal Status[1]	TXNDD Records[2]	County(-ies)	Habitat and Life History Requirements[3]	Habitat Present	Impact Potential	Comment
Interior least tern	*Sternula antillarum athalassos*	LE	0	Jackson Victoria	Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also known to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony.	No	None	Pipeline is within 50 miles of coastline. Breeding habitat absent, adults are mobile enough to flee if necessary.
Northern aplomado falcon	*Falco femoralis septentrionalis*	LE	0	Aransas Calhoun Matagorda Refugio San Patricio	Wintering migrant along the Texas Gulf Coast; beaches and bayside mud or salt flats, open country, especially savanna and open woodland, and sometimes in very barren areas; grassy plains and valleys with scattered mesquite, yucca, and cactus; nests in old stick nests of other bird species.	Yes	None	Adults are mobile enough to flee if necessary.
Piping plover	*Charadrius melodus*	LT	28	Aransas Calhoun Matagorda Refugio San Patricio	Wintering migrant along the Texas Gulf Coast; beaches and bayside mud or salt flats.	Yes	None	Adults are mobile enough to flee if necessary.

Common Name	Scientific Name	Federal Status[1]	TXNDD Records[2]	County(-ies)	Habitat and Life History Requirements[3]	Habitat Present	Impact Potential	Comment
Red knot	*Calidris canutus rufa*	C	0	Aransas Calhoun	Breeds in the middle and high-Arctic areas of northern Canada. Texas is within the historic range and migratory path. Wintering and migration habitats are large, sandy tidal flats and coastlines near inlets of bays and estuaries. Primarily eats mollusks, but eats horseshoe crab eggs in Delaware Bay before final stretch to Arctic breeding grounds (Avery 2011).	Yes	None	Bays and estuaries will be avoided by use of HDD technology. BMPs will be implemented to avoid impacts to this species. Adults are mobile enough to flee if necessary.
Sprague's pipit	*Anthus spragueii*	C	0	Aransas Calhoun Jackson Matagorda Refugio San Patricio Victoria	Only in Texas during migration and winter, mid-September to early April; short to medium distance, diurnal migrant; strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges.	Yes	None	Pipeline located adjacent to existing pipeline corridors with edge effect. Likely not use these areas. Adults are mobile enough to flee if necessary.
Whooping crane	*Grus americana*	LE	2	Aransas Calhoun Jackson Matagorda Refugio San Patricio Victoria	Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.	Yes	None	Ensure lighting of facility makes structures visible during low-light conditions (dawn, dusk, and nighttime hours). Bays and estuaries will be avoided by use of HDD to avoid impacts to this species habitat.

Common Name	Scientific Name	Federal Status[1]	TXNDD Records[2]	County(-ies)	Habitat and Life History Requirements[3]	Habitat Present	Impact Potential	Comment
Reptiles								
Green sea turtle	*Chelonia mydas*	LT	3	Aransas Calhoun Jackson Matagorda Refugio San Patricio	Gulf and bay system; shallow water sea grass beds, open water between feeding and nesting areas, barrier island beaches; adults are herbivorous feeding on sea grass and seaweed; juveniles are omnivorous feeding initially on marine invertebrates, then increasingly on sea grasses and seaweeds; nesting behavior extends from March to October, with peak activity in May and June.	No	None	Habitat will be avoided by use of HDD technology. BMPs will be implemented to avoid impacts to this species.
Hawksbill sea turtle	*Eretmochelys imbricata*	LE	3	Aransas Calhoun Matagorda Refugio San Patricio	Gulf and bay system, warm shallow waters especially in rocky marine environments, such as coral reefs and jetties, juveniles found in floating mats of sea plants; feed on sponges, jellyfish, sea urchins, mollusks, and crustaceans, nests April through November.	No	None	Habitat will be avoided by use of HDD technology. BMPs will be implemented to avoid impacts to this species.
Kemp's Ridley sea turtle	*Lepidochelys kempii*	LE	5	Aransas Calhoun Jackson Matagorda Refugio San Patricio	Gulf and bay system, adults stay within the shallow waters of the Gulf of Mexico; feed primarily on crabs, but also other crustaceans, snails, clams and plants, juveniles feed on sargassum and its associated fauna; nests April through August.	No	None	Habitat will be avoided by use of HDD technology. BMPs will be implemented to avoid impacts to this species.

Common Name	Scientific Name	Federal Status[1]	TXNDD Records[2]	County(-ies)	Habitat and Life History Requirements[3]	Habitat Present	Impact Potential	Comment
Leatherback sea turtle	*Dermochelys coriacea*	LE	0	Aransas Calhoun Matagorda Refugio San Patricio	Gulf and bay systems, and widest ranging open water reptile; omnivorous, shows a preference for jellyfish; in the US portion of their western Atlantic nesting territories, nesting season ranges from March to August.	No	None	Habitat will be avoided by use of HDD technology. BMPs will be implemented to avoid impacts to this species.
Loggerhead sea turtle	*Caretta caretta*	LT	2	Aransas Calhoun Jackson Matagorda Refugio San Patricio	Gulf and bay system primarily for juveniles, adults are most pelagic of the sea turtles; omnivorous, shows a preference for mollusks, crustaceans, and coral; nests from April through November.	No	None	Habitat will be avoided by use of HDD technology. BMPs will be implemented to avoid impacts to this species.
Mollusks								
Golden orb	*Quadrula aurea*	C	0	Refugio San Patricio Victoria	Sand and gravel in some locations and mud at others; found in lentic and lotic; Guadalupe, San Antonio, Lower San Marcos, and Nueces River basins.	Yes	None	Habitat will be avoided by use of HDD methodology. BMPs will be implemented to avoid impacts to this species.
Smooth pimpleback	*Quadrula houstonensis*	C	0	Matagorda	Small to moderate streams and rivers as well as moderate size reservoirs; mixed mud, sand, and fine gravel, tolerates very slow to moderate flow rates, appears not to tolerate dramatic water level fluctuations, scoured bedrock substrates, or shifting sand bottoms, lower Trinity (questionable), Brazos, and Colorado River basins.	No	None	Habitat will be avoided by use of HDD methodology. BMPs will be implemented to avoid impacts to this species.

Common Name	Scientific Name	Federal Status[1]	TXNDD Records[2]	County(-ies)	Habitat and Life History Requirements[3]	Habitat Present	Impact Potential	Comment
Texas fatmucket	*Lampsilis bracteata*	C	0	Jackson	Streams and rivers on sand, mud, and gravel substrates; intolerant of impoundment; broken bedrock and course gravel or sand in moderately flowing water; Colorado and Guadalupe River basins.	Yes	None	Habitat will be avoided by use of HDD methodology. BMPs will be implemented to avoid impacts to this species.
Texas fawnsfoot	*Truncilla macrodon*	C	0	Matagorda	Little known; possibly rivers and larger streams, and intolerant of impoundment; flowing rice irrigation canals, possibly sand, gravel, and perhaps sandy-mud bottoms in moderate flows; Brazos and Colorado River basins.	No	None	Habitat will be avoided by use of HDD methodology. BMPs will be implemented to avoid impacts to this species.
Texas pimpleback	*Quadrula petrina*	C	0	Victoria	Mud, gravel and sand substrates, generally in areas with slow flow rates; Colorado and Guadalupe river basins.	Yes	None	Habitat will be avoided by use of HDD methodology. BMPs will be implemented to avoid impacts to this species.

Common Name	Scientific Name	Federal Status[1]	TXNDD Records[2]	County(-ies)	Habitat and Life History Requirements[3]	Habitat Present	Impact Potential	Comment
Plants								
Black lace cactus	*Echinocereus reichenbachii var. albertii*	LE	2	Refugio	Texas endemic; grasslands, thorn shrublands, mesquite woodlands on sandy, somewhat saline soils on coastal prairie, most frequently in naturally open areas sparsely covered with brush of a low stature not resulting from disturbance or along creeks in ecotonal areas between this upland type and lower areas dominated by halophytic grasses and forbs; flowering April-June.	No	None	MEP Corridor is approximately 2.7 miles southeast of the Refugio county population. At its closest point to the cactus population, the MEP Corridor crosses primarily wetlands and scrub-shrub upland and not native grasslands, thorn shrublands or mesquite woodlands on sandy somewhat saline soils (pipeline traverses clay soils). Most habitats disturbed along pipeline by anthropogenic uses.
Slender rush-pea	*Hoffmannseggia tenella*	LE	3	San Patricio	Grows on clayey soil of blackland prairies and creek banks in association with short and midgrasses such as buffalograss, Texas wintergrass, and Texas grama. Woody plants such as mesquite, huisache, huisachillo, spiny hackberry, brasil, retama, lotebush, tasajillo, and prickly pear are also common at the known sites.	No	None	Only known to occur in two locations in San Patricio County. Project Action Area does not contain plant habitat - blackland prairies and creek banks with midgrasses. Most habitats disturbed along pipeline by anthropogenic uses.

Common Name	Scientific Name	Federal Status[1]	TXNDD Records[2]	County(-ies)	Habitat and Life History Requirements[3]	Habitat Present	Impact Potential	Comment
South Texas ambrosia	*Ambrosia cheiranthifolia*	LE	5	San Patricio	South Texas ambrosia occurs in open grasslands or savannas on soils varying from clay loams to sandy loams.	No	None	Only known in six locations in San Patricio County. Project Action Area contains nominal native open grasslands and no savannas.

[1] Federal Status: C - Candidate, DL - Delisted, LE – Listed Endangered, LT – Listed Threatened, T/SA - Threatened due to Similarity of Appearance (TPWD 2013a and USFWS 2012a).
[2] TXNDD data requests (1/2012 and 3/2013), number of records for particular species. NR = No record provided.
[3] TPWD 2012a.
Sources: ADFG 2012, Avery 2011, DOI 2011, TPWD 2013a, TPWD and TXNDD 2012, TPWD and TXNDD 2013, TPWD 2013b, Toepfer 2011, USFWS 2007a, USFWS 2010c, and USFWS 2013a.

Table 3-3 Acres of Habitat/Land Use Types Affected[1] by Construction and Operation of the Ethane Cracker Facility, MEP Corridor, and SPP Corridor

Habitat/Land Use Type	Description	Ethane Cracker		MEP Corridor		SPP Corridor		Totals
		Permanent[2]	Temporary[3]	Permanent[2]	Temporary[3]	Permanent[2]	Temporary[3]	
Cropland	Fields used annually for crop growing. Most are very large areas with no medians or boundaries, except for intersecting roads. Much of the cropland was either just planted or not planted yet during the survey.	111.77	137.69	243.58	491.45	95.15	97.63	**1,177.28**
Maintained herbaceous	Includes the maintained right-of-way (ROW), other mowed or maintained farm/ranchland, and vegetated ranch roads.	0.00	0.00	144.75	237.96	0.59	0.18	**383.48**
Pastureland	Cattle-grazed land.	0.00	0.00	89.11	172.78	1.64	2.61	**266.14**
Scrub-shrub Upland	Upland areas with woody vegetation in the shrub and tree stratum. The tree stratum is not as dense as in a forested upland.	1.81	2.33	65.80	183.62	0.03	0.03	**253.62**
Upland Grassland	Non-prairie upland areas with mainly herbaceous cover and limited to no woody vegetation.	0.00	0.00	33.79	70.33	1.65	2.13	**107.9**
Maintained	Includes residential properties, industrial areas, paved and gravel roads, and the vegetation immediately surrounding roads.	8.95	2.06	15.63	31.64	1.46	1.44	**61.18**
Ditch	Intermittent and ephemeral man-made features primarily used to drain uplands and croplands.	0.00	0.00	2.83	8.12	0.00	0.00	**10.95**
Forested Upland	Upland areas dominated by a thick tree stratum.	0.00	0.00	1.70	5.76	0.00	0.00	**7.46**
Stream	Perennial, intermittent, and ephemeral bodies of naturally-flowing water (e.g., rivers, streams, creeks, and bayous)	0.00	0.00	1.05	2.15	0.00	0.00	**3.20[1]**

Habitat/Land Use Type	Description	Ethane Cracker		MEP Corridor		SPP Corridor		Totals
		Permanent[2]	Temporary[3]	Permanent[2]	Temporary[3]	Permanent[2]	Temporary[3]	
	or ship channels/barge canals.							
Emergent Wetland	Wetland areas with mainly herbaceous cover and limited to no woody vegetation.	0.00	0.00	0.69	2.28	0.00	0.00	**2.97**
Saltmarsh	Mudflat areas dominated by vegetation that is highly adapted to very saline conditions.	0.00	0.00	0.00	0.49	0.00	0.00	**0.49**[1]
Pond	Manmade and natural bodies of standing water either isolated or connected to a stream. Includes stock ponds on pasturelands and commercial holding ponds.	0.00	0.00	0.00	0.12	0.00	0.00	**0.12**
Scrub-shrub Wetland	Wetland areas dominated by a shrub and/or sapling stratum.	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Upland Prairie	Grasslands dominated by native grasses and other herbaceous plants. Not developed/used for other purposes (e.g., agricultural or grazing).	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Forested Wetland	Wetland areas dominated by a thick tree stratum.	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Totals:	**122.53**	**142.08**	**598.93**	**1,206.70**	**100.52**	**104.02**	**2,274.78**

[1] Acreages take into account use of HDD technology to install the MEP.
[2] Permanent acreage includes those areas located within the Project permanent operational area of the Ethane Cracker Facility and MEP/SPP Corridors permanent maintained ROW.
[3] Temporary acreage includes those areas temporarily used during Project construction of the Ethane Cracker Facility (e.g. construction staging areas) and MEP/SPP Corridors (e.g., temporary construction ROW and ATWS), that will be returned to pre-construction habitat/land use.

A brief description of the habitat/land use categories in the Ethane Cracker Facility Site, MEP Corridor, and SPP Corridor is provided below.

Cropland: This land use occupies 1,177.28 acres or 52% of the Project Action Area and is common in Calhoun, Jackson, Matagorda, San Patricio, and Victoria Counties. During the time of the survey, many of the croplands were not planted or were in the early stages of planting. Corn (*Zea mays*) and sorghum (*Sorghum bicolor*) were observed in some of the fields at the time of the surveys. Other crops typically found in the croplands of the Project Action Area include cotton (*Gossypium* spp.) and grain crops other than corn and sorghum (Contract Land Staff 2013).

Maintained herbaceous: This land use encompasses approximately 383.48 acres or 17% of the Project Action Area. It includes maintained ROW corridors, other maintained farm or ranchland, and vegetated farm or ranch roads. Dominant herbaceous plants found in this land use include: annual marshelder (*Iva annua*) arrowleaf sida (*Sida rhombifolia*), Bahia grass (*Paspalum notatum*), Bermuda grass (*Cynodon dactylon*), Brazilian vervain (*Verbena brasiliensis*), broomsedge (*Andropogon virginicus*), buffalograss (*Buchloe dactyloides*), bur clover (*Medicago polymorpha*), bushy seaoxeye (*Borrichia frutescens*), Canada goldenrod (*Solidago canadensis*), Canada wildrye (*Elymus canadensis*), Carolina geranium (*Geranium carolinianum*), Cherokee sedge (*Carex cherokeensis*), common broomweed (*Amphiachyris dracunculoides*), crowpoison (*Nothoscordum bivalve*), devilweed aster (*Chloracantha spinosa*), Dutch clover (*Trifolium repens*), eastern baccharis (*Baccharis halimifolia*), Engelmann pricklypear (*Opuntia engelmannii*), evening primrose (*Oenothera speciosa*), field brome (*Bromus arvensis*), fringed windmill-grass (*Chloris ciliata*), frog fruit (*Phyla nodiflora*), gulf cordgrass (*Spartina spartinae*), Johnson grass (*Sorghum halepense*), Leavenworth's eryngo (*Eryngium leavenworthii*), little bluestem (*Schizachyrium scoparium*), Macartney rose (*Rosa bracteata*), marsh bristlegrass (*Setaria parviflora*), perennial ragweed (*Ambrosia psilostachya*), powderpuff (*Mimosa strigillosa*), prickly sow thistle (*Sonchus asper*), purple threeawn (*Aristida purpurea*), sand dropseed (*Sporobolus cryptandrus*), silver bluestem (*Bothriochloa saccharoides*), St. Augustine grass (*Stenotaphrum secundatum*), sticky-willy (*Galium aparine*), Texas wintergrass (*Nassella leucotricha*), wild petunia (*Ruellia nudiflora*), woodrush flatsedge (*Cyperus entrerianus*), wooly croton (*Croton capitatus*), wooly plantain (*Plantago patagonica*), and yellow bluestem (*Bothriochloa ischaemum*). This category is frequently bordered by the scrub-shrub upland, upland grassland, and pastureland land use categories found in this section.

Pastureland: This land use category encompasses approximately 266.14 acres or 12% of the Project Action Area. This land use is fairly common throughout the extent of the pipeline. These areas are grazed by domesticated cattle (*Bos taurus*) and therefore the vegetation is stunted and composed of a variety of forbes and grasses. Dominant herbaceous plants found in this land use include: arrowleaf sida, Bahia grass, Bermuda grass, Canada goldenrod, Carolina geranium, common broomweed, crowpoison, dallis grass (*Paspalum dilatatum*), Drummond's onion (*Allium drummondii*), Dutch clover, evening primrose, fringed windmill-grass, frog fruit, milk purslane (*Chamaesyce maculata*), perennial ragweed, powderpuff, prickly sow thistle, spotted beebalm (*Monarda punctata*), stinging nettle (*Urtica dioica*), tapered rosette grass (*Dicanthelium acuminatum*), woodrush flatsedge, wooly croton, wooly plantain, and yellow bluestem. The dominant woody vegetation (in the tree, sapling, or shrub strata) found in pastureland included honey mesquite, huisache, and live oak. Some of the pasturelands even included woody vines of field blackberry and Macartney rose.

Scrub-shrub upland: This habitat is comprised of 253.62 acres or 11% of the Project Action Area. These areas have vegetation in the shrub, sapling, and tree strata but have few, if any

trees. Dominant woody plants that characterized the shrub, sapling, tree, and woody vine strata of scrub-shrub uplands include: Alabama supplejack (*Berchemia scandens*), black willow (*Salix nigra*), catclaw (*Acacia greggii*), cedar elm (*Ulmus crassifolia*), Chinese privet (*Ligustrum sinense*), Chinese tallow (*Triadica sebifera*), desert hackberry (*Celtis pallida*), desert yaupon (*Schaefferia cuneifolia*), eastern baccharis, field blackberry (*Rubus arvensis*), honey mesquite (*Prosopis glandulosa*), huisache (*Acacia farnesiana*), lime pricklyash (*Zanthoxylum fagara*), live oak (*Quercus virginiana*), Macartney rose, old man's beard (*Clematis drummondii*), Roemer catclaw (*Acacia roemeriana*), saw greenbriar (*Smilax bona-nox*), sugar hackberry (*Celtis laevigata*), Texas mimosa (*Mimosa texana*), Texas persimmon (*Diospyros texana*), water oak (*Quercus nigra*), whitebrush (*Aloysia gratissima*), and yaupon (*Ilex vomitoria*).

Upland grassland: This habitat includes approximately 107.90 acres or 5% of the Project Action Area. These areas are dominated by herbaceous vegetation and characterized by an absence of at least one of the following: wetland hydrology, wetland vegetation, or wetland soils (Environmental Laboratory 1987). Although not a wetland due to lack of hydrology and wetland soils, some wetland plants were present. Dominant herbaceous plants in this habitat include: annual marshelder, balloonvine (*Cardiospermum halicacabum*), Bermuda grass, bushy seaoxeye, Canada goldenrod, Canada wildrye, Carolina geranium, Cherokee sedge, common ragweed (*Ambrosia artemisiifolia*), devilweed aster, downy phlox (*Phlox pilosa*), field brome, frog fruit, fringed windmill grass, gulf cordgrass, Lindheimer's beeblossom (*Gaura lindheimeri*), little bluestem, Maximilian sunflower (*Helianthus maximiliani*), perennial ragweed, plains lovegrass (*Eragrostis intermedia*), powderpuff, Roemer catclaw, silver bluestem, silver ponysfoot (*Dichondra argentea*), silverleaf nightshade (*Solanum elaeagnifolium*) sand spikerush (*Eleocharis montevidensis*), seashore vervain (*Verbena litoralis*), snow on the prairie (*Euphorbia bicolor*), torpedo grass (*Panicum repens*), whorled pennywort (*Hydrocotyle prolifera*), and yellow bluestem. Dominant shrubs found in the grassland uplands include eastern baccharis, honey mesquite, huisache, Macartney rose, Texas mimosa, Texas persimmon, and whitebrush. Upland grassland sites also occasionally contained woody vines of field blackberry, Macartney rose, and purple passionflower (*Passiflora incarnata*).

Maintained: This land use occupies approximately 61.18 acres or 3% of the Project Action Area. It includes all residential and commercial properties, as well as all maintained (paved or gravel) roads along the pipeline corridor. Also included in this land use type are all mowed areas (e.g., lawns, roadsides and medians) associated with the maintained features.

Ditch: This land use comprises approximately 10.95 acres or <1% of the Project Action Area. It includes intermittent and ephemeral man-made features constructed with the purpose of draining uplands. This category is typically found in croplands and pastureland.

Forested upland: This habitat encompasses approximately 7.46 acres or <1% of the Project Action Area. This land use is uncommon throughout the extent of the pipeline. Dominant woody plants in the tree stratum of forested uplands include: Chinese tallow, huisache, slippery elm (*Ulmus rubra*), and water oak.

Stream: This habitat includes approximately 3.20 acres or <1% of the Project Action Area. This category is used primarily to describe natural ephemeral, intermittent, and perennial streams. It is also used for large man-made flowing water features (e.g., Victoria Barge Canal). This category is frequently bordered by the maintained herbaceous, salt marsh, scrub-shrub upland, and upland grassland categories. It is also occasionally bordered by the emergent wetland category.

Emergent wetland: This habitat occupies approximately 2.97 acres or <1% of the Project Action Area. Most of the wetlands surveyed (29) fall into this category. These areas are dominated by herbaceous vegetation and meet all three of the criteria of wetland hydrology, wetland vegetation, and wetland soils (Environmental Laboratory 1987). Dominant herbaceous plants found in these wetlands include: Bermuda grass, broadleaf arrowhead (*Sagittaria latifolia*), bushy seaoxeye, cattail (*Typha latifolia*), Cherokee sedge, creeping primrose-willow (*Ludwigia repens*), delta arrowhead (*Sagittaria platyphylla*), desert saltgrass, devilweed aster, Egyptian panicum (*Paspalidium geminatum*), gulf cordgrass, longleaf pondweed (*Potamogeton nodosus*), sand spikerush, shoregrass, small spikerush (*Eleocharis minima*), squarestem spikerush (*Eleocharis quadrangulata*), swamp smartweed (*Persicaria hydropiperoides*), and woodrush flatsedge. In a few instances, these wetlands also contained a shrub stratum with the following dominant vegetation: honey mesquite, huisache, lotebush (*Ziziphus obtusifolia*), and poisonbean (*Sesbania drummondii*).

Saltmarsh: This habitat comprises approximately 0.49 acres or <1% of the Project Action Area. With 10 wetlands in this category, it is the second most common type of wetland encountered on the Project site. These wetlands are found in mudflats and have vegetation that is adapted to very saline conditions. These areas also meet all three of the criteria of having weltand hydrology, wetland vegetation, and wetland soils (Environmental Laboratory 1987). Dominant herbaceous plants include: Atlantic cordgrass (*Spartina alterniflora*), bushy seaoxeye, butterweed (*Packera glabella*), common threesquare (*Scirpus americanus*), desert saltgrass (*Distichlis spicata*), gulf cordgrass, needlegrass rush (*Juncus roemerianus*), saltwort (*Batis maritima*), shoregrass (*Monanthochloe littoralis*), and Virginia glasswort (*Salicornia depressa)*. One wetland also included Jesuit's bark (*Iva frutescens*) and another had huisache as a dominant shrub.

Pond: This habitat occupies approximately 0.12 acres or <1% of the Project Action Area and includes non-flowing waterbodies that are either natural or manmade (e.g., cattle stock ponds or agricultural/aquaculture ponds).

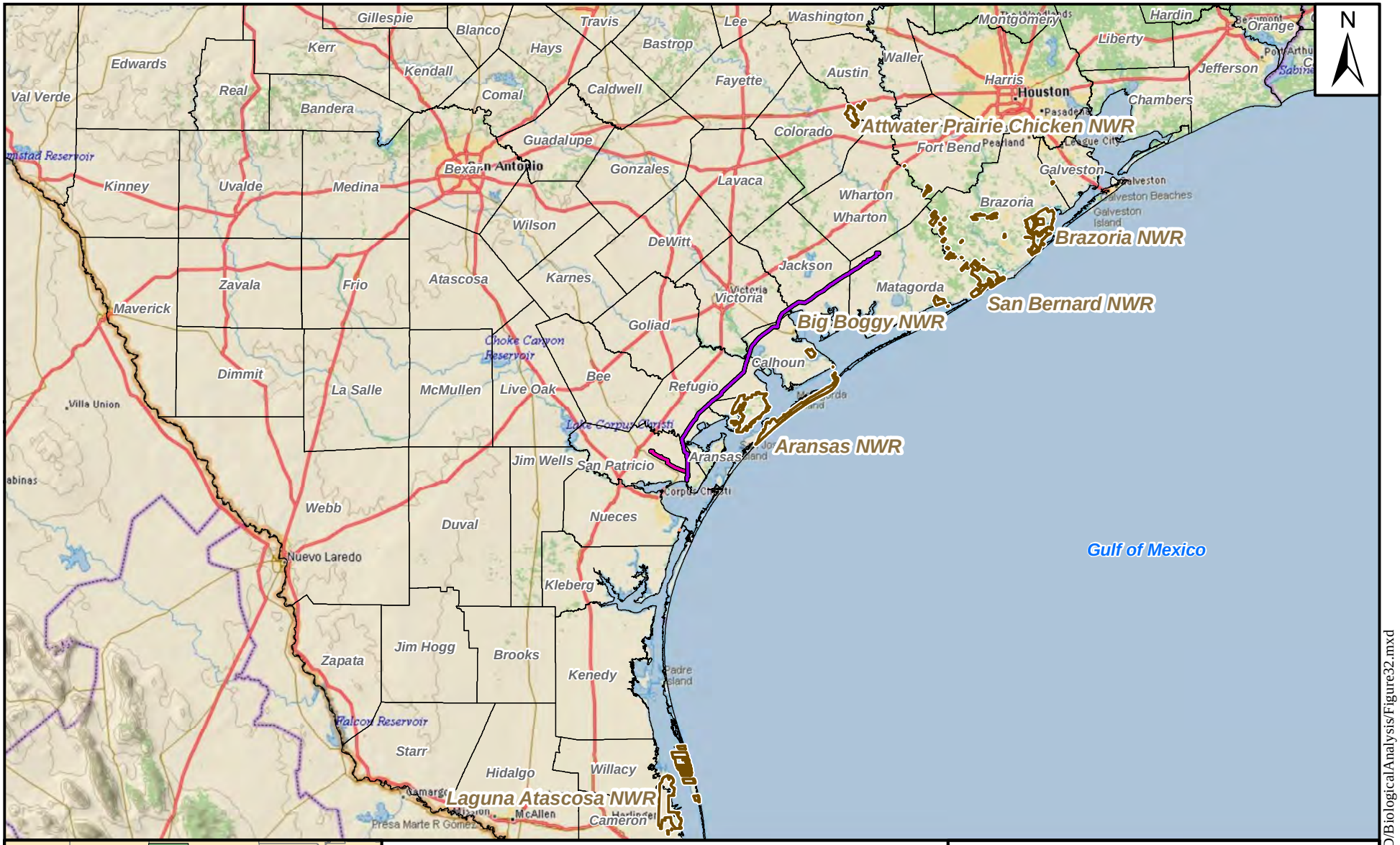
Scrub-shrub wetland: This habitat was initially part of the Project Action Area but no longer is because it will be avoided via use of HDD technology. With only five (8) wetlands delineated during the project survey in this category, it is one of the least common types of wetlands encountered in the vicinity of the Project Action Area. These areas have vegetation in the shrub, sapling, and tree strata but have few, if any, trees. As wetlands, these areas meet all three of the criteria of having wetland hydrology, wetland vegetation, and wetland soils (Environmental Laboratory 1987). Dominant plants found in the shrub stratum of these wetlands include: cattail, Chinese tallow, eastern baccharis, giant reed (*Arundo donax*), Macartney rose, and poisonbean. Herbaceous plants include: alligator weed (*Alternanthera philoxeroides*), annual marshelder, desert saltgrass, devilweed aster, sand spikerush, southern dewberry (*Rubus trivialis*), swamp smartweed, and woodrush flatsedge.

Upland prairie: This habitat was initially part of the Project Action Area but no longer is because it will be avoided via use of HDD technology. There is only one upland prairie and it is located north of MEP Corridor mile post (MP) 12 and before existing mudflats. The dominant species in this prairie is silver bluestem.

Forested wetland: This habitat was initially part of the Project Action Area but no longer is because it will be avoided via use of HDD technology. With only three (4) wetlands in this category, it is the least common type of wetland encountered in the Project Action Area vicinity. These areas have vegetation in the tree stratum and as wetlands meet all three of the criteria of

having wetland hydrology, wetland vegetation, and wetland soils (Environmental Laboratory 1987). Dominant plants found in the tree and sapling strata include: American elm (*Ulmus americana*), Chinese tallow, live oak, and water oak. Herbaceous plants include: common rush (*Juncus effusus*), swamp smartweed, torpedo grass, and woodrush flatsedge. Field blackberry is present as a woody vine at one of the forested wetlands.

State- and federally-owned lands can provide important habitat for T&E species. An analysis of nearby public lands and records of T&E occurrence were investigated to further assist with the impact assessment (Figures 3-1 and 3-2). Maps of these lands are provided for reference as they are discussed in Section 4.0 below.



Source: DeLorme World Basemap from ESRI ArcView Data. NWR Boundaries from Geospatial Data Giveaway, downloaded 3/2012.

LEGEND

- Markham Pipeline
- San Patricio Pipeline
- National Wildlife Refuge Boundaries
- County Boundary

0 50 100 150 Miles

Scale = 1:3,000,000

Sheet 1 of 1

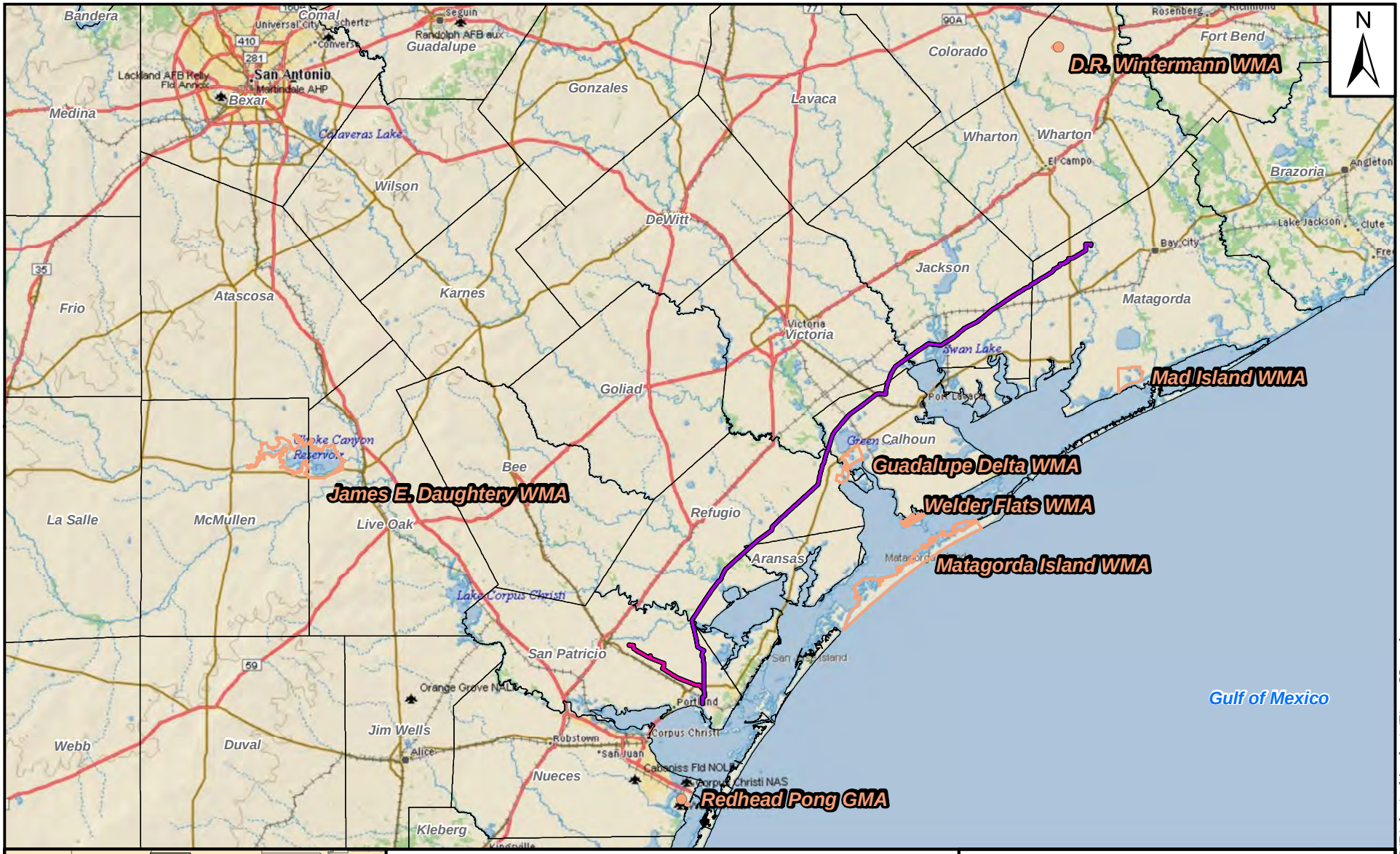
Figure 3-2. National Widlife Refuges Near the Oxy Chem Ethane Cracker Facility, Markham Ethylene Pipeline, and San Patricio Pipeline Corridor.

Prepared For: Occidental Chemical Corporation

Prepared By: TETRA TECH

Date: 6/13

P:GIS/Projects/OxyPhaseII/MXD/BiologicalAnalysis/Figure32.mxd



Source: DeLorme World Basemap from ESRI ArcView Data. Texas Management Areas from TPWD 3/2012.

LEGEND

- Markham Pipeline
- San Patricio Pipeline
- TPWD Management Areas
- County Boundary

0 20 40 60 80 Miles

Scale = 1:1,500,000

Sheet 1 of 1

Figure 3-3. State Management Areas Near the Oxy Chem Ethane Cracker Facility, Markham Ethylene Pipeline, and San Patricio Pipeline Corridor.

Prepared For: Occidental Chemical Corporation

Prepared By: TETRA TECH

Date: 6/13

P:GIS/projects/OxyPhaseII/MXD/BiologicalAnalysis/Figure33.mxd

3.4 Waterbodies Traversed by the MEP Centerline

Most major waterbodies (including associated saltmarsh wetlands) will be traversed by use of HDD technology whereby impacts to the habitat will be completely avoided. Table 3-4 lists the waterbodies (and associated wetlands) traversed by the MEP and the method of crossing for each. Of the 48 waterbodies/wetlands traversed, 31 will be crossed by HDD. Conventional trench methodology will be used for smaller ephemeral waterbodies which typically are dry and not flowing except for after rain events. Such ephemeral waterbodies do not provide habitat for the marine/estuarine species listed in counties traversed by the Project. Ephemeral waterbodies do not provide habitat for freshwater mussels which are known to occur in certain rivers of Texas (see Section 4.16). The only river traversed by the MEP in which freshwater mussels might be found is the Guadalupe River and this river will be crossed using HDD technology, thereby avoiding this potential freshwater mussel habitat.

Table 3-4 Waterbodies Crossed by the Markham Ethylene Pipeline and the Method of Crossing

Approximate Milepost	Waterbody Name	County	Crossing Method	Waterbody Type[1]
12.2-12.7	Mud Flats near Copano Bay	San Patricio	HDD	Wetlands
13.7-13.9	Mud Flats near Copano Bay	San Patricio	HDD	Wetlands
14.4	Unnamed Stream of the Chiltipin Creek and Aransas River wetlands Complex	San Patricio	HDD	Intermittent
14.5	Chiltipin Creek	San Patricio	HDD	Perennial
14.5	Unnamed tributary connecting Chiltipin Creek and Aransas River	San Patricio	HDD	Perennial
15.3	Aransas River	San Patricio Refugio	HDD	Perennial
20.4	Mullens Bayou	Refugio	Conventional Trench	Perennial
22.3-24.4	Mud Flats near Mission Bay	Refugio	HDD	Wetland
23.5	Mission River	Refugio	HDD	Perennial
24.1	Melon Creek	Refugio	HDD	Perennial
30	Unnamed tributary of Copano Creek	Refugio	Conventional Trench	Ephemeral
30.6	Copano Creek	Refugio Aransas	Conventional Trench	Intermittent
38.4	Salt Creek	Refugio	Conventional Trench	Ephemeral
39.2	Unnamed tributary of Willow Creek	Refugio	Conventional Trench	Ephemeral
40.1	Willow Creek	Refugio	Conventional Trench	Ephemeral
42	Artesian Creek	Refugio	Conventional Trench	Ephemeral
53.4	Guadalupe River	Refugio Calhoun	HDD	Perennial
53.9	Schwings Bayou	Calhoun	HDD	Intermittent
54.5	Unnamed stream of the Schwings Bayou, Guadalupe River, Hog Bayou, and Victoria Barge Canal Wetlands complex	Calhoun	HDD	Ephemeral/ Wetlands
55.2	Hog Bayou	Calhoun	HDD	Intermittent
56.3	Unnamed stream of the Schwings Bayou, Guadalupe River, Hog Bayou, and Victoria Barge Canal Wetlands complex	Calhoun	HDD	Ephemeral/ Wetlands
56.6	Unnamed stream of the Schwings Bayou, Guadalupe River, Hog Bayou, and Victoria Barge Canal Wetlands complex	Calhoun	HDD	Ephemeral/ Wetlands
56.7	Unnamed ponds of the Schwings	Calhoun	HDD	Ephemeral/

Approximate Milepost	Waterbody Name	County	Crossing Method	Waterbody Type[1]
	Bayou, Guadalupe River, Hog Bayou, and Victoria Barge Canal Wetlands complex			Wetlands
56.8	Victoria Barge Canal	Calhoun	HDD	Perennial
57.2	Jones Bayou	Calhoun	HDD	Perennial
65.8	Chocolate Bayou	Calhoun	Conventional Trench	Ephemeral
72.6	Placedo Creek	Calhoun	HDD	Perennial
73.4-73.6	Tidal Flats near Lavaca Bay	Calhoun	HDD	Wetlands
73.5	Agula Creek	Calhoun	HDD	Perennial
74.7	Kentucky Mott Creek	Calhoun	Conventional Trench	Intermittent
75.2-76.1	Tidal Flats near Garcitas Cove	Calhoun Jackson	HDD	Wetlands
75.3	Unnamed stream of Garcitas Cove	Calhoun	HDD	Perennial
75.7-75.8	Garcitas Creek	Calhoun Jackson	HDD	Perennial
77.3	Unnamed stream near Garcitas Cove	Jackson	Conventional Trench	Ephemeral
79.6	Unnamed stream connected to Venado Lakes	Jackson	Conventional Trench	Ephemeral
79.9-81.9	Tidal Flats near Lavaca Bay and Venado Lakes	Jackson	HDD	Wetlands/ Perennial
81.7-81.9	Lavaca River	Jackson	HDD	Perennial
84.5	Cox Creek	Jackson	Conventional Trench	Ephemeral
87.8	Keller Creek	Jackson	Conventional Trench	Intermittent
93.5	West Carancahua Creek	Jackson	HDD	Perennial
93.5	Unnamed tributary of West Carancahua Creek	Jackson	HDD	Perennial
95.5	Unnamed tributary of West Carancahua Creek	Jackson	Conventional Trench	Ephemeral
95.9	Unnamed tributary of West Carancahua Creek	Jackson	Conventional Trench	Ephemeral
101.2	East Carancahua Creek	Matagorda	Conventional Trench	Intermittent
109.5	Juanita Creek	Matagorda	HDD	Perennial
109.5	Unnamed tributary of Juanita Creek	Matagorda	HDD	Ephemeral
112.5	Willow Creek	Matagorda	Conventional Trench	Intermittent

[1] *Ephemeral* - An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.
Intermittent - An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.
Perennial - A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.
Wetlands – Wetlands as defined by the USACE.

3.5 Air Quality Analysis and Results

A preliminary air quality dispersion analysis of potential emissions associated with the Project was conducted to determine if significant impacts would be likely to result in the Action Area extending beyond the boundaries of the Ethane Cracking Facility Site. Results of this initial review indicated that ambient concentration resulting from the proposed action would be less than the established SIL at locations along and beyond the property boundary. Because impacts are below SIL, no indirect off-site impacts to soils, vegetation, or surface waters are expected. Additionally, with all criteria pollutants less than SIL, no off-site indirect effects on federally-listed species are expected.

3.5.1 Estimated Annual Emission Rate

During the preparation of the pre-construction air permit applications for the Project, Keil Environmental, Inc. developed a set of detailed emissions calculations for the sources associated with the proposed Project. These data were processed using USEPA and TCEQ approved dispersion models to evaluate the potential off-site impact that would result. The emission sources to be constructed as part of the proposed Project and their proposed emission rates used for modeling are shown in Table 3-5.

Table 3-6 provides the NAAQS, PSD Increments and SIL which are used to evaluate Project impacts.

3.5.2 Area of Impact Dispersion Modeling Methodology

Air quality dispersion analysis of the proposed Project's emissions is required to meet both the requirements of PSD (40 CFR 52.21) and the TCEQ (30 TAC 116). According to the USEPA, "dispersion modeling uses mathematical formulations to characterize the atmospheric processes that disperse a pollutant emitted by a source." This section provides an overview of the methods used for dispersion modeling. Preliminary modeling of the project indicates the project will not result in a significant off-site impact. An addendum to this assessment will be prepared in the event the final modeling of the Project identifies impacts higher than SIL at any off-site location.

3.5.3 Dispersion Modeling

Modeling was performed using the American Meteorological Society (AMS)/USEPA Regulatory Model (AERMOD). The AERMOD model was chosen because it is approved by the USEPA as a preferred/recommended model and is approved by the TCEQ modeling staff.

AERMOD is a steady-state plume dispersion model for predicting the concentrations of air contaminants from a variety of sources. AERMOD determines concentrations from multiple point, area, and/or volume sources based on an up-to-date characterization of the atmospheric boundary layer.

The specific modeling parameters applicable to the geographic location, in which the Project site is located, have been documented in a protocol submitted to the TCEQ. The protocol addressed parameters such as meteorological data, rural versus urban dispersion coefficients, and receptor grids. The modeling parameters were defined primarily by the USEPA-recommended "regulatory default option" which includes the use of stack-tip downwash, the effects of elevated terrain, and calms and missing data processing routines.

Table 3-5 Criteria Pollutant Emissions

EPN	Description	NO_x		CO		VOC		SO_2		$PM_{2.5}$		PM_{10}	
		(lbs/hr)	(TPY)	(lbs/hr)	(TPY)	(lbs/hr)	(TPY)	(lbs/hr)	(TPY)	(lbs/hr)	(TPY)	(lbs/hr)	(TPY)
CR-1	Ethane Cracking Furnace No. 1	4.13	12.05	11.00	48.18	1.48	6.49	0.19	0.84	0.88	3.85	0.88	3.85
CR-2	Ethane Cracking Furnace No. 2	4.13	12.05	11.00	48.18	1.48	6.49	0.19	0.84	0.88	3.85	0.88	3.85
CR-3	Ethane Cracking Furnace No. 3	4.13	12.05	11.00	48.18	1.48	6.49	0.19	0.84	0.88	3.85	0.88	3.85
CR-4	Ethane Cracking Furnace No. 4	4.13	12.05	11.00	48.18	1.48	6.49	0.19	0.84	0.88	3.85	0.88	3.85
CR-5	Ethane Cracking Furnace No. 5	4.13	12.05	11.00	48.18	1.48	6.49	0.19	0.84	0.88	3.85	0.88	3.85
CR-1-MSS through CR-5-MSS	Ethane Cracking Furnace Nos. 1-5 – MSS Activities (hourly rate for each furnace and annual rate for the total for five furnaces	26.00	1.87	43.00	3.10			10.42	9.00				
CR-6	CR Thermal Oxidizer No. 1	5.10	22.34	3.40	14.89	2.98	13.03	0.09	0.37	0.85	3.72	0.85	3.72
CR-7	CR Thermal Oxidizer No. 2	5.10	22.34	3.40	14.89	2.98	13.03	0.09	0.37	0.85	3.72	0.85	3.72
CR-8	CR High Pressure Flare	0.22	0.97	0.44	1.93			0.01	0.01	0.01	0.05	0.01	0.05
CR-8-MSS	CR- High Pressure Flare – MSS Activities	510.60	76.95	1019.35	153.62	1113.00	144.12	30.12	4.34	27.75	4.18	27.75	4.18
CR-9	CR Emergency Generator Diesel Engine	24.45	0.64	2.14	0.06	0.54	0.01	0.02	0.01	0.14	0.01	0.14	0.01
CR-11	Cr Cooling Tower					50.04	21.92			0.007	0.03	0.67	2.92
CR-12-MSS	C_3/C_4 Hydrogenation Regeneration Vent – MSS Activities			76.09	3.80	2.00	0.10						
CR-13	CR Furnace Area Fugitives					0.21	0.91						
CR-14	CR Charge Gas Area Fugitives					0.18	0.78						
CR-15	CR Recovery Area Fugitives					1.99	8.70						
CR-16	CR C_3+ Area Fugitives					0.28	1.24						
CR-17	CR Waste Treatment and C_5 Are Fugitives					0.24	1.03						
CR-18	CR Liquefied Petroleum Gas (LPG) Storage Area Fugitives					0.07	0.31						
CR-19	CR Hydrogen Vent			0.01	0.03								

Table 3-6 NAAQS, PSD Increments, and Significant Impact Levels (µg/m^3)

Pollutant	Average Periods				
	1-Hour	3-Hour	8-Hour	24-Hour	Annual
NAAQS					
NO_x	188	--	--	--	100
CO	40,000	--	10,000	--	--
SO_2	196	1,300	--	365	80
PM_{10}	--	--	--	150	--
$PM_{2.5}$	--	--	--	35	15
PSD Increments					
NO_x	--	--	--	--	25
SO_2	--	512	--	91	20
PM_{10}	--	--	--	30	17
$PM_{2.5}$	--	--	--	9	4
Significant Impact Level					
NO_x	7.5	--	--	--	1
CO	2,000	--	500	--	--
SO_2	7.8	25	--	5	1
PM_{10}	--	--	--	5	1
$PM_{2.5}$	--	--	--	1.2	0.3

3.6 Water Quality Analysis

3.6.1 Chemical Discharge

Process wastewater will be directed to the contaminated water stripper *where volatile hydrocarbons will be removed prior to discharge to the existing adjacent OxyChem Facility wastewater treatment unit*. The current average flow of the existing wastewater discharge is approximately 830 gpm. The combined flow of the existing wastewater (830 gpm), the Ethylene plant blow down streams (300 gpm), and the treated process wastewater (100 gpm) will be approximately 1,280 gpm. The cooling tower and boiler blow downstream contains no contaminants that require treatment in the wastewater system and this stream is added directly to the discharge.

The existing discharge of process wastewater is subject to federal effluent limitation guidelines per 40 CFR- 414, (Organic Chemicals, Plastics, and Synthetic Fibers). This guideline establishes effluent concentration and loading limits for the following chemicals: Copper; Benzene; Chloroform; Chloroethane; 1,2-Dichloroethane; Acenaphthene; Acrylonitrile; Carbon Tetrachloride; Chlorobenzene; 1,2,4-Trichlorobenzene; Hexachlorobenzene; 1,1,1-Trichloroethane; Chloroethane; 1,1-Dichloroethane; 1,1,2-Trichloroethane; 2-Chlorophenol; 1,2-Dichlorobenzene; 1,3-Dichlorobenzene; 1,4-Dichlorobenzene; 1,1-Dichloroethylene; 1,2-Trans Dichloroethylene, 2,4-Dichlorophenol; 1,2-Dichloropropane; 1,3-Dichloropropylene; 2,4-Dimethylphenol; 2,4-Dinitrotoluene; 2,6-Dinitrotoluene; Ethylbenzene; Fluoranthene; Methylene Chloride; Methyl Chloride; Hexachlorobutadiene; Naphthalene; Nitrobenzene; 2-Nitrophenol; 4-Nitrophenol; 2,4-Dinitrophenol; 4,6-Dinitro-o-cresol; Phenol; Bis(2-ethylhexyl)phthalate; Di-n-butyl phthalate; Dimethyl phthalate; Benzo(a)anthracene; Benzo(a)pyrene; 3,4-Benzofluoranthene; Benzo(k)fluorathene; Chrysene; Acenaphthylene; Anthracene; Fluorene; Phenanthrene; Pyrene; Tetrachloroethylene; Toluene; Trichloroethylene; and Vinyl Chloride. Analysis is conducted to demonstrate compliance with these effluent limits.

The Ethane Cracker Facility wastewater will be subject to these same effluent guidelines and analytical requirements. Similar performance is anticipated for the wastewater treatment system with the additional effluent added from the ethylene process. The worst case contaminant expected to be in the process wastewater is benzene. The highest concentration of benzene expected after steam stripping and treatment in the activated sludge process is 0.005 milligrams per liter (mg/l). The current VCM wastewater permit establishes a discharge concentration limit for benzene of 0.136 mg/l which is considered to be protective of marine organisms in accordance with Texas Surface Water Quality Standards for Marine Aquatic Life (30 TAC 307). The discharge associated with the Ethane Cracker Facility will be well below (27 times) this threshold.

The existing discharge of wastewater is also subject to permit requirements for acute and chronic biomonitoring to demonstrate that the wastewater discharge is not toxic to marine organisms. This testing is done in accordance with the most recent version of EPA toxicity test procedures "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms" (EPA-821-R-02-014) and "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA-821-R-02-012). Historical results from this testing have consistently demonstrated that the effluent is not toxic to marine organisms and this requirement will remain in effect for future effluent discharges. As such, the discharge associated with the Ethane Cracker Facility will not result in impacts to marine organisms.

Additionally, the wastewater is discharged to the La Quinta Channel through a six port diffuser designed to rapidly mix the wastewater with receiving water. Modeling was conducted to predict the effluent concentration at 50-feet from the discharge location. Specifically, the CORMIX2 model was used to simulate the mixing zone dilutions for several effluent/receiving water conditions. The CORMIX2 model, developed by the USEPA, simulates the discharge of effluent from a multi-port diffuser. The average receiving water tidal velocity in the La Quinta Channel was fixed at 0.05 meters per second (m/sec) in all simulations. This value is based on predictions made by the USACE Coastal and Hydraulics Laboratory for Corpus Christi Bay, including the La Quinta Channel.

The receiving water density conditions were applied to the CORMIX2 model to simulate the dilution of effluent discharge into the La Quinta Channel from OxyChem's 001 Outfall. The following bulleted list describes each of the six cases that were simulated using CORMIX2;

- Case 1 – represents a summer time unstratified condition with a minimal difference between the effluent and the receiving water and the maximum permitted effluent flow of 1,555 gpm.
- Case 2 – represents a summer time unstratified condition with a maximum difference between the effluent and receiving water and the maximum permitted effluent flow of 1,555 gpm.
- Case 3 – represents a winter time unstratified condition with a slightly negative buoyancy effluent and the maximum permitted effluent flow of 1,555 gpm.
- Case 4 – represents a winter time unstratified condition with a moderately positive buoyancy effluent and the maximum permitted effluent flow of 1,555 gpm.
- Case 5 – same as Case 1 with a demonstrated average effluent flow of 840 gpm.
- Case 6 – represents a typical stratified condition with a demonstrated average effluent flow of 840 gpm.

Mixing zone dimensions for equivalent mixing zone size.

Mixing Zone	Dimensions
50-foot equivalent	X = 11.2 m; Y = 16.2 m
200-foot equivalent	X = 51.6 m; Y = 56.6 m
400-foot equivalent	X = 105.6 m; Y = 110.6 m

CORMIX predicted dilutions for each of three sizes of mixing zone.

CORMIX Results Using an Ambient Velocity of 0.05 m/sec	% $C_{Init.}$ 50-Foot Equivalent (11.2 m)	% $C_{Init.}$ 200-Foot Equivalent (51.6 m)	% $C_{Init.}$ 400-Foot Equivalent (105.6 m)
Case 1	2.74	2.21	1.94
Case 2	1.73	1.32	1.19
Case 3 (Worst Case)	**5.55**	3.10	2.60
Case 4	1.77	1.39	1.25
Case 5	1.58	1.29	1.14
Case 6	5.22	4.16	3.62

As indicated above, modeling revealed the diffuser reduces the effluent concentration to 5.55% of the initial discharge concentration within 50 feet of the diffuser. Given the low concentrations of contaminants in the combined wastewater outfall which is well below the effluent limits (considered to be protective of marine organisms), the additional wastewater discharge is expected to have no effect on marine species such as sea turtles, whales, and the West Indian manatee.

The effluent limits for the existing wastewater discharge establish a requirement to maintain the pH of the effluent between 6.0 and 9.0 and these pH limits will apply to the combined effluents with the Ethylene plant effluent included. The 2012 analytical data indicates that the average pH values range between 6.8 and 7.2. Similar performance is anticipated for the wastewater treatment system with the additional effluent added from the Ethane Cracker Facility process.

Uncontaminated stormwater from the site will be segregated from contaminated stormwater. Uncontaminated stormwater will be routed through earthen trenches and discharged in accordance with standards established via TPDES permitting. The trenches will direct stormwater to an existing stormwater outfall. The outfall structure has gates to contain the stormwater until analysis can be conducted to ensure the stormwater meets the TPDES permit limitations. Water discharges are monitored for several water quality parameters and outfall discharges into La Quinta Channel will meet state water quality standards, thereby avoiding degradation of water quality in waters potentially used by T&E and protected species. The use of the existing outfall structures also eliminates the need for new outfall structures along the Ethane Cracker Site shoreline, thereby avoiding impacts to EFH and marine species habitat.

3.6.2 Thermal Discharge

There is no thermal water discharge associated with the Project. Therefore, there will be no impacts to sea turtles or the West Indian manatee from thermal water discharges.

4.0 EFFECTS OF ACTION

4.1 Gulf Coast jaguarundi (*Herpailurus yaguarondi cacomitli*)

The Gulf Coast jaguarundi (*Herpailurus yaguarondi cacomitli*), referred to as jaguarundi, is a medium- to small-sized member of the Felidae (cat) family. The jaguarundi is often a dark greyish color, but some individuals have a reddish hue. This carnivore is often confused with members of the weasel (Mustelidae) family due to their elongated body, short limbs, coloration, and rounded ears. It is slightly similar in size to a bobcat (*Lynx rufus*). The jaguarundi was first listed as endangered in 1976 under the protection of the ESA (USFWS 2012b) and remains listed as endangered under the ESA (USFWS 2012a).

4.1.1 Distribution

In the US, the jaguarundi is only known to occur in Texas and Arizona. Due to a paucity of documentation, the range and distribution of the jaguarundi is not well known (Rick 2004). The last documented record of this species in Texas was three individuals in the Aransas National Wildlife Refuge (ANWR) in 1992 (Aransas County) (TPWD and TXNDD 2013). Prior to the 1992 sighting, the species was recorded in 1969 in Willacy County (TPWD 2013c).

4.1.2 Endangerment Factors

The primary limiting factors for jaguarundi populations are current low population levels, habitat loss, habitat conversion, and habitat fragmentation (USFWS 1990a).

4.1.3 Life History Requirements

Little data is available detailing the life history of the jaguarundi. The gestation period is approximately 2.5 months. In Texas, jaguarundi can have two litters per year, one in March and one in August (TPWD 2013c). It is unknown how long kittens stay with the mother, but likely much of jaguarundi life history is somewhat analogous to the ocelot's. Females reach sexual maturity at age two or three. No conclusive home range size has been identified, but ranges of 2.5 to 40 square miles (1,600 to 26,000 acres) have been observed (Rick 2004).

The jaguarundi uses a variety of habitats in its entire range and is known to inhabit deciduous forests, rainforests, chaparral, thickets, and shrublands. In Texas, the preferred habitat is thick brushlands, typically near water sources (TPWD 2013c). Typical prey species include lizards, birds, and small mammals (Rick 2004).

4.1.4 Field Survey Results

Field surveys revealed the lack of presence of preferred habitat for jaguarundi. No deciduous forests, rainforests, chaparral, or thickets were present in the Project Action Area. In Texas, the preferred habitat is thick brushlands, typically near water sources (TPWD 2013c). Scrub-shrub habitat was present primarily in the MEP Corridor, with a small portion present in the SPP Corridor and Ethane Cracker portions of the Project Action Area. Although scrub-shrub habitat was present, shrubs were low in density and the habitat was fragmented by existing maintained ROWs and other mowed herbaceous corridors alongside fences, farm roads, and other corridors. Additionally, in other areas of the MEP Corridor, scrub-shrub habitat was fragmented by major highways as well as the CIG 804 Heliport and the Ineos Nitriles Plant. The Nitriles Plant is active and contains several maintained roads and mowed areas. Throughout Aransas, Calhoun, Refugio, and San Patricio Counties, there were several small patches of scrub-shrub

habitat. However, they were comprised of low density shrub vegetation and typically were surrounded by land uses conducive to frequent disturbance such as cropland, pastureland, highways, and other maintained features.

4.1.5 Impact Analysis

The Project Action Area does not contain deciduous forests, rainforests, chaparral, or thickets which are preferred habitat of jaguarundi. Although scrub-shrub habitat is present, in Texas, the preferred habitat is thick brushlands, typically near water sources (TPWD 2013c). The scrub-shrub habitat in the Project Action Area is suboptimal habitat for this species due to its low density and fragmented and patchy nature, the majority of which is not near water sources. While there is scrub-shrub habitat along Copano Creek where the MEP Corridor crosses, it is not thick and the vegetation is cleared where previous pipelines cross the creek, making it less preferred as a travel corridor for the jaguarundi.

Per TXNDD (TPWD and TXNDD 2013), in 1992, the last documented record of jaguarundi in Texas occurred at ANWR. The MEP Corridor is closest to the ANWR at approximately MP 36, putting the MEP Corridor approximately 5.75 miles northwest of ANWR at its closest point. Willow Creek is crossed at MP 40 and eventually joins Salt Creek, which enters ANWR. However, the scrub-shrub vegetation along the path of these streams is not dense and crosses disturbed areas, including Farm to Market (FM) Road 774, making it unlikely that the jaguarundi, which prefers thick scrub-shrub habitat and undisturbed areas, would use this as a travel corridor to travel from ANWR to less optimal habitat outside the refuge.

Although the scrub-shrub habitat in the MEP Corridor is fragmented and patchy, to avoid further fragmenting this habitat, the MEP Corridor primarily follows existing pipelines, such that impacts to scrub-shrub habitat are only to the edges of the habitat already adjacent to disturbed areas. Additionally, co-locating the pipeline will accommodate use of previously disturbed areas during pipeline installation, which minimizes the footprint necessary for installation and thereby minimizes disturbance to adjacent undisturbed habitats such as scrub-shrub.

Impacts to the suboptimal scrub-shrub habitat will comprise of 67.64 acres of permanent impacts which involve conversion of the habitat from scrub-shrub to maintained herbaceous habitat. The remaining 185.98 acres of impacts will be temporary in nature as the areas will be allowed to revegetate to a scrub-shrub state.

Due to the low likelihood of presence of jaguarundi in the Project Action Area vicinity as well as the suboptimal habitat within the Project Action Area, it is highly unlikely this species will be affected by the project.

Although it is highly unlikely jaguarundi would use the scrub-shrub habitat within the Project Action Area, per USFWS' request during the February 11, 2013 pre-application meeting, in the event lighting is used during pipeline construction, it will be directed away from any brush that might be used as a travel corridor (vegetation along creeks or riparian areas) by the jaguarundi. Additionally, per USFWS' request during the November 22, 2013 coordination meeting, environmental training for workers will include instructions to use slow speed when operating vehicles and equipment in the ROW to avoid the potential for collision with a jaguarundi which might travel through the area.

4.1.6 Preliminary Determination

Based on the above analysis and proposed conservation measures, implementation of the proposed Project **may affect but is not likely to adversely affect** the **Gulf Coast jaguarundi**.

4.2 Ocelot (*Leopardus pardalis*)

The ocelot (*Leopardus pardalis*) is a medium-sized member of the Felidae family. Ocelots are typically yellow to brown in color with black spots on their body and two black stripes on each cheek. These carnivores are distinctly characterized by rounded ears and a banded tail (Kittel 2011). The ocelot, which includes the subspecies *Leopardus pardalis albescens* and *Leopardus pardalis sonoriensis*, was first listed as endangered in 1972 under the protection of the ESA (USFWS 2012c). The ocelot remains listed as endangered under the ESA (USFWS 2012a).

4.2.1 Distribution

The Project Action Area is located within the range of the *Leopardus pardalis albescens* subspecies (USFWS 2012c). However, in Texas, the ocelot is only known to occur in Laguna Acosta National Wildlife Refuge (LANWR) in Cameron County and on some private lands in Willacy and Kenedy Counties. The LANWR and Willacy/Kenedy County populations are two distinct subpopulations that are separated by more than 15 miles. These populations are primarily restricted to the remnant fragments of thornscrub habitats. There is no new evidence suggesting there are breeding populations of ocelot anywhere else in Texas (TPWD 2013d).

4.2.2 Endangerment Factors

The primary limiting factors for ocelot populations are current low population levels, as well as habitat loss, conversion of habitat, and fragmentation. In this region of Texas, conversion of scrublands to agriculture has forced the ocelot into small, compartmentalized habitats of scrubland, which resulted in a loss of genetic diversity and poses a serious threat to this species (USFWS 2010b).

4.2.3 Life History Requirements

As a fairly unstudied animal, little data is available detailing the life history of wild ocelots. Most data is from captive members of the species. Breeding season in Texas is in late summer and autumn, and gestation is approximately two and one half months and typically results in one or two kittens. Kittens will often disperse after their first year, but have been known to stay with their mother for their first three years (USFWS 2010b). The ocelot reaches sexual maturity in their second year in most cases (USFWS 2010b). Home range depends on habitat quality, but is estimated to be between 0.75 and 12 square miles (480 and 7,680 acres) (Kittel 2011).

The ocelot will use a variety of habitats, however in coastal Texas there is evidence of a preference for thornscrub communities. These thornscrub communities often have a dense canopy (greater than 75%) and a very thick shrub layer (approaching 100% coverage) (USFWS 2010b), and are characterized by many plant species. Such plant species include: creosote bush (*Larrea tridentata*), lecheguilla (*Agave lecheguilla*), Wright's beebrush (*Aloysia wrightii*), yerba de pasmo (*Baccharis pteronioides*), green sotol (*Dasylirion leiophyllum*), American tarwort (*Flourensia cernua*), ocotillo (*Fouquieria splendens*), crown of thorns (*Koeberlinia spinosa*), littleleaf ratany (*Krameria erecta*), Big Bend barometerbush (*Leucophyllum minus*), catclaw mimosa (*Mimosa aculeaticarpa* var. *biuncifera*), Rio Grande saddlebush (*Mortonia scabrella*),

cactus apple (*Opuntia engelmannii*), mariola (*Parthenium incanum*), honey mesquite (*Prosopis glandulosa*), and littleleaf sumac (*Rhus microphylla*) (NatureServe 2009). Typical prey species include lizards, birds, and small mammals.

4.2.4 Field Survey Results

Scrub-shrub habitat was present primarily in the MEP Corridor, with a small portion present in the SPP Corridor and Ethane Cracker portions of the Project Action Area. Although scrub-shrub habitat was present, no dense canopy was present and the shrub layer was low in density. The scrub-shrub habitat was predominantly fragmented with existing maintained ROWs and other mowed herbaceous corridors alongside fences, farm roads, and other corridors. Additionally, in other areas of the MEP Corridor, it was fragmented by major highways as well as the CIG 804 Heliport and the Ineos Nitriles Plant. The Plant is active and contains several maintained roads and mowed areas. Throughout Aransas, Calhoun, Refugio, and San Patricio Counties, there were several small patches of scrub-shrub habitat. However, they were comprised of low density shrub vegetation and typically surrounded by cropland, pastureland, highways, and other maintained features. The ocelot is intolerant of such disturbances.

4.2.5 Impact Analysis

Scrub-shrub habitat exists predominantly within the MEP Corridor and is present in a nominal segment of the SPP Corridor (between MPs 1.75 – 2.75). Overall, the habitat does not provide the scrub-shrub density (100%) considered optimal for use by ocelots. In most areas, it is fragmented by pastureland or cropland.

Between MPs 26.5 – 44 of the MEP Corridor, the scrub-shrub habitat is somewhat more contiguous with little or no pastureland or cropland fragmentation. However, the habitat is disturbed/fragmented by well-maintained roads, dirt roads, prominent pipeline ROWs, and other mowed paths that parallel and cross the MEP Corridor. Although the density of the shrub layer varies, it is well below 100% density and would not be suitable for use by ocelots. Due to the disturbance and low density, this portion of scrub-shrub vegetation represents suboptimal habitat for the ocelot.

The scrub-shrub habitat on the Ethane Cracker Facility Site is small and patchy which makes it inadequate to support the ocelot, especially due to the ocelot's sensitivity to disturbance from human activities. The patchy nature of the scrub-shrub habitat is due to being isolated by surrounding commercial/industrial, pastureland, and agricultural lands. Overall, the habitat does not have the core density or size necessary to support the ocelot. This species is vulnerable due to its sensitivity from disturbance by human activities. Given the proximity of the cropland and pastureland and fragmentation, this portion of scrub-shrub habitat would not be suitable for the ocelot.

Given the suboptimal quality and isolated nature of the scrub-shrub habitat within the Project Action Area, and its distance from known locations of ocelot populations, it is highly unlikely ocelots would use the scrub-shrub habitat within or adjacent to the Project area. The ocelot's largest documented home range is 12 square miles. An ocelot from one of the known populations (LANWR, Cameron County and on some private lands in Willacy and Kenedy Counties) in search of a new home range would likely not travel the distance (approximately 100 miles to the southern end of the Project Action Area) necessary to reach suboptimal habitat (low density shrub, isolated, fragmented, and surrounded by human activity) in the Project Action Area. As such, it is highly unlikely the Project would affect this species.

Although it is highly unlikely ocelot would use the scrub-shrub habitat within the Project Action Area, per USFWS' request during the February 11, 2013 pre-application meeting, in the event lighting is used during pipeline construction, it will be directed away from any brush that might be used as a travel corridor (vegetation along creeks or riparian areas) by the ocelot. Additionally, per USFWS' request during the November 22, 2013 coordination meeting, environmental training for workers will include instructions to use slow speed when operating vehicles and equipment in the ROW to avoid the potential for collision with an ocelot which might travel through the area.

4.2.6 Preliminary Determination

Based on the above analysis and proposed conservation measures, implementation of the proposed Project **may affect but is not likely to adversely affect** the **ocelot**.

4.3 Red wolf (*Canis lupus rufus*)

The red wolf (*Canis lupus rufus*) is a medium- to large-sized member of the Canidae (dog) family. The red wolf has dark brown coloration on its back with reddish coloration on its legs and face. This carnivore can be confused with the coyote (*Canis latrans*) because of its similar size and coloration (USFWS 1989). The red wolf is larger than the coyote, but smaller than the grey wolf (*Canis lupus*). The red wolf was first listed as endangered in 1967 under the protection of the ESA (USFWS 2012d). It remains listed as endangered under the ESA (TPWD 2013a).

4.3.1 Distribution

In the US, the red wolf is only known to occur in Florida and the Carolinas. There are also experimental populations in North Carolina and Tennessee (USFWS 2012d). The red wolf was accepted as extinct in the wild (EW) in 1980, but experimental populations were placed in the Smoky Mountains region of Tennessee and North Carolina that have been moderately successful since. The TXNDD has no record of the red wolf in Texas (TPWD 2013a).

4.3.2 Endangerment Factors

The primary limiting factors for red wolf populations are current low population levels, habitat conversion, habitat fragmentation, and permanent loss of habitat. The species was also hunted heavily during the early settlement of the US. It is also probable that the overhunting of white tailed deer (*Odocoileus virginianus*) in the early 1900s caused issues for red wolf. Large populations of coyote will out-compete red wolf populations, but small to medium populations do not seem to threaten these populations (USFWS 1989).

4.3.3 Life History Requirements

The red wolf is a pack animal. Only the dominant female and male of the pack are capable of breeding. Other adult members of the pack assist in raising pups. Breeding season is late winter and early spring (January to March). The gestation period is approximately two months, typically three to six pups are born, however, a litter can include up to 12 individuals. Young are typically raised for the first year and become fully functioning members of their parents' pack thereafter.

The red wolf uses vast habitat sizes of at least 170,000-acres (265 square miles) (USFWS 1989). Types of habitat include lowland forests, wetlands, and mountains. Prey species include deer, raccoon (*Procyon lotor*), rodents, and small mammals (Mulheisen and Csomos 2001)

4.3.4 Field Survey Results

Typical habitat used by red wolf includes lowland forests and mountains, none of which were located in the Project Action Area. Wetland habitats are also typicallyused by the red wolf and are present in the MEP Corridor. However, the wetlands are primarily surrounded by pastureland or croplands and are not of the size necessary to support the red wolf. Small patchy forested areas exist along the MEP Corridor, however, none of these are large enough to support the red wolf.

4.3.5 Impact Analysis

The red wolf is considered extirpated from Texas. No recent records of red wolf are known in Texas. The last known red wolves in Texas were removed from the wild and sent to zoos in an effort to save the species from extinction (USFWS 2012d). Due to the lack of habitat within the Project Action Area and its removal from the wild, it is highly unlikely that the red wolf occurs in or near the Project Action Area or would be affected by the Project.

4.3.6 Preliminary Determination

Based on the above analysis and that there are no known red wolves in the wild in Texas, implementation of the proposed Project will have **no effect** on the **red wolf**.

4.4 West Indian manatee (*Trichechus manatus*)

The West Indian manatee (*Trichechus manatus*), also known as a sea cow, is a large water-dwelling mammal in the Trichechidae (manatee) family and in the Sirenia (manatee and dugong) order. This species is grey in color with short, round flippers and a paddle-shaped tail. Adults are approximately nine feet long and weigh up to 2,000 pounds. These herbivores have a whiskered muzzle and might have barnacles or algae on their bodies. The West Indian manatee was first listed as endangered in 1967 under the protection of the ESA (USFWS 2012e), and remains listed as endangered under the ESA (USFWS 2012a).

4.4.1 Distribution

In the US, the manatee is only known to occur in coastal zones along the Gulf of Mexico and Atlantic Ocean, from Texas to North Carolina. The TXNDD has one record of manatees in Corpus Christi Bay documenting three observations in 2001, 2006, and 2011 (TPWD 2013b). Since 1980, only about 10 manatees have been rescued by the Texas Marine Mammal Stranding Network (TMMSN 2012). Experts at Florida Fish and Wildlife Conservation Commission (FFWCC 2012) indicate manatee sightings are rare in Texas.

4.4.2 Endangerment Factors

The primary limiting factors for manatee populations are loss of habitat, degradation of water quality (older and juvenile manatees susceptible to red tide which results in mortality), and boat strikes (USFWS 2001).

4.4.3 Life History Requirements

The manatee is a very solitary animal for most of its life, but herds (up to 20 individuals) are witnessed when males begin to follow a female in estrous. Females reach sexual maturity around five years and males mature around nine years. Breeding season is late winter and early spring (January to March). The gestation period is approximately one year. Young are raised for the first two years. Migration regions are mostly contained to the coast of the US. In summer months the manatee can be seen as far north as Virginia and in winter they congregate mostly around Florida estuaries and warm-water refugia (e.g., at Power Plants which use water to cool generators). The species rarely ventures farther west than Louisiana. It is an aquatic herbivore and retains characteristics of terrestrial herbivores (low metabolic rate, inefficient digestion systems, and low-nutrient foods). The manatee is a grazer and spends much of its time (6–8 hours a day) grazing sea grasses from the sea floor (Edwards 2000).

The West Indian manatee has a fairly large but stable habitat range. Individuals can be found in shallow rivers, estuaries, and canals as well as the shallow regions of the sea coast. Inland rivers must be at least 3.5 feet deep to accommodate these large mammals. The species is not often found outside of the littoral zone (i.e., the shallow portions of oceans to a depth of 20 feet) (USFWS 2001).

4.4.4 Field Survey Results

Potential West Indian manatee habitat within the Project Action Area includes estuarine river/stream complexes traversable by manatees. The MEP Corridor traverses several large streams, rivers, and lake systems close to the coast. Chiltipin Creek and the Aransas River are found between MPs 14 – 16; Mission River and Melon Creek are found between MPs 22 – 24.5; the Guadalupe River, Hog Bayou, Victoria Barge Canal, and Jones Bayou are found between MPs 53 – 58; Placedo Creek is crossed between MPs 72.5 – 73; Garcitas Creek is found between MPs 75 – 76; and finally Venado Lakes and the Lavaca River are found between MPs 79.5 – 81.5.

4.4.5 Previous Agency Coordination

Although the likelihood of a manatee using the near shore waters of the Project is very low based on Florida Fish and Wildlife Conservation Commission (FFWCC) telemetry data; an occasional male manatee might stray from the Florida coast to the Texas coast and inland bays (personal communication with Mary Duncan, FFWCC 2012).

4.4.6 Impact Analysis

Habitat – The MEP Corridor traverses estuarine areas as mentioned above (Section 4.5.4). Estuarine waterbodies that are potentially traversable by West Indian manatee crossed by the MEP Pipeline include: Chiltipin Creek, the Aransas River, Mission River, Melon Creek, Guadalupe River, Hog Bayou, Victoria Barge Canal, Jones Bayou, Placedo Creek, Garcitas Creek, Venado Lakes, and the Lavaca River. OxyChem will use HDD technology to traverse all of these perennial estuarine waterbodies along the MEP route to avoid impacts to estuarine areas and coastal streams and rivers, thereby avoiding potential direct impacts to the West Indian manatee habitat.

Water Quality (Chemical) – To ensure the Project does not adversely affect the quality of waters potentially used by the West Indian manatee, wastewater generated from the new upland Ethane Cracker Facility will be treated prior to its discharge into the La Quinta Channel

adjoining Corpus Christi Bay. As indicated in Section 3.6 of this BA, the levels of contaminant discharged from the existing wastewater outfall/diffuser will be well below the level authorized by the existing TPDES Permit (already considered to be protective of marine organisms in accordance with Texas Surface Water Quality Standards for Marine Aquatic Life [30 TAC 307]). As such, discharges associated with the proposed Project will not adversely affect the West Indian Manatee.

In addition to the previously-mentioned actions to avoid and minimize impacts to the West Indian manatee or its habitat, OxyChem will use water obtained from existing sources and transported to the MEP Corridor for hydrostatic testing of pipelines. Operational test waters will also be obtained from existing sources. OxyChem does not anticipate that surface water withdrawals will be necessary, thereby avoiding impacts to surface waters potentially used by West Indian manatee. Temporary use waters will be treated prior to outfall to La Quinta Channel/Corpus Christi Bay as described in Section 3.6 of this BA.

Water Quality (Thermal) – There is no thermal water discharge associated with the Project and therefore manatees will not be adversely affected by thermal water discharges. However, it should be noted that although thermal water discharges are artificial, West Indian manatees significantly benefit from such warm water discharges as is evident by the large congregations of manatees at the warm water discharges at power plants during the winter months in Florida (FFWCC 2012).

In summary, although the likelihood of a West Indian manatee using the near shore waters of the Project site is low given past records of manatee sightings (TXNDD data) and manatee telemetry data from Florida Fish and Wildlife Conservation Commission (FFWCC 2012), all perennial estuarine waterbodies potentially traversable by West Indian manatee along the MEP route will be crossed by HDD to avoid direct impact to potential habitat of this species. Additionally, the aforementioned actions will be taken to further avoid or minimize potential impacts to this species. Therefore, the Project is not expected to adversely affect the West Indian manatee.

4.4.7 Preliminary Determination

Based on the above analysis, implementation of the proposed the proposed Project will have **no effect** on the **West Indian manatee**.

4.5 Mammals – Whales

Based on the NOAA-NMFS range maps for whales protected under the ESA, the blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), sei whale (*Balaenoptera borealis*), and sperm whale (*Physeter macrocephalus*) have the potential to occur in Gulf of Mexico waters (NMFS 2013a). These whales have been classified as endangered since the passage of the ESA in 1973, and remain so today throughout their ranges (which include the Gulf of Mexico).

4.5.1 Distribution

The blue whale is found worldwide, from sub-polar to sub-tropical latitudes. Although the species is often found in coastal waters, blue whales are thought to occur generally more offshore than other whales (NMFS 2013b). The fin whale is found in deep, offshore waters of all major oceans, primarily in temperate to polar latitudes, and less commonly in the tropics (NMFS 2013c). The humpback whale occurs in all the world's oceans. In winter, humpback whales

seek out waters near coastal areas and islands in temperate and tropical areas (NMFS 2013d). The sei whale prefers subtropical to subpolar waters on the continental shelf edge and slope worldwide. It is usually observed in deeper waters of oceanic areas far from the coastline (NMFS 2013e). The sperm whale tends to inhabit areas with a water depth of 1,968 feet or more, and is uncommon in waters less than 984 feet deep (NMFS 2013f).

4.5.2 Endangerment Factors

Current threats/endangerment factors to blue, fin, humpback, sei, and sperm whales include vessel strikes, fisheries interactions (e.g., entanglement in fishing gear, reduced prey abundance due to overfishing), and to a lesser extent, anthropogenic noise, habitat degradation (pollution), and vessel disturbance (NMFS 2013b, NMFS 2013c, NMFS 2013d, NMFS 2013e, NMFS 2013f).

4.5.3 Life History Requirements

The blue, fin, humpback, and sei whales are species of baleen whales, whereas the sperm whale is a toothed whale. The preferred diet of blue whales is krill (NMFS 2013b). Fin and sei whales feed on krill, small schooling fish, and squid (NMFS 2013c and NMFS 2013d). Humpback whales filter feed on krill, plankton, and small fish (NMFS 2013e). Feeding grounds for baleen whales tend to be in cold productive coastal waters during the summer months. Sperm whales spend most of their time in deep water and feed on larger organisms that also occupy deep waters of the ocean such as large squid (principle prey), sharks, skates, and fishes (NMFS 2013f).

Gestation periods for these whales vary (blue whale – 10-12 months, fin whale – 11-12 months, humpback whale – 11 months, sei whale – 11-13 months, and sperm whales – 14-16 months). Breeding usually occurs once every two to three years. Age at sexual maturity varies between whale species with 5-15 years of age for blue whales, 6-12 years of age for fin whales, 6-10 years of age for humpback whales, 6-12 years of age for sei whales, and 10-20 years of age for sperm whales (NMFS 2013b, NMFS 2013c, NMFS 2013d, NMFS 2013e, NMFS 2013f).

4.5.4 Field Survey Results

The pipeline Project is inland and waterways traversed by the Project are too shallow to support habitat for blue, fin, humpback, sei, and sperm whales.

4.5.5 Impact Analysis

Habitat – Because the waters traversed by the pipeline Project and those adjacent to the existing stormwater and wastewater discharge locations are shallow, they do not provide habitat for any of the ESA listed whale species.

Water Quality (Chemical) – To ensure the Project does not contribute to pollutants in La Quinta Channel/Corpus Christi Bay which adjoins the Gulf of Mexico and potential whale habitat, wastewater generated from the new upland Ethane Cracker Facility will be treated prior to its discharge. As indicated in Section 3.6 of this BA, the levels of contaminant discharged from the existing wastewater outfall/diffuser will be well below the level authorized by the existing TPDES Permit (already considered to be protective of marine organisms in accordance with Texas Surface Water Quality Standards for Marine Aquatic Life [30 TAC 307]). The existing discharge of wastewater is also subject to permit requirements for acute and chronic biomonitoring to demonstrate that the wastewater discharge is not toxic to marine organisms.

This testing is done in accordance with the most recent version of EPA toxicity test procedures "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms" (EPA-821-R-02-014) and "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA-821-R-02-012). Historical results from this testing have consistently demonstrated that the effluent is not toxic to marine organisms and this requirement will remain in effect for future effluent discharges. As such, the discharge associated with the Ethane Cracker Facility will not result in impacts to whales.

4.5.6 Preliminary Determination

Based on the above analysis, implementation of the proposed Project will have **no effect** on the **blue, fin, humpback, sei, or sperm whale**.

4.6 Attwater's prairie chicken (*Tympanuchus cupido attwateri*)

The Attwater's prairie chicken (*Tympanuchus cupido attwateri*) is a subspecies of the greater prairie chicken (*T. cupido*) and is a small member of the Phasianidae (pheasants, turkeys, grouse, and partridges) family. This bird is brown and white banded with a short, rounded dark tail. Males have large orange air sacs on either side of their necks (TPWD 2013e). The air sacs are typically covered by pinnae feathers when the males are not displaying. The Attwater's prairie chicken was first listed as endangered in 1967 under the protection of the ESA (USFWS 2012f) and remains listed as endangered under the ESA (USFWS 2012a).

4.6.1 Distribution

The Attwater's prairie chicken (APC) can only be found in Texas on coastal prairies (TPWD 2013e). Historically, this subspecies ranged approximately from Brownsville, Texas to southeastern Louisiana. However, it was extirpated from Louisiana in 1919 (USFWS 2010c).

This prairie chicken is only found in the wild at three locations: the APC National Wildlife Refuge (APCNWR) in Colorado County, Texas; the Nature Conservancy's Texas City Prairie Preserve (TCPP) in Galveston County; and a private ranch in Goliad County, Texas (USFWS 2010c). In addition, individuals are held in captivity for breeding and release of captive-reared birds into presently unoccupied but suitable habitat.

The Coastal Prairie Conservation Initiative (CPCI) was created to restore native prairie grasslands within the APC former range. The CPCI partnership involves implementation of Safe Harbor Agreements to promote voluntary management to restore native prairie grasslands on private property while giving assurances to landowners that no additional future regulatory restrictions will be imposed if these species colonize or increase in numbers as a result of management activities. Approximately 82,681 acres were enrolled under Safe Harbor Agreements for APC management by May of 2009. Landowner assistance agreements have been implemented by TPWD and the Natural Resource Conservation Service (NRCS) for the purpose of restoring coastal prairie habitat within the APC former range. USFWS has designated three priority management zones in which APC restoration (habitat enhancement and release of captive-reared birds) is focused (USFWS 2010c). The three priority management zones for the APC include: approximately 2,396 acres in the Texas City Prairie Preserve (TCPP); 10,538 acres in Austin and Colorado Counties (containing APCNWR); and 663,670 acres in Refugio and Goliad Counties (USFWS 2010c).

4.6.2 Endangerment Factors

The susceptibility of the lower Texas coast and Rio Grande River plain to severe droughts has limited the establishment of long-term populations of APC south of the Nueces River (USFWS 2010c). The northern distribution is limited by the northern edge of coastal prairie. The primary cause for decline of this bird is the loss of prairie grassland habitat due to destruction and degradation. To a lesser extent, overharvesting also contributed to the decline of this subspecies. Current threats include small populations, genetic isolation due to habitat and population fragmentation, disease and parasites, poor brood survival in wild populations, and low numbers of captive-reared birds that are capable of survival and reproduction in wild populations. Without intensive management, APC populations have a high probability of going extinct if there are less than 250 males for three successive years (USFWS 2010c).

4.6.3 Life History Requirements

The APC uses lekking behavior for its breeding strategy. Males gather on a lek to display and attract females. A prairie chicken lek is colloquially called a "booming ground" due to the "booming" noises produced as the males inflate the air sacs on their necks. Booming grounds form a vital focal point for the ecology of this subspecies. This is where all breeding occurs and most of the life history of this bird occurs within a mile (1.6 kilometers [km]) of its lek (USFWS 2010c). Booming grounds vary from 0.13 acres (0.05 ha) to several acres and can occur naturally in short grass clearings or can occur in artificial areas such as roads, oil well pads, drainage ditches, and airport runways. Artificial areas (including roads and pipeline rights-of-way) sometimes produce less stable booming grounds than ancestral booming grounds (USFWS 2010c).

Males gather on booming grounds in the early morning and late evening to defend their individual territories within the lek. Booming grounds can contain between three to 40 males, with an average of six to 15. Males increase their attendance and intensity of lek territory defense in late January or early February. Peak courtship activity occurs late February to March and the peak displaying period lasts about three weeks. Most booming activity ends by the third week in May (USFWS 2010c). The largest groups of females can be seen a few days before the peak breeding season and booming efforts increase with females present. Copulations start in late February, peak in early March, and decline through April and early May. A secondary peak in breeding activity can occur in April when females attempt to re-nest after failed initial attempts (USFWS 2010c).

Males play no part in incubating the eggs or rearing the chicks. Females usually lay about 12 eggs during the nesting season (TPWD 2013e) with clutches ranging from seven to 16 eggs (USFWS 2010c). Vegetation at nesting sites can vary from region to region, but generally speaking, the APC requires grass and seeks out undisturbed residual grass cover of six inches to 20 inches (15-50 centimeters [cm]) in height. Nests are typically found within one mile (1.6 km) of the booming grounds. Initiation of incubation is estimated to be before March 21 through May 29. Eggs take approximately 26 days to hatch. Nest depredation occurs by skunks (*Mephitis mephitis, Spilogale putorius*), opossum (*Didelphis virginiana*), raccoon, coyote, armadillos (*Dasypus novemcinctus*), domestic dogs (*Canis lupus familiaris*), and cats (*Felis catus*). Nest abandonment can occur due to human disturbance and nest flooding (USFWS 2010c). During the first two to three months after hatching, brood home ranges average 1,205 acres (488 ha) but about 99.8 acres (40.4 ha) of this home range is used intensively. Chicks can remain with the female up until late October or November (USFWS 2010c). APCs live to around two to three years in the wild (TPWD 2013e).

The APC requires tall grass coastal prairies (TPWD 2013e) and large areas of open space (USFWS 2010c). Common grasses in these prairies include little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*) (TPWD 2013e). This subspecies benefits from moderately grazed and burned grassland. The optimum habitat for the APC contains well-drained grassland, some weeds or shrubs and grasses, cover varying in density from light to heavy, and supplies of surface water in the summer (USFWS 2010c). Permanent grassland is especially important for nesting, brood rearing, and year-round night roosting. The minimum size necessary for viable populations of *T. cupido* is highly variable and the literature does not seem to reach a consensus. This bird will occasionally use tree cover for roosting and food, but generally avoids spending much time in woodlands or areas with overhanging cover. Large artificial structures (e.g., roads, buildings, electric transmission lines) near booming grounds (see above) can cause prairie chickens to abandon or move their booming grounds. However, the APC does not avoid areas developed for petroleum production and many booming grounds have been observed at oil/gas well sites (USFWS 2010c). The APC eats small green leaves, seeds, and insects (TPWD 2013e). Native plants are the most important components of the diet, especially plants of the genus *Ruellia* (USFWS 2010c).

4.6.4 Field Survey Results

The SPP Corridor and Ethane Cracker Facility Site are outside of any management zones or known occupied ranges for this species. The MEP Corridor does not traverse through the known occupied ranges of the APC (USFWS 2010c); however, per personal communication with USFWS (USFWS 2013a), and receipt of spatial data from USFWS, the MEP Corridor crosses the APC Refugio-Goliad Priority Management Zone between approximately MPs 23.5 – 57. Much of the rest of the Priority Management Zone crossed by the MEP Corridor is composed of scrub-shrub habitat, with some pastureland, cropland, and wetland at the northwestern corner.

Within Refugio-Goliad Priority Management Zone, the MEP Corridor crosses USFWS-classified "good core area" from approximately MPs 44.5 – 48 (see Figure 4-1). From the field surveys, the land use between MPs 44.5 – 48 is primarily pastureland and maintained herbaceous cover along the existing pipeline ROW paralleled by the MEP Corridor. Dominant plants encountered in and around this area included Bermuda grass, yellow bluestem, bushy seaoxeye, Canada goldenrod, common broomweed, honey mesquite, and huisache. Vegetation is maintained close to the ground in the ROW and a couple of feet tall outside of the ROW.

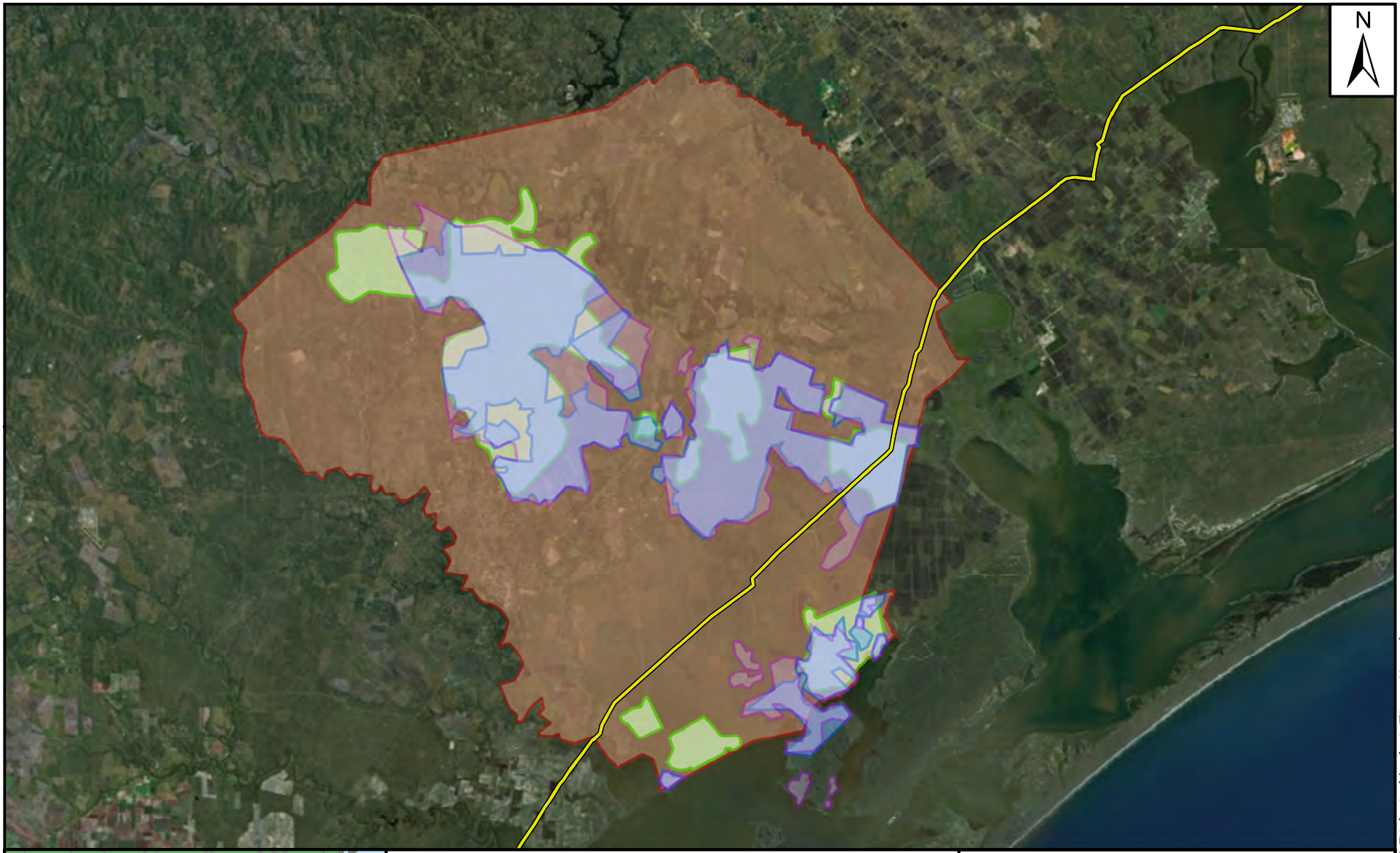
4.6.5 Impact Analysis

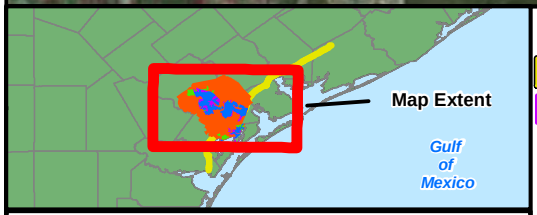
No APCs were encountered during field surveys. The Project Action Area does not traverse known occupied ranges of the APC (USFWS 2010c). However, a portion of the MEP Corridor traverses an APC Priority Management Zone and specifically, "good core area" as identified by USFWS. The presence of invasive Bermuda grass and yellow bluestem indicate that this location is not native prairie. However, per the APC Recovery Plan, USFWS plans on maintaining areas identified as "good core areas" in native vegetation suitable for recovery of APC. Therefore, upon completion of pipeline installation, OxyChem will use a native seed mix suitable for APC to revegetate the permanent and temporary impact areas of the "good core area".

The native seed mix may include, but not be limited to, the following:

- Big bluestem (*Andropogon gerardii*)
- Little bluestem (*Schizachyrium scoparium*)
- Brownseed paspalum (*Paspalum plicatulum*)
- Indiangrass (*Sorghastrum nutans*)
- Bundleflower (*Desmanthus virgatus*)
- Croton (*Croton spp.*)
- Engelmann daisy (*Engelmannia pinnatifida*)
- Gayfeather (*Liatris spp*.)
- Horned beaksedge (*Rhynchospora corniculata*)
- Partridge pea *(Chamaecrista fasciculata)*
- Perennial ragweed (*Ambrosia psilostachya*)
- Ruellia (*Ruellia spp*.)
- Sideoats grama (*Boutleoua curtipendula*)
- Sunflower (*Helianthus spp*.)
- Switchgrass (*Panicum virgatum*)
- Three-Awn (*Aristida spp*.)
- Windmill grass (*Chloris spp*.)

The above-listed native seed mix was created from various sources, including "Restoration Manual for Native Habitats of South Texas" (Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, Undated), "Restoring Native Grasslands" (Hays et al. Undated), "The APC Recovery Plan" (USFWS 2010c), and "Conservation Action Plan for the Refugio-Goliad Prairie Conservation Area" (The Nature Conservancy 2009). In addition to seeding the "good core area" with native seed mix (between approximately MPs 44.5 – 48), this segment of pipeline will not be constructed during the APC breeding season (March 1 through mid-June, USFWS 2013a). Furthermore, post-construction monitoring of seeding in the APC "good core area" will occur to ensure success of these areas.





Source: ESRI World Imagery from ESRI ArcView Data. APC shapefiles from USFWS 3/2013.

LEGEND

- Markham Pipeline
- APC Booming Ground Range 1981
- APC Booming Ground Range 1990
- APC Good Condition Prairie 2008
- Safe Harbor Area

0 5 10 15 20 25 Miles

Scale = 1:500,000

Sheet 1 of 1

Figure 4-1. Attwater's Prairie Chicken Conservation Area Boundary, Historic Booming Grounds, and Good Condition Prairie Adjacent to the Project.

Prepared For: Occidental Chemical Corporation

Prepared By: TETRA TECH

Date: 6/13

P:GIS/Projects/OxyPhaseII/MXD/BiologicalAnalysis/Figure41.mxd

4.6.6 Preliminary Determination

Based on the above analysis and proposed conservation measures, implementation of the proposed Project **may affect but is not likely to adversely affect** the **Attwater's prairie chicken**.

4.7 Bald eagle (*Haliaeetus leucocephalus*)

The bald eagle (*Haliaeetus leucocephalus*) is a large raptor with a wingspread of about five to eight feet. Adults have a dark brown body and wings, white head and tail, and a yellow beak. Juveniles are mostly brown with white mottling on the body, tail, and undersides of wings. Juveniles gradually acquire adult plumage by five years of age (USFWS 2007a).

4.7.1 Distribution

Bald eagles are a North American species that occur throughout the contiguous United States and Alaska. North American breeding populations vary in size with the largest in Alaska and Canada. Significant bald eagle populations also exist in Florida, the Pacific Northwest, the Greater Yellowstone area, the Great Lakes states, and the Chesapeake Bay region. Distribution varies seasonally (USFWS 2007b). Most eagles that breed at northern latitudes migrate southward during winter and conversely, bald eagles that nest in southern latitudes frequently move northward in late spring and early summer.

4.7.2 Endangerment Factors

Historically, the most endangerment factor for the bald eagle was the contamination of its food source, largely as a consequence of organochlorine pesticides (such as DDT) (USFWS 2007b) which impaired egg shell quality and were toxic to embryos. Habitat destruction and degradation also endangered the bald eagle. However, habitat protection afforded by the ESA and the federal government's banning of DDT in 1972 resulted in the recovery of this species. Bald eagles reclaimed their historic range in the late 1990s and their estimated population in the Lower 48 states increased from an estimated 417 pairs in 1963 to 9,789 pairs by 2007 (USFWS 2007c). In response to the recovery of the bald eagle, USFWS removed (delisted) the bald eagle in the lower 48 states from the ESA in 2007 (USFWS 2007c). However, the bald eagle remains protected under the MBTA and BGEPA.

USFWS developed National Bald Eagle Management Guidelines in May of 2007 to avoid and minimize disturbance to eagles from human activities. During the breeding season (October through July in Texas, USFWS 2007a and TPWD 2013f), bald eagles are sensitive to a variety of human activities. However, not all bald eagle pairs react to human activities in the same way. The variability might be related to a number of factors, including visibility, duration, noise levels, extent of the area affected by the activity, prior experiences with humans, and tolerance of individual nesting pair (USFWS 2007a).

4.7.3 Life History Requirements

Bald eagles generally nest near coastlines, rivers, large lakes, or streams that support adequate food supply. They often nest in mature or old-growth trees; dead trees; cliffs; rock promontories; and with increasing frequency on human-made structures such as power poles and communication towers. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds (USFWS 2007a).

Most bald eagles are capable of breeding at four or five years of age, but in healthy populations they may not start breeding until much older (USFWS 2007a). Bald eagle clutch size ranges from one to three eggs (usually two). Egg incubation typically lasts about five weeks and is conducted by both adults of the breeding pair. Juveniles first fly at 10-12.5 weeks. They are cared for by adults and might remain around nest for several weeks after fledging (NatureServe 2013). Bald eagles may live 15 to 25 years in the wild (USFWS 2007a).

Bald eagles are opportunistic feeders with fish comprising much of their diet. They also eat waterfowl, shorebirds/colonial waterbirds, small mammals, turtles, and carrion. Bald eagles will also feed on carcasses along roads, in landfills, and at feedlots (USFWS 2007a). Young eagles are slow to develop hunting skills and congregate together, often feeding upon easily acquired food such as carrion and fish (USFWS 2007a).

4.7.4 Field Survey Results

Prior to field surveys, Brent Ortega, Wildlife Diversity Biologist with TPWD, was contacted (provided a Google Earth kmz file of the proposed Pipeline route) to ascertain the presence of any bald eagle nests in the Project vicinity. Mr. Ortega indicated it has been seven years since TPWD conducted aerial surveys for bald eagle nests. However, based on historic records, he indicated where bald eagle nest tree surveys should be conducted along the MEP route. Specifically, surveying for bald eagle nest trees needed to occur where the proposed MEP traversed the Guadalupe River Floodplain (Calhoun County in the vicinity of MPs 53.5-56.5) and West Carancahua Creek (Jackson County in the vicinity of MP 93.5) (TPWD 2013f).

The MEP survey corridor was specifically surveyed for bald eagle nest trees/structures and bald eagles in the Guadalupe River Floodplain and West Carancahua Creek vicinity. No trees/structures suitable for bald eagle nesting or bald eagles were observed during the field survey.

4.7.5 Impact Analysis

No trees/structures suitable for bald eagle nesting or bald eagles were observed within 660 feet of the Project during the field survey. As such, the Project will not impact bald eagle breeding habitat. Saltmarshes, rivers, and streams traversed by the Project likely provide foraging opportunities for bald eagle. These features will be crossed by use of HDD technology thereby avoiding impacts to bald eagle foraging habitat. If a bald eagle nest is found within 660 feet of a construction area prior to or during construction, Project activities will comply with the USFWS 2007 Bald Eagle Management Guidelines to avoid disturbance or take of bald eagles.

4.7.6 Preliminary Determination

Based on the above analysis, implementation of the proposed Project **will not result in the take** of the **bald eagle**.

4.8 Eskimo curlew (*Numenius borealis*)

The Eskimo curlew (*Numenius borealis*) is a medium-sized bird (12- to 14-inches long) of the Scolopacidae (sandpiper and snipe) family and the Charadriiformes (shorebird) order. This species is characterized by a downward curved bill, yellow belly, dark crown with pale stripe, brown back, “V” shaped markings on its chest and flank, and bluish-gray legs. In 1967, the Eskimo curlew was listed as endangered under the Endangered Species Preservation Act. When the Endangered Species Conservation Act, the predecessor to the ESA, was passed, the

Eskimo curlew was once again listed as endangered. Thereafter, the species was listed as endangered under the ESA in 1973 (Alaska Department of Fish and Game [ADFG] 2012). The Eskimo curlew is also protected by the MBTA.

4.8.1 Distribution

Eskimo curlews are known to nest in the Arctic tundra in Alaska and northwest Canada. Curlews migrate during the spring from wintering grounds on the Pampas grasslands of Argentina, through the North American prairies and Texas (mid-March through mid-April), to their breeding grounds in the arctic tundra (TPWD 2013g). During migration, Eskimo curlews were historically documented in tallgrass prairie from Texas through the Midwest during migration (National Audubon Society, undated). During migration, curlews feed in natural grassland and tundra, burned prairies, meadows, and pastures.

The current population of Eskimo curlew is estimated at less than 50 individuals. The last documented sighting of the Eskimo curlew was in Texas in 1962. There were confirmed sightings of a flock of 23 individuals in Texas in 1981 and a single bird in Nebraska in 1987. People reported sightings of the Eskimo curlew in ANWR (at its closest, the MEP Corridor is approximately 5.75 miles northwest from the ANWR) in 1983 however; the report was not confirmed (ADFG 2012).

4.8.2 Endangerment Factors

Between 1870 and 1890, unrestricted hunting rapidly reduced populations of Eskimo curlew. The birds were hunted for food and killed by the thousands by market hunters. The curlew's lack of fear and habit of traveling in large flocks made it an easy target (TPWD 2013g).

Currently, the main threat to the Eskimo curlew is habitat loss (ADFG 2012). The prairie habitat in central North America has changed due to fire suppression and conversion to agricultural lands. In 1994, only 4% of the prairie habitat on their northern migration route remained. Though its former breeding grounds are relatively undisturbed, they have been taken over by the whimbrel, a larger shorebird, limiting the available breeding habitat. Additionally, the grasslands in its former wintering grounds in South America have largely been converted to tree plantations.

4.8.3 Life History Requirements

Eskimo curlews breed in Alaska and the northern Mackenzie (northwest Canada), on wetlands north of the tree line, in open tundra and on tidal marshes. Preferred breeding habitats are fields, pastures, and the drier parts of salt and brackish marshes, as well as coastal beaches and vegetated dunes (New York State Department of Environmental Conservation [NYDEC] 2012). They construct well-camouflaged nests that are a hollow in the ground lined with leaves or straw. Females lay one clutch per year with typically three to four eggs (brownish-green to blue) per clutch. Eggs hatch in late June and early July. Both parents incubate and rear the young. Eskimo curlew chicks are precocial, capable of leaving the nest shortly after hatching (ADFG 2012).

In early March and April, Eskimo curlews migrate from wintering grounds on the Pampas grasslands of Argentina through the North American prairies to breeding grounds in the Arctic tundra (TPWD 2013g). They return to breeding grounds in February. During migration, Eskimo curlews can be found in tallgrass prairie from Texas through the Midwest during migration (National Audubon Society, undated). During migration, curlews feed in natural grassland and

tundra, burned prairies, meadows, and pastures. They forage for grasshoppers and other insects on the grasslands of the central US and it is thought that they might have specialized in eating the now-extinct Rocky Mountain grasshopper egg cases and emerging nymphs (TPWD 2013g).

4.8.4 Field Survey Results

No Eskimo curlews or their signs were observed during the field survey. Grasslands in the Project Action Area are dominated by invasive Bermuda grass and yellow bluestem. Pastures are present in the Project Action Area, but they are also mostly dominated by Bermuda grass and yellow bluestem. The MEP Corridor also crosses saltmarshes surrounded by croplands at MPs 12 – 13, 13.5 – 14, and 14 – 16. Other saltmarshes are surrounded by thin scrub-shrub (MPs 75 – 76 and 79.5 – 81.5) or disturbed grassland and cropland (MPs 22 – 24.5).

4.8.5 Impact Analysis

The last authenticated Eskimo curlew identified in Texas occurred in 1962 (ADFG 2012). The species is assumed to be extirpated from Texas. The Project Action Area contains nominal migration habitat for the Eskimo curlew as the majority of the Project Action Area has cropland, non-native grasses in the pastureland, and non-native grasslands. Although saltmarshes are present and could potentially be used by migrating Eskimo curlews, OxyChem will use HDD technology to avoid any mudflats or saltmarshes in the Project Action Area. As such, Eskimo curlews are not anticipated to be impacted by the Project.

4.8.6 Preliminary Determination

Based on the above analysis, implementation of the proposed Project will have **no effect** on the **Eskimo curlew**.

4.9 Interior least tern (*Sternula antillarum athalassos*)

The interior least tern (*Sternula antillarum athalassos*) is a subspecies of the endangered least tern (*S. antillarum*) and a small member of the Laridae (gull, tern, and skimmer) family. Interior least terns are fairly monochromatic with grey on the back and wings and white neck and undersurfaces. They have a black cap, nape, and eye stripe, white forehead, yellow bill with a black or brown tip, and yellow to orange legs. They have narrow, pointed wings. Males and females are similar in appearance. Adults are between eight inches to 10 inches in body length and have a 20 inch wingspan (TPWD 2013h). The least tern was first listed as endangered in 1985 under the protection of the ESA (USFWS 2012g). The species remains listed as endangered under the ESA (USFWS 2012a).

4.9.1 Distribution

The interior least tern winters along the Texas, Central American, and South American coasts. It uses the Arkansas, Colorado, Mississippi, Missouri, Red, and Rio Grande River systems for inland breeding (TPWD 2013h). It continues to use these river systems, but it is generally restricted to portions of the rivers with less alteration (USFWS 1990b). In Texas, the interior least tern's breeding distribution is generally restricted to three reservoirs along the Rio Grande, Canadian River, and the Red River (including the Prairie Dog Town Fork in the eastern Panhandle) (TPWD 2013h).

4.9.2 Endangerment Factors

Barren sandbars are the most common nesting habitat of the interior least tern (USFWS 1990b). The interior least tern adapted to natural declines in river flows and summer flow patterns when they were more predictable (TPWD 2013h). However, channelization, construction of reservoirs and pools, and the stabilization of major rivers for navigation, hydropower, irrigation, and flood control have all changed the dynamics of this nesting habitat (USFWS 1990b and TPWD 2013h). Historic flooding helped remove vegetation, providing extra nesting habitat, but many of these sandbars are now unsuitable due to encroachment of vegetation or flooding of nests due to the sandbars being too low (USFWS 1990b and TPWD 2013h). Discharges from dams along these rivers also threaten this bird (TPWD 2013h). In Texas, rivers are highly popular recreational areas and fishing, camping, and all-terrain vehicle use near sandbars threaten nesting terns. Agricultural and irrigational runoff also poses a threat to birds nesting downstream. Such contaminants affect the water quality and prey of the terns. Interior least terns accumulate contaminants known to cause reproductive complications and increased chick mortality in many species of birds. Contaminants such as mercury, selenium, Dichlorodiphenyltrichloroethane (DDT) and its derivatives, and Polychlorinated biphenyl (PCB) have been found at concerning levels in interior least terns, but reproductive difficulties have not been noted (TPWD 2013h). Low water levels in some river channels also cause potential problems as they reduce the bird's food supply and give humans and predators greater access to nests (TPWD 2013h).

4.9.3 Life History Requirements

Interior least terns spend between three and five months at breeding grounds, arriving anywhere from early April to early June. Courtship ensues for two to three weeks (TPWD 2013h). Courtship- including a variety of postures, nest scraping, and copulation- can happen at the nesting site or at a distance from the nesting site. One of the more elaborate courtship displays is the "fish flight" - a display involving aerial pursuit and maneuvers and concluding with the exchange of a fish on the ground between the courting birds (USFWS 1990b). Interior least tern nests are very inconspicuous; they use shallow depressions in gravel, sand, or exposed flats, often with small twigs, stones, or other debris around the nest. These birds are somewhat colonial, with nests as close as 10 feet apart, but typically more than 30 feet apart (USFWS 1990b and TPWD 2013h). Females lay two to three eggs over a period of three to five days in late May. The eggs are pale to olive and speckled or streaked with blue-grey, dark brown, or purple-brown markings (TPWD 2013h). Pink eggs have also been observed, but not frequently (USFWS 1990b). Both sexes are involved with the incubation, which typically lasts 20-25 days. The chicks are precocial (hatched with feathers, open eyes, and quickly able to walk) and wander further from the nest as they mature. They are capable of flight within three weeks, but the parents continue to feed them until both parents and offspring begin migration in August (USFWS 1990b and TPWD 2013h). Least terns will renest until late July if they lose a clutch or brood. Where their ranges overlap, piping plovers (see piping plover life history) are known to nest in close proximity to interior least terns (TPWD 2013h).

For their breeding habitat, interior least terns require bare or sparsely vegetated sand, shell, or gravel beaches, and islands, sandbars, or salt flats associated with rivers and reservoirs. They avoid heavy vegetation and narrow beaches. Favorable nesting habitat includes wide unobstructed river channels with sand and gravel bars or open flats found along lake and reservoir shorelines. Nests are often at higher elevations away from the water's edge as the nests are typically formed when river levels are high. The size of a nesting colony depends on water levels and the extent of the sandbars and beaches. Because of the dynamic nature of the

interior least tern's nesting habitat, terns will move colony sites as necessary (TPWD 2013h). Artificial habitats like sand and gravel pits, as well as dredge islands, have also been used. They are even recorded to occasionally nest on rooftops. In some areas, artificial nesting sites might be the only available nesting habitat (USFWS 1990b).

The feeding habitat of this bird is shallow water with small fish. Shallow water of lakes, ponds, and rivers near the nesting areas are preferred (TPWD 2013h). The interior least tern is primarily piscivorous (feeding on fish), but will also eat crustaceans, insects, mollusks, and segmented worms. These birds are opportunistic feeders and will eat many different small fish within a certain size range. While fishing, the interior least tern will hover and dive over standing and or moving water (USFWS 1990b). Most interior least terns live up to five years, but ages in excess of 20 years have been recorded (USFWS 1990b).

4.9.4 Field Survey Results

The Project Action Area does not traverse the known breeding areas for the interior least tern (reservoirs along the Rio Grande, Canadian River, and the Red River, including the Prairie Dog Town Fork in the eastern Panhandle). The SPP Corridor and Ethane Cracker Facility contain no wetlands (as verified by the USACE). However, the MEP Corridor does traverse coastal wetlands which may be used by interior least tern for foraging during its winter migration along the Texas coast. The wetlands include estuarine areas and salt flats.

4.9.5 Impact Analysis

The MEP Corridor is located within 50 miles of the coast and therefore outside any breeding range for the interior least tern. Although outside the breeding range for this species, the MEP Corridor is located within counties that are considered part of the wintering range of the interior least tern (TPWD 2013h). The estuarine/saltmarsh habitat along the MEP Corridor will be avoided by use of HDD technology, thereby avoiding potential foraging/wintering habitat for this species. The MEP Corridor does not cross any river systems used as nesting grounds for the interior least tern. The Project Action Area at its closest point is approximately 140 miles north and east of the Rio Grande. The middle of the MEP Corridor is approximately 400 miles south and east of the Prairie Dog Town Fork of the Red River and approximately 540 miles south and east of the Canadian River. These rivers are the known nesting sites for this subspecies in Texas (TPWD 2013h). As such, the Project is expected to have no effect on this species.

4.9.6 Preliminary Determination

Based on the above analysis, implementation of the proposed Project will have **no effect on** the **interior least tern**.

4.10 Northern aplomado falcon (*Falco femoralis septentrionalis*)

The northern aplomado falcon (*Falco femoralis septentrionalis*) is a member of the Falconidae (falcon) family. Adults are a blue-grey color with a white neck and upper chest and a reddish lower chest. The bird also has two white stripes on each side of its head, one over and one under the eye. The northern aplomado falcon was first listed as endangered in 1986 under the protection of the ESA (USFWS 2012h). The species remains listed as endangered under the ESA (USFWS 2012a).

4.10.1 Distribution

The northern aplomado falcon is found in Texas, but its complete range extends throughout Central and South America. Historically, the species was found along the southern boundaries of Texas, New Mexico, and Arizona, with a large percentage of nests occurring in the most southern reaches of Texas (USFWS 1990c). This species occurs in three national wildlife refuges: Laguna Acosta, Lower Rio Grande Valley, and Santa Ana. An experimental population also exists in New Mexico with a "non-essential" classification (USFWS 2012h). Per personal communication with USFWS (USFWS 2013a), a release of aplomado falcons was recently conducted in the Laguna, Texas area. USFWS has been observing the birds in Matagorda Island area because the birds tend to nest in tall structures in coastal areas.

4.10.2 Endangerment Factors

The primary limiting factors for northern aplomado falcon populations are conversion and succession of habitat. Channelization of stream beds might have also impacted breeding habitat through drainage of associated wetlands. The conversion of grasslands to agricultural fields has resulted in loss of habitat. Additionally, use of DDT as a pesticide likely historically impacted the bird. Individuals in Mexico displayed heavy levels of DDT contamination in their clutches (USFWS 1990c).

4.10.3 Life History Requirements

In the US, the northern aplomado falcon uses stick nests made by other species. In Central and South America, individuals build nests out of leaves of bromeliads (family Bromeliaceae) (USFWS 1990c). Members of this species breed for life and stay together year-round. Breeding season is spring to early summer (March to June). The average clutch size is two to three eggs. Both parents incubate the eggs, which hatch after about a month. Young fledge around one month later and exhibit nesting behavior after one year (USFWS 2007b).

The preferred habitat for this species is open terrain with sparse roosting trees or shrubs. If these key characteristics are present, northern aplomado falcons are found in a wide variety of habitats (e.g., wooded edges, mature forests, and bordering marsh wetlands). The northern aplomado falcon has a varied diet and will eat small birds, insects, rodents, and reptiles (USFWS 1990c).

4.10.4 Field Survey Results

No roosting trees or shrubs were observed during the field surveys of the Project Action Area. However, foraging habitat is present within the Project Action Area. Such habitat includes croplands (1,177.28 acres) and pastureland (266.14 acres). Other open habitat includes saltmarshes in the MEP Corridor which are surrounded by croplands at MPs 12 – 13, 13.5 – 14, and 14 – 16. Other saltmarshes are surrounded by thin scrub-shrub (MPs 75 – 76 and 79.5 – 81.5) or disturbed grassland and cropland (MPs 22 – 24.5).

4.10.5 Impact Analysis

No northern aplomado falcons were observed during field surveys. Additionally, no roosting trees were observed. TXNDD data indicated no records of the northern aplomado falcon in the Project Action Area (TPWD and TXNDD 2013). Although no records were documented and no birds were observed during the field survey, the agricultural and pastureland land uses and

scrub-shrub and grassland habitat within the Project Action Area could provide potential foraging habitat for the northern aplomado falcon.

Upon completion of installation of the pipelines through potential habitat (scrub-shrub and grassland), the permanent impact areas will be maintained in an herbaceous state which will still provide foraging habitat for northern aplomado falcons. Agricultural and pastureland areas will be allowed to revert to their original condition, as will habitats in the temporary impact areas, resulting in a minor temporal loss of foraging habitat for this species. Once restored to their pre-construction condition, these areas will continue to provide foraging habitat for this species. As such, the Project is not expected to adversely affect this species.

4.10.6 Preliminary Determination

Based on the above analysis, implementation of the proposed Project **may affect but is not likely to adversely affect** the **northern aplomado falcon**.

4.11 Piping plover (*Charadrius melodus*)

The piping plover (*Charadrius melodus*) is a small member of the Charadriiformes (shorebird) order. They are approximately the size of an American robin (*Turdus migratorius*). This species is characterized with beige on its back and top of its head, a white rear, and black tail with a white edge near the end of the tail. In breeding season, the legs and bill of this species are orange and a black band is present around the chest and above the eyes. In winter, the bands recede, the bill fades to black, and the legs become a pale yellow (Vinelli 2000). The piping plover was first listed as threatened in 1985 under the protection of the ESA (USFWS 2012i). The species is listed as threatened throughout its range, except in the Great Lakes region, where it was originally listed as endangered. It remains listed as threatened (endangered in the Great Lakes region) under the ESA (USFWS 2012a).

4.11.1 Distribution

Piping plover are known to occur throughout most of the states between the Rocky Mountains and the Mississippi River (except Missouri), in all of the states bordering the Great Lakes, and all states bordering the Atlantic Ocean and the Gulf of Mexico (except Georgia) (USFWS 2012i). The majority of those states bordering the Gulf of Mexico are wintering habitats for the piping plover (USFWS 2009a).

4.11.2 Endangerment Factors

The primary limiting factor for piping plover populations is development and stabilization of shoreline habitat by humans (TPWD 2011). Recreational vehicles and pedestrian traffic can cause egg and chick mortality directly through nest destruction and indirectly through parental nest abandonment. The USFWS indicates that a variety of human activities are resulting in the exacerbation of natural predation (USFWS 1996).

4.11.3 Life History Requirements

The piping plover breeding season is approximately April through July throughout most of its range. The typical clutch size of four eggs takes approximately a month to incubate before hatching. Both parents will incubate the egg in hour long intervals (Vinelli 2000). Females will abandon their fledglings after two to three weeks but males stay with them until they can fly. Individuals reach sexual maturity in their second year (TPWD 2011).

The piping plover nests in sandy coastal areas above the high tide lines. Individuals are found in a variety of systems, including sparsely vegetated dunes, sandflats, beaches, and blowout areas behind dunes. Feeding areas include almost any coastal wet area (e.g., beaches, mudflats, sandflats, lagoons, and saltmarshes) (USFWS 1996). Wintering individuals in Texas seem to be primarily from the US Great Plains and Prairie Canada populations, though some members of the US Great Lakes region populations are present (USFWS 2009a). The piping plover feeds on mollusks, insects, crustaceans, worms, and beetles (Vinelli 2000).

4.11.4 Field Survey Results

The MEP Corridor crosses estuarine/saltmarshes surrounded by croplands at MPs 12 – 13, 13.5 – 14, and 14 – 16. Other saltmarshes are surrounded by thin scrub shrub (MPs 75 – 76 and 79.5 – 81.5) or disturbed grassland and cropland (MPs 22 – 24.5). There are no beaches or dunes traversed by the MEP Corridor.

4.11.5 Impact Analysis

The piping plover winters along the Texas Gulf Coast and therefore the Project Action Area will not cross or disturb breeding grounds for this species. Although breeding habitat is not present, saltmarshes and associated waterbodies located in the MEP Corridor could be used for foraging by this species. OxyChem will use HDD technology to install the pipeline under these habitats, thereby avoiding impacts to this potential habitat for the piping plover. As such, the Project is not expected to adversely affect the piping plover.

4.11.6 Preliminary Determination

Based on the above analysis, implementation of the proposed Project **may affect but is not likely to adversely affect** the **piping plover**.

4.12 Red knot (*Calidris canutus rufa*)

The red knot (*Calidris canutus rufa*) is one of six subspecies of the red knot (*C. canutus*) and a small member of the Scolopacidae family. Adults are approximately 10 inches in length. During the spring, adults are mottled with grays, black, and light ochre, and have stripes on the crown. The throat, breast, and sides of head are a cinnamon-brown color; there is a dark gray line through the eye; the abdomen and undertail coverts are white; and uppertail coverts are white and barred with black. During the winter, adults are a pale ashy gray above, with feathers on the back narrowly edged with white. Wintering red knots also have white underparts, a lightly streaked and speckled breast, and flanks narrowly barred with gray (USFWS 2013b). The red knot is a candidate for listing as threatened or endangered (USFWS 2013b) as USFWS has yet to determine the listing category.

4.12.1 Distribution

The red knot breeds in the middle and high-Arctic areas of northern Canada and it winters in three main Neotropical regions. Bahía Lomas, Chile, and the north coast of Tierra del Fuego host the largest wintering population. Smaller but still significant populations winter on the coastlines of Bahía San Sebastián and Río Grande in the Province of Tierra del Fuego of Argentina as well as along the coast of Maranhão, Brazil. During migration, Delaware Bay is the most important staging area for this subspecies, but the red knot also appears along the New Jersey, New York, and Massachusetts shorelines (Avery 2011). The historic range of this bird includes Connecticut, Delaware, Florida, Georgia, Louisiana, Maine, Maryland,

Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Rhode Island, South Carolina, Texas, and Virginia. Most of these states, including Texas, consider the red knot a species of conservation concern and these states have wildlife action plans that outline steps needed to conserve the red knot and its habitat (USFWS 2010d). Wintering and migration habitats are large, sandy tidal flats and coastlines near inlets of bays and estuaries that have no human development (Avery 2011).

4.12.2 Endangerment Factors

The red knot faces destruction of its habitat and foraging areas. A particular threat is the harvest of horseshoe crabs (*Limulus polyphemus*) for the biomedical industry and bait. The horseshoe crab is a key food resource (USFWS 2010d). Other threats include habitat destruction from beach erosion, shoreline protection, and stabilization projects; human disturbances; and competition with other species for limited food resources. The red knot is also potentially threatened by large-scale events (e.g., oil spills, severe weather, climate change) due to their concentrations along Delaware Bay, coastal Virginia, and a small number of wintering areas (USFWS 2010d).

4.12.3 Life History Requirements

The red knot is believed to be annually monogamous and reach reproductive maturity at two years of age. Males and females arrive at the breeding grounds in the Arctic region of northern Canada in late May to early June (Avery 2011). Breeding habitat is slightly vegetated tundra where it is sunny and windy. Eggs are laid over a four to six day period with four eggs in an average clutch. Incubation lasts 22 days from the laying of the first egg to the time of the last egg's hatching; both parents incubate the nest (Avery 2011). Lost clutches are not replaced. Young are precocial and the female soon abandons the chicks, leaving the male to protect them. At 21 days old, the chicks fledge and no longer rely on the male (Avery 2011).

Red knots feed mainly on mollusks, including large bivalves. During the spring migration stop-over around Delaware Bay, red knots only eat horseshoe crab eggs. Horseshoe crab eggs are soft and jelly-like and the only thing red knots can digest after the non-stop flight from the southern tip of South America. The eggs are packed with protein and fat, helping the birds make the last stretch to the breeding grounds in the Arctic (Avery 2011). Breeding season diet includes terrestrial invertebrates and some plant material. Red knots peck to eat small mussels and horseshoe crab eggs. They plow and probe to detect bivalves under the sand (Avery 2011).

4.12.4 Field Survey Results

The SPP Corridor and Ethane Cracker Site lack suitable habitat (foraging during migration) for the red knot as they do not contain large, sandy tidal flats and coastlines near inlets of bays and estuaries that have no human development. However, the MEP Corridor crosses saltmarshes which could serve as potential foraging habitat for this species as they are comprised of native saltmarsh vegetation and contain salt flats.

4.12.5 Impact Analysis

Although the MEP Corridor will traverse potential foraging habitat of the red knot, OxyChem will use HDD technology to install the pipeline under the saltmarshes and associated waterbodies, thereby avoiding any mudflats or saltmarshes potentially used by red knots. The red knot

migrates through the Texas Gulf Coast and therefore the MEP Corridor will not cross or disturb breeding grounds for this species. As such, the Project is not expected to affect this species.

4.12.6 Preliminary Determination

Based on the above analysis, implementation of the proposed Project **may affect but is not likely to adversely affect** the **red knot**.

4.13 Sprague's pipit (*Anthus spragueii*)

Sprague's pipit (*Anthus spragueii*) is a small member of the Motacillidae (pipits and wagtails) family. This species is well camouflaged in prairie grasses. Sprague's pipit has tan feathers that are highlighted with black and white streaks. The outer tail feathers are white. This species has pinkish yellow legs, dark eyes, and a small cream-colored beak (Javier 2007). Juveniles are similar in appearance to adults but are slightly smaller and have black spotting rather than streaking. This species is about four to six inches in length and weighs about 0.9 ounces (DOI 2010). Sprague's pipit is a candidate for listing as threatened or endangered (USFWS 2013c).

4.13.1 Distribution

Sprague's pipit breeds in the northern prairies of the Great Plains, reaching as far north as Saskatchewan and as far west as the Rocky Mountains. Its breeding range includes parts of British Columbia, Montana, Minnesota, North Dakota, and South Dakota. The wintering range includes Arkansas, Arizona, Louisiana, Mississippi, New Mexico, Oklahoma, Texas, and portions of Northern Mexico (Javier 2007). The vast majority of winter sightings have been in Texas (DOI 2012). Sprague's pipits are found in densely and sparsely vegetated grassland and pastures of their wintering range. They are rarely found in fallow cropland and avoid areas with too much shrub encroachment. They avoid narrow strips of grassland remaining along agricultural field borders (DOI 2010). The species prefers grassland with high visibility and few shrubs. Preferred native grasses include blue grama (*Bouteloua gracilis*), crested wheat (*Agropyron cristatum*), and smooth brome (*Bromus inermis*) (Javier 2007). However, vegetation structure is probably a better predictor of occurrence than species composition (DOI 2010).

4.13.2 Endangerment Factors

Due to its cryptic coloring and secretive nature, the Sprague's pipit is "one of the least known birds in North America" (DOI 2010). Threats to Sprague's pipit include habitat loss and conversion, fragmentation of the breeding grounds, energy development, roads, and inadequacy of existing regulatory mechanisms. In the United States, only 15 to 18 percent of the historical breeding habitat remains in patches of sufficient size for males to establish territories (DOI 2012). Sprague's pipits require native prairie (land which has never been plowed) and therefore continued conversion and fragmentation of native prairie poses a large threat to the species (DOI 2012). Native grassland requires disturbance (e.g., fire, grazing by bison [*Bison bison*]) to keep vegetation heterogeneous and prevent overgrowth of woody vegetation. Without these disturbances, woody vegetation encroaches and reduces habitat for Sprague's pipit. Current sources of disturbance are typically mowing or cattle grazing. However, because the species prefers vegetation of intermediate height, grasslands disturbed by mowing or landowner burning might not be suitable at the times the species needs them (DOI 2012). Most of the breeding range, including where habitat still exists, is considered a prime area for wind energy development. An oil and gas boom is occurring in the central part of the breeding range. Conversion of grasslands to agricultural and other uses is accelerating in the wintering range. Threats are moderate in magnitude because the remaining suitable

breeding habitat exists in large enough patches to support nesting and population decline appears to have slowed (DOI 2012). The 40-year trend data from the Christmas Bird Counts in Texas shows an annual decline of 2.54 percent (DOI 2012).

4.13.3 Life History Requirements

The breeding season for Sprague's pipit begins early in May and extends through July. Males have a high-flying territorial display that can last up to three hours. However, the species is secretive around the nest and might not flush until a searcher is extremely close. When they return to their nest, Sprague's pipits will land several meters away and run through the grass towards the nest (DOI 2010). The dome-shaped nests are in areas of relatively dense cover, low forb density, and minimal bare ground. Nests are constructed out of woven grasses and typically contain four to five eggs that are incubated for 11 to 17 days. Females do most of the incubation, but both parents feed the chicks, with parental care continuing well past fledging (DOI 2010). Populations in Saskatchewan are documented to take three to four months to raise a clutch (Javier 2007). Females will renest if the first nest fails and some females have successfully nested twice within a breeding season. Long intervals between renesting attempts suggest renesting occurs at a low rate. Males are polygamous and typically have two females on two nests at the same time (DOI 2010).

Sprague's pipit eats a large variety of insects during the breeding season and seeds make up about one to two percent of their diet (DOI 2010). This bird solitarily forages in grasses during the day. Insect prey includes ants, beetles, caterpillars, crickets, false cinch bugs, grasshoppers, leaf beetles, stink bugs, and weevils. Spurge seeds are also consumed (Javier 2007).

4.13.4 Field Survey Results

No Sprague's pipits were observed during the field surveys. The species prefers native grasslands which are not located within the Project Action Area. Grassland within the Project Action Area is non-native (107.90 acres). Additionally, the birds are rarely found in fallow cropland and avoid areas with too much shrub encroachment. Cropland and scrub-shrub comprise 1,177.28 acres and 253.62 acres of the Project Action Area, respectively.

4.13.5 Impact Analysis

Many of the grasslands in the Project Action Area are small strips of grassland bordering agricultural fields and are therefore not conducive to use by this bird. The grasslands that are present are typically dominated by Bermuda grass and yellow bluestem, neither of which are native. The pasturelands that are present are also typically dominated by Bermuda grass and yellow bluestem. Although cattle grazing can help simulate the disturbance of bison, the pasturelands crossed by the MEP Corridor typically have short grass that would not provide much cover for this secretive bird. The grasslands and pasturelands crossed by the MEP Corridor frequently contain isolated to large patches of scrub-shrub vegetation, another feature that makes this habitat suboptimal for the Sprague's pipit. The MEP Corridor primarily follows and will overlap existing well-maintained pipeline ROWs. Therefore the vegetation within the ROW is not at an intermediate height, yet another feature making it less suitable for use by Sprague's pipit. As a result, the Project Action Area contains marginal habitat for wintering Sprague's pipits, such that the species is not anticipated to be impacted by the Project.

4.13.6 Preliminary Determination

Based on the above analysis, implementation of the proposed Project **may affect but is not likely to adversely affect** the **Sprague's pipit**.

4.14 Whooping crane (*Grus americana*)

The whooping crane (*Grus americana*) is a large member of the Gruidae (crane) family. Adults are white with a red and black patch on their face above the bill and young are a reddish brown. Individuals can reach a height of five feet and have a wingspan of about seven feet. It is the larger of the two species of North American crane. Often, it is more than one foot taller than the sandhill crane (*Grus canadensis*). The whooping crane was first listed as endangered in 1967 under the protection of the ESA (USFWS 2012j). The species remains listed as endangered under the ESA (USFWS 2012a).

4.14.1 Distribution

The whooping crane is only found in North America. The total population of whooping cranes once stood around 20 individuals, but as of February 2006, there were 473 individuals documented (USFWS 2011c). There are two experimental populations: a non-migratory Florida population and a population that summers in Wisconsin and winters in Florida. The only self-sustaining population of whooping cranes remaining in North America is the Aransas-Wood Buffalo National Park (AWBNP) population that summers in and around Wood Buffalo National Park in Canada (northeastern Alberta and southern Northwest Territories) and winters in the coastal marshes of Texas (Canadian Wildlife Service [CWS] and USFWS 2007). Whooping cranes are found wintering along the Texas coast at Matagorda Island Wildlife Management Area (WMA), Welder Flats WMA, ANWR, and vicinity. The AWBNP population follows a very linear migration route between summer and winter habitats, maintaining a stable flyway corridor width. Approximately 95% of the whooping crane individuals observed during migration are within a 170-mile-wide corridor in Texas (USFWS 2012k).

4.14.2 Endangerment Factors

The primary limiting factors for whooping crane populations have developed as their recovery became increasingly apparent in the last 30 years. Historically, loss of nesting habitat and hunting were limiting factors. Current threats include loss of genetic variability, loss of migration stopover habitat, coastal ecosystem degradation, and collision with man-made structures, such as power lines. Additionally, the potential for chemical spills in Texas is considered a threat to the species (CWS and USFWS 2007).

4.14.3 Life History Requirements

The whooping crane is monogamous and selects its mate for life. Although they pair at two or three years of age, sexual maturity is reached at four or five years. Breeding season is late spring (April and May). Both parents construct a nest on raised microtopography (typically in wetlands) so the nest is surrounded by water. Eggs are cared for by both parents and hatch after approximately a month. Young fledge around three months, but remain with the family until approximately nine months. The whooping crane is a very long-lived species that often reaches over 20, and up to 30, years of age (Esch 2011).

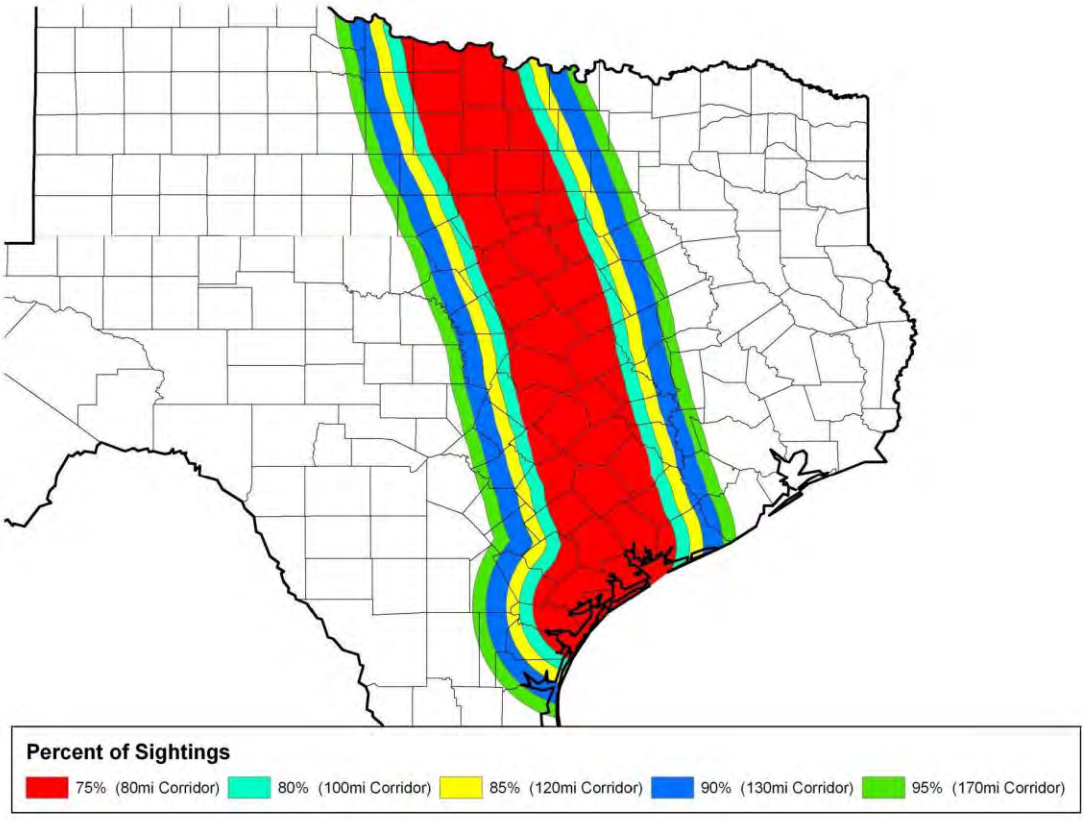
All stages of life for the whooping crane take place in a variety of habitats, including breeding, foraging, and migration. Types of habitat include coastal marshes, estuaries, marshes, lakes,

ponds, wet meadows, rivers, and agricultural fields (USFWS 2011c). The whooping crane has a varied diet, including crabs, Carolina wolfberry (*Lycium carolinianum)* fruit, plant tubers, worms, minnows, insects, mollusks, and amphibians. In agricultural fields the primary food is waste grains (Esch 2011).

4.14.4 Field Survey Results

The MEP Corridor crosses saltmarshes surrounded by croplands at MPs 12 – 13, 13.5 – 14, and 14 – 16. Other saltmarshes are surrounded by thin scrub-shrub (MPs 75 – 76 and 79.5 – 81.5) or disturbed grassland and cropland (MPs 22 – 24.5). Agricultural fields are predominant throughout the extent of the MEP Corridor. During the initial field surveys (March 4-22, 2013), planting of the agricultural fields around the saltmarshes had just commenced. During May, field surveys at the saltmarshes between MPs 12 – 16, many of the surrounding croplands were planted with sorghum and other cereal grains. Figure 4-2 below shows that all of Aransas, Calhoun, Jackson, Refugio, and Victoria Counties, along with the eastern half of San Patricio County and the western half of Matagorda County (collectively the survey area) are located within the corridor that contains migrating whooping crane sightings (USFWS 2012k).

Figure 4-2 Whooping Crane Migration Corridor Sightings



Source: (USFWS 2012k)

4.14.5 Impact Analysis

The Project is located within the historic migration corridor (USFWS 2012k) of the only known self-sustaining whooping crane population. The migration route (titled the Central Flyway by USFWS) is 170 miles in width and extends from the Aransas County coast of Texas (winter

habitat) in a north/northwesterly linear manner to the population's summer habitat at Wood Buffalo National Park in Canada (northeastern Alberta and southern Northwest Territories). Types of migratory (stopover and foraging) habitat used by whooping cranes include coastal marshes, estuaries, freshwater marshes, lakes, ponds, wet meadows, rivers, and agricultural fields (USFWS 2011c). In agricultural fields the primary food is waste grains (Esch 2011). The MEP Corridor is closest to the ANWR and Matagorda Island WMA at approximately MP 36, approximately 5.75 miles northwest of ANWR and approximately 24 miles northwest of Matagorda Island WMA. At approximately MP 47.5, the MEP Corridor is approximately 15 miles northwest of the Welder Flats Wildlife Management Area.

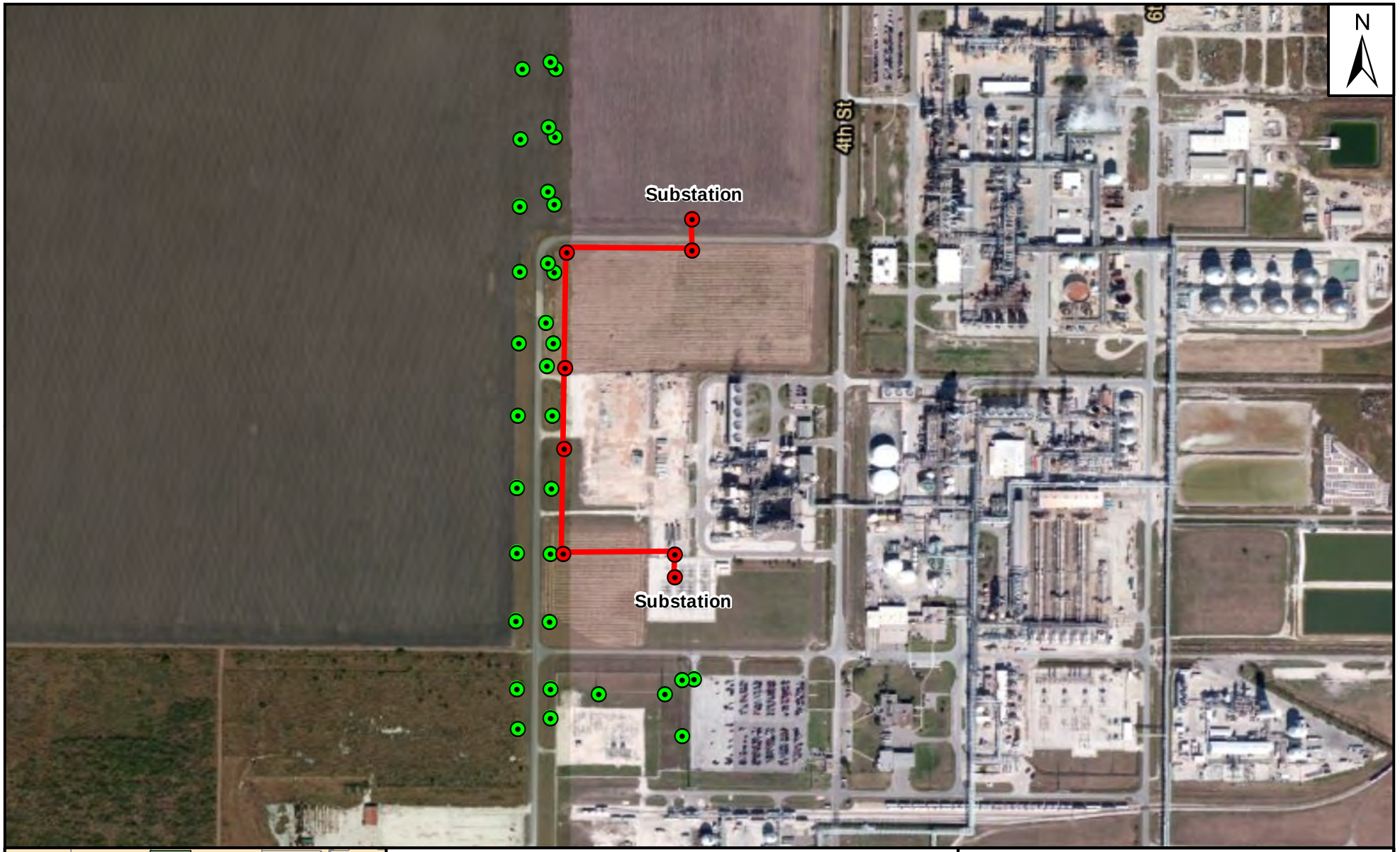
Based on field survey results, potential migratory stopover and foraging habitat is present in the Project Action Area, specifically in the MEP Corridor where saltmarshes will be traversed. OxyChem will use HDD technology to drill under these saltmarshes, thereby avoiding impacts to this potential habitat. The agricultural fields along the MEP corridor are typically planted with cotton (*Gossypium* spp.), corn, and grains (e.g., sorghum) (Contract Land Staff 2013). Although the MEP Corridor does cross many agricultural fields, the permanent impact areas will be maintained in herbaceous state and the temporary impact areas will be allowed to revert to their preconstruction condition, thus resulting in a limited temporal loss to potential foraging habitat. Once reverted, these areas will continue to be available as potential foraging habitat for the whooping crane.

During the February 2013 pre-application meeting, USFWS staff expressed concern regarding the potential for future bird strikes with new aboveground facilities proposed at the Ethane Cracker Site. To address this concern, lights will be located throughout the Ethane Cracker Facility so new structures are visible during low-light conditions (dawn, dusk, and nighttime hours). As a matter of standard lighting procedures at the existing OxyChem Facility, OxyChem will ensure the Ethane Cracker Facility will be well lighted for aircraft safety and to accommodate maintenance needs during nighttime hours.

New overhead power lines will be located adjacent to and at a similar height as existing overhead power lines, and are not located in a highly used avian flight path, and thereby avoid creation of a new potential strike hazard to migrating whooping cranes. The power lines will be on one power supply line and are approximately 800-yards in length; comprised of eight steel monopoles; and located parallel, clustered with, and at a similar height as two sets of existing adjacent power lines. OxyChem will install the power lines using Avian Power Line Interaction Committee (APLIC) standards for collision-reducing techniques as outlined in "Mitigating Bird Collisions with Power Lines: The State of the Art in 2012 (APLIC 2012) as follows:

- Placement of towers and lines will not be located above existing towers and lines, topographic features, or tree lines to the maximum extent practicable; and
- Power lines will be clustered in the vertical and horizontal planes, aligned with existing geographic features or tree lines, and located parallel (rather than perpendicular) to prevailing wind patterns to the maximum degree feasible.

The power lines will be located between and amongst existing and new major aboveground industrial facilities (see Figure 4-3), and therefore are not located in a highly used avian flight path where marking by use of avian diversion devices is warranted. The existing facilities are well-lighted. Substations will be located at each end of the power lines, further illuminating the area such that the power lines will be broadly visible during low-light conditions. The proposed electrical substations will be located adjacent to the existing DuPont substation, and will be well lighted for clear visibility during low-light conditions.



Source: Aerial basemap from ESRI Online Mapping Services.

LEGEND

- Existing Power Pole
- Proposed Power Pole
- Proposed Power Line

0 300 600 Feet

Sheet 1 of 1

Figure 4-3. Existing and Proposed Power Lines at Proposed Ethane Cracker Facility.

Prepared For:	**Occidental Chemical Corporation**	
Prepared By:	TETRA TECH	**Date:** 12/13

The pipeline construction schedule is flexible, but there will be few (if any) tall structures associated with the pipeline construction to necessitate constructing the pipeline outside of the whooping crane migration window. Per the November 22, 2013 meeting with USFWS, if a whooping crane is observed within 1,000 feet of an active work area (at the proposed Ethane Cracker or along the proposed MEP Corridor), construction personnel will cease work until the bird is out of harm's way. Given these conservation measures, the Project is not expected to adversely affect the whooping crane.

4.14.6 Preliminary Determination

Based on the above analysis and the proposed conservation measures, implementation of the proposed Project **may affect but is not likely to adversely affect** the **whooping crane**.

4.15 Sea Turtles (Order Testudines)

All species of sea turtles are in the Order Testudines (turtles, tortoises, terrapins). Five species of sea turtle are federally protected under the ESA and might occur in or near the survey area. The green sea turtle (*Chelonia mydas*) is a large sea turtle and weighs approximately 450 pounds. It gets its name from the color of its flesh (Crite 2000). The hawksbill sea turtle (*Eretmochelys imbricata*) has a head that tapers to a "v", giving the illusion of the turtle having a beak. This turtle has two claws on each forelimb and young have a heart-shaped shell that lengthens with age. The head often has brown spots and adults weigh around 150 pounds (Edelman 2004). The Kemp's Ridley sea turtle (*Lepidochelys kempii*) is the smallest species of sea turtle and weighs between 65-110 pounds. It is often a light green and has a grey-olive colored carapace (Klug 2006). The leatherback sea turtle (*Dermochelys coriacea*) is the largest living species of sea turtle. Adults can weigh between 500-2,000 pounds. They get their name from a layer of brown or black skin on top of their shell's bones (Fontanes et al. 2007). The loggerhead sea turtle (*Caretta caretta*) has a large head in proportion to its body. It has a heart-shaped shell and weighs between 200-1,200 pounds. Adults are typically a reddish-brown color with olive green hues. This species is frequently found with barnacles and algae growing on its carapace (Duermit 2007). The hawksbill sea turtle, Kemp's Ridley sea turtle, and leatherback sea turtle are federally-listed endangered species. The green sea turtle and loggerhead sea turtle are federally-listed threatened species (USFWS 2012a).

4.15.1 Distribution

In the United States, sea turtles are typically found in the oceans close to shore and have been seen in every coastal continental state. Some species spend more time in the deeper waters away from shore and others venture into estuarine areas. All are capable of long distance migration.

The green sea turtle was historically heavily populated around Florida and the Texas Gulf Coast (NMFS and USFWS 1991), but they are currently known (or believed) to occur along every coastal state in the continental United States (USFWS 2012l). They also are known to nest in many different countries (Sea Turtle Restoration Project 2003).

The hawksbill is known or believed to occur in every state on the coast of the Atlantic and the Gulf Coasts (USFWS 2012m) and nest in 60 different countries. Puerto Rico, Texas, and Florida are the places most populated by hawksbills, and sightings north of Florida on the Atlantic Coast are very rare (NMFS and USFWS 1993).

Kemp's Ridley is known or believed to occur in states along the entire Gulf of Mexico and the Atlantic Coast (except Maine) (USFWS 2012n). Nest sites are primarily in the western Gulf of Mexico. The majority of nests on U.S. lands are in southern Texas (Padre Island is most common), but some nests have been found in Florida, Alabama, Georgia, and the Carolinas (NMFS, USFWS, & SEMARNAT 2010).

The leatherback has no documented nesting grounds under U.S. jurisdiction. The largest known nesting area was on the Pacific coast of Mexico. Nesting also occurs in several western pacific countries (NMFS and USFWS 1998). It is known or believed to occur in every Atlantic and Gulf Coast state and Alaska (USFWS 2012o).

The loggerhead is known to inhabit the Atlantic, Pacific, and Indian Oceans in the temperate and tropical zones. The species nests in the entire Gulf of Mexico and the Atlantic Coast as far north as Virginia, but is concentrated along the eastern Gulf of Mexico and Cuba (NMFS and USFWS 2008). Florida is a major nesting area, where an estimated 14,000 individuals nest (Sea Turtle Restoration Project 2003).

4.15.2 Endangerment Factors

The primary limiting factors for sea turtle populations are habitat conversion, modification, human use of habitat, and light pollution (NMFS and USFWS 1991, 1993, 2008 and NMFS, USFWS, & SEMARNAT 2010). Some species, like the hawksbill, were hunted heavily for their shell (Sea Turtle Restoration Project 2003). The leatherback has no nesting habitat in the United States, but the limiting factors for nesting habitat are similar to the other species mentioned (NMFS and USFWS 1998).

In marine environments, the limiting factors for all five species are the same and include oil and gas production, development, and transportation; dredging; loss of foraging habitat from development; water pollution; and accidental interaction with commercial fisheries (NMFS and USFWS 1991, 1993, 2008 and NMFS, USFWS, & SEMARNAT 2010).

4.15.3 Life History Requirements

Sea turtles are truly marine animals. Males never return to land after reaching the water as hatchlings. Females will only go on shore to nest. All species (except Kemp's Ridley) nest at night and females have multiple clutches (7–238 eggs, depending on species) per season. The incubation time for the eggs is about 2 months for all species. For most species, the sex of the young is determined by nest temperature. It is unknown how the young navigate to the ocean after they hatch, but it seems that they are drawn toward the greater reflected light from the sea. It is also possible the young have an "internal compass" to direct them to the sea. These species usually reach sexual maturity between 10 and 35 years of age (Crite 2000, Edelman 2004, Klug 2006, Duermit 2007, and Fontanes et al. 2007).

Most sea turtles eat a variety of foods, including mollusks, crustaceans, plants, and fish (Pecor 2003a). The preferred diet of the leatherback is jellyfish (Pecor 2003b).

The green sea turtle lives throughout the tropical oceans of the world. Nests are built on unstable beaches and the species seems to prefer islands. Adult grazing habitats are located on large beds of vegetation. Coral reefs and rocky substrates also provide suitable habitats for this species (NMFS and USFWS 1991).

The hawksbill sea turtle prefers areas with hard bottoms and populations of sponges. It is found in fairly shallow waters (less than 60 feet). Young depend on mats of algae (typically *Sargassum*) to hide in because they lack the ability to dive to deep depths (Edelman 2004). Nesting habitat is often shared with the green sea turtle on secluded beaches. The hawksbill is not very selective about the type of soil in which it will deposit eggs. Typically, the nests are covered with vegetation (NMFS and USFWS 1993).

The Kemp's Ridley sea turtle prefers shallow water systems like bays and lagoons, typically with substrates of soft muds and sands (Klug 2006). Nesting habitat is located on sandy beaches with most occurring in Padre Island, Texas, and Tamaulipus, Mexico (NMFS, USFWS, & SEMARNAT 2010).

The leatherback sea turtle has an enormous range throughout the oceans of the world. Few migration routes have been established due to lack of data. Nesting females prefer high-energy beaches with deep, unobstructed access frequently found along continental shorelines (NMFS and USFWS 1998).

The loggerhead sea turtle nests on sandy ocean beaches. Occasionally, females might nest on estuarine shorelines. Little data is available about nest-site selection. One study conducted in Florida revealed that loggerheads prefer heavily sloped, coarse-grained sand beaches for nest sites. However, a later study found that loggerheads showed no preference toward the type or characteristics of the sandy beaches selected for nesting (NMFS and USFWS 2008).

4.15.4 Field Survey Results

The only potential sea turtle habitat within the Project Action Area includes estuarine river/stream complexes traversable by sea turtles. Saltmarshes and their associated rivers and streams are found between MPs 12 – 13, 13.5 – 14, 14 – 16, 22 – 24.5, 75 – 76, and 79.5 – 81.5.

4.15.5 Impact Analysis

Habitat – The Project Action Area occurs away from coastline or beaches where sea turtles might nest and therefore will not affect sea turtle nesting habitat. However, potential foraging habitat is present in estuarine areas traversable by sea turtles. OxyChem will use HDD technology to cross all perennial estuarine waterbodies traversable by sea turtles along the MEP Corridor, thereby avoiding direct impacts to estuarine areas and the associated streams and rivers which could serve as potential habitat for sea turtles.

Water Quality (Chemical) – To ensure the Project does not adversely affect the quality of waters potentially used by sea turtles, wastewater generated from the new upland Ethane Cracker Facility will be treated prior to its discharge into the La Quinta Channel adjoining Corpus Christi Bay. As indicated in Section 3.6 of this BA, the levels of contaminant discharged from the existing wastewater outfall/diffuser will be well below the level authorized by the existing TPDES Permit (already considered to be protective of marine organisms in accordance with Texas Surface Water Quality Standards for Marine Aquatic Life [30 TAC 307]).

Additionally, the existing discharge of wastewater is also subject to permit requirements for acute and chronic biomonitoring to demonstrate that the wastewater discharge is not toxic to marine organisms. This testing is done in accordance with the most recent version of EPA toxicity test procedures "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms" (EPA-821-R-02-014) and "Methods

for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA-821-R-02-012). Historical results from this testing have consistently demonstrated that the effluent is not toxic to marine organisms and this requirement will remain in effect for future effluent discharges. As such, discharges associated with the proposed Project will not adversely affect threatened or endangered sea turtles.

In addition to the previously-mentioned actions to avoid and minimize impacts to sea turtles or their habitat, OxyChem will use water from an existing source in association with operation of the Ethane Cracker Facility. Surface water withdrawals from La Quinta Channel/Corpus Christi Bay will not be necessary, thereby further avoiding impacts to protected sea turtles or their habitat. Temporary use waters will be treated prior to outfall to La Quinta Channel/Corpus Christi Bay as described in Section 3.6 of this BA.

Water Quality (Thermal) – There is no thermal water discharge associated with the Project and therefore sea turtles will not be adversely affected by thermal water discharges.

4.15.6 Preliminary Determination

Based on the above analysis, implementation of the proposed Project **may affect but is not likely to adversely affect** the **green sea turtle, hawksbill sea turtle, Kemp's Ridley sea turtle, leatherback sea turtle,** and **loggerhead sea turtle**.

4.16 Mussels (Order Unionoida)

Most freshwater mussels belong to the order Unionoida (freshwater mussels). Five species of freshwater mussels are candidates for federal listing as threatened or endangered and might occur in the Project Action Area. The golden orb (*Quadrula aurea*) is oval to round in shape, with a smooth shell that varies in color from yellow to brown and gold to dark brown or black. It usually grows to a maximum of 3.2 inches (USFWS 2011d). The smooth pimpleback (*Quadrula houstonensis*) is round in shape and generally grows to at least 2.6 inches in length. The coloring of the shell varies from different shades of brown to black (NatureServe 2012a). The Texas fatmucket (*Lampsilis bracteata*) has a large, oval-shaped shell that can reach a maximum length of 3.94 inches. The shell's coloration varies from tan to greenish-yellow with irregularly-shaped dark brown rays (NatureServe 2012b). The Texas fawnsfoot (*Truncilla macrodon*) has a long oval-shaped shell that can reach 2.4 inches in length, but generally will not reach that length. The coloring of the shell can vary from orange-brown, to red-brown, to smoky green with patterns of broken rays (NatureServe 2012c). The Texas pimpleback (*Quadrula petrina*) has a smooth, thick shell that can reach 3.5 inches in length. The shell's coloration ranges from yellow-brown to dark brown with some individuals displaying dark green rays (USFWS 2011d). All five species are currently candidate species for listing as either threatened or endangered (USFWS 2011d).

4.16.1 Distribution

The golden orb, smooth pimpleback, Texas fatmucket, Texas fawnsfoot, and Texas pimpleback are all freshwater mussels and occur only in Texas. They occur in portions of the Colorado, Guadalupe, Nueces-Frio, and Brazos River Systems (USFWS 2011d).

The historical range of the golden orb included nearly the entire lengths of the Guadalupe, San Antonio, and Nueces-Frio River basins in Central Texas, including the Frio, Guadalupe, Medina, Nueces, and San Antonio Rivers as well as Cibolo Creek. Currently, the golden orb is only known to occur in disjunct locations along four streams. Since 1995, the golden orb has only

been found in Lake Corpus Christi and the Guadalupe, lower San Marcos, and lower San Antonio rivers (USFWS 2011d).

The historical range of the smooth pimpleback is the central and lower Brazos and Colorado Rivers and their tributaries in central Texas. It was also potentially found in the Trinity River and other drainages in Texas, along with locations in Arkansas and Kansas, although these could be misidentifications of similar species. Currently, the smooth pimpleback has been nearly extirpated from the Colorado River basin, and few populations are found in the Brazos River basin. Within the Colorado River system, the species is restricted to one mainstem reservoir, two sites on the mainstem Colorado River, and the San Saba River (USFWS 2011d).

The historical range of the Texas fatmucket included at least 18 rivers in the upper Colorado, Guadalupe, and San Antonio River systems. The species is now known from only nine streams in the Colorado and Guadalupe River systems (USFWS 2011d). It is considered extirpated from the Colorado River mainstem. Within the Colorado River system, it is only known in sparse populations of Colorado River tributaries, including South Concho River, Spring Creek, Llano River (including Threadgill Creek), Pedernales River (including Live Oak Creek), Onion Creek, Jim Ned Creek, Elm Creek, and the San Saba River. Within the Guadalupe River system, the only remaining populations are in the mainstem Guadalupe River and possibly the North Fork Guadalupe River (USFWS 2011d).

Historical records suggest the Texas fawnsfoot inhabited much of the Colorado River and throughout the Concho, San Saba, and Llano Rivers and Onion Creek. Within the Brazos River, the species occurred from Fort Bend County to the lower reaches of the Clear Fork Brazos River in Shackleford River, as well as Leon River, Little River, San Gabriel River, Deer Creek, and Yegua Creek (USFWS 2011d). Few Texas fawnsfoot have been documented since it was first described in 1859, and few live individuals have been found in recent decades. A live population was not discovered until 2008 in the Brazos River near its confluence with the Navasota River. A second live population was found in the Colorado River in 2009. These two locations represent the only confirmed populations of the species to date. The Colorado River Basin population persists in the San Saba River. The Texas fawnsfoot is presumed extirpated from the remainder of the Colorado River basin. In the Brazos River system, the species persists in the mainstem Brazos River, Clear Fork Brazos River, Navasota River, and possibly in Deer Creek.

The historical range of the Texas pimpleback includes the Colorado and Guadalupe-San Antonio River basins. It was found throughout the entire mainstem of the Colorado River and many of its tributaries. It also occurred throughout most of the Guadalupe River and the San Antonio, San Marcos, Blanco, and Medina Rivers. Now, only the San Saba, Concho, Guadalupe, and San Marcos Rivers are known to have persistent, small, disjunct, and isolated populations (USFWS 2011d).

4.16.2 Endangerment Factors

As with other declining freshwater mussels across the United States, a major factor of decline has been the large-scale impoundment of rivers. Dams block upstream and downstream movement of mussels by blocking host fish movement and eliminate or reduce river flow within impounded areas. Dams change downstream water flow timing and temperature, decrease habitat heterogeneity, and affect normal flood patterns. The decline of freshwater mussels has been attributed to sedimentation, decreased dissolved oxygen, and alteration of resident fish populations (USFWS 2011d). Chemical contamination is another major reason for the decline

of freshwater mussel species. Other factors contributing to the decline of freshwater mussels include river dewatering and sand and gravel mining (USFWS 2011d).

Only four populations of the golden orb appear to be relatively stable and capable of recruiting, and the remaining five populations are only represented by a few individuals. All four of the large populations which are presumed to be reproducing are found within 75 miles of the Gulf of Mexico in the basin formed by the lower San Marcos, San Antonio, and Guadalupe Rivers. This includes a large population of over 100 individuals of multiple size classes found in 2009 in Victoria County (USFWS 2011d).

The smooth pimpleback has declined throughout its range and is only known to occur in nine locations. The populations on the San Saba River, lower Brazos River, Navasota River, Leon River, and Yegua Creek appear stable and reproducing, but all other populations are small, isolated, and only contain a few individuals (USFWS 2011d).

Extant populations of the Texas fatmucket are represented by only a few individuals, and they are highly disjunct. Many of the populations are small, likely unstable, and no have no evidence of recruitment with the possible exception of those found in the Llano River (USFWS 2011d).

The Texas fawnsfoot has declined range-wide and is now known from only five populations. The Colorado, San Saba, and Brazos River populations are likely to be stable and recruiting and the rest are disjunct and restricted to short stream reaches (USFWS 2011d).

Only two populations of the Texas pimpleback appear large enough to be stable, but there is limited evidence of recruitment in the Concho River. The San Saba River population might be the only remaining population capable of recruitment. Two populations are represented by a few individuals and all other populations are highly disjunct (USFWS 2011d). This species has not recently been found anywhere along the mainstem Guadalupe River except for Victoria County where two individuals where collected in 2009. A small population might remain in the lower Guadalupe River (USFWS 2011d).

4.16.3 Life History Requirements

Adult freshwater mussels are suspension feeders, using their incurrent siphon to bring in food and oxygen. They might also feed on organic particles in the sediment by using their large, muscular foot. Freshwater mussels feed on algae, microscopic animals, dissolved organic matter, bacteria, and detritus. Mussels grow rapidly during the first few years and then grow much more slowly after reaching sexual maturity. Freshwater mussels are very long-lived, living up to or in excess of two decades. In extremely rare cases, it is speculated that they can live up to 200 years (USFWS 2011d).

Freshwater mussels are sexually dimorphic. The male releases sperm into the water column and the female intakes the sperm through her incurrent siphon tube during regular feeding and respiration. Fertilization occurs internally, on the water tubes in the gills of the female, where the eggs are housed for either a few weeks or a few months (depending on the species of mussel) until they develop into glochidia, the mussel's larval form. Glochidia are obligate parasites and once released from the female, they must encyst themselves onto the gills or fins of a suitable host fish to complete their metamorphosis into a juvenile mussel (Cummings and Graf 2013). Some mussel species, like the Texas fatmucket, will display a lure that mimics minnows, leeches, worms or aquatic insects to attract a host fish. If the eligible host fish is attracted to the lure, it will bite or strike the lure, causing the mussel to release the glochidia (USFWS 2011d). Glochidia can be released either individually, in small groups, or in

conglutinates – larvae that are embedded in large, mucus-like structures (Couch, Mason, Miller 2013). If the glochidia fail to successfully attach to a host fish, or encyst on the wrong location, or attach themselves to a fish that has grown immune to glochidia, then they will not survive. Conversely, if they are successful in parasitizing the host fish, then they will remain encysted on the fish, and will feed on the fish's bodily fluids until metamorphosis is complete and they have grown a large, muscular organ known as the "foot" (Boss 1982).

Depending on the species of mussel, metamorphosis can take anywhere between two weeks to a few months to complete. Once completed, the juvenile will detach from the host fish and will fall to the substratum. If the mussel releases itself into an environment lacking good water quality, stable stream channels and flowing water, then it will likely die due its limited ability to relocate to a more favorable environment (USFWS 2011d). If the mussel is successful in finding a suitable substrate (usually a mixture of sand, gravel, and mud), then it will burrow between the interstitial spaces of the substrate floor and will use its foot to anchor itself to the substrate bottom. From this point, the mussel will utilize its incurrent siphon as well as the cilia on its foot to feed on the available detritus, bacteria and phytoplankton of the streambed (Buchsbaum et al. 1987). The mussel will most likely inhabit this same area of substrate throughout the course of its life, which can range from two decades to over 100 years in some cases (USFWS 2011d).

The golden orb is found in moderately-sized rivers with flowing waters and substrates composed of sand, gravel, and firm mud. The only reservoir it has been found in is Lake Corpus Christi, where the waves might have simulated flowing water conditions (USFWS 2011d). The host fish for the golden orb has not been identified, but because other species of the genus *Quadrula* regularly parasitize catfish, it is believed that the golden orb does as well (USFWS 2011d).

The smooth pimpleback can be found in medium to large-sized rivers with substrates composed of sand, mud, and fine gravel. Unlike other species of its genus, the smooth pimpleback can inhabit reservoirs (NatureServe 2012a). The host fish for the smooth pimpleback has not been confirmed, but it is believed that it likely parasitizes catfish, as do other species of the genus *Quadrula* (USFWS2011f).

The Texas fatmucket is generally found in moderately-sized rivers with a substrate of sand, gravel, mud, or a combination of these elements. It has also been found in crevices between bedrock slabs (NatureServe 2012b). The Texas fatmucket is not found in ponds, lakes, or reservoirs and is intolerant of deep, low-velocity water from artificial impoundments (USFWS 2011d). Females of this mussel species have mantle flaps that mimic minnows and they display these flaps when trying to attract a host fish. The host fish for the Texas fatmucket is believed to be the bluegill (*Lepomis macrochirus*) and the green sunfish (*Lepomis cyanellus*) (USFWS 2011d).

Less than 15 specimens of the Texas fawnsfoot have been found in over 30 years, so information regarding the habitat of this mussel is not readily available; however, a population was discovered in 2008 in the Brazos River and this suggests that the mussel inhabits moderately-flowing rivers with soft, sandy substrates. It has never been found in ponds, lakes, or reservoirs (USFWS 2011d). The host fish for the Texas fawnsfoot has yet to be confirmed, but it is believed that it might parasitize the freshwater drum (*Aplodinotus grunniens*) as do other species in the genus *Truncilla* (USFWS 2011d).

The Texas pimpleback can be found in medium-sized rivers, typically with substrates composed of sand, mud, gravel, and cobble. It has occasionally been identified in gravel-filled cracks at

the bottom of bedrock slabs. It is believed that the Texas pimpleback can tolerate waters travelling at much higher velocities than any other mussel species. It has not been found in water depths over 6.6 feet, nor has it been found in reservoirs (USFWS 2011d). A host fish for the Texas pimpleback has not been confirmed, but in laboratory settings, glochidia have successfully parasitized yellow bullhead (*Ameiurus natalis*), flathead catfish (*Pylodictis olivaris*), and bluegill (USFWS 2011d).

4.16.4 Field Survey Results

The MEP Corridor crosses the Guadalupe River just south of MP 53.5. A review of United States Geological Survey (USGS) 7.5-minute series topographic quadrangle maps covering the Project Action Area revealed that the MEP Corridor does not cross any of the other streams, rivers, or other water features named in sections 4.17.1 or 4.17.2 (USGS 2013).

4.16.5 Impact Analysis

The Guadalupe River is included in the historic and current distributions of the golden orb, Texas fatmucket, and Texas pimpleback. Of these species, only the golden orb appears to have a stable enough population in the Guadalupe River capable of recruitment (USFWS 2011d). In 2009, a large population of over 100 golden orbs of multiple size classes (including juveniles) was found in the Guadalupe River within Victoria County. The Texas fatmucket does not appear to have a large or recruiting population in the Guadalupe River; it is possible that the Llano River populations are capable of recruitment, but the MEP Corridor does not cross this river. Finally, the Texas pimpleback has not been recently found in the Guadalupe River except for two individuals found in Victoria County in 2009, although a small population might exist in the lower Guadalupe River (USFWS 2011d).

Through use of HDD technology, OxyChem will be able to install the pipeline without disturbing the Guadalupe River, thereby avoiding potential habitat or individuals of golden orb, Texas fatmucket, or Texas pimpleback. In the unlikely event of a frac-out, a HDD Monitoring and Contingency Plan will be implemented. The Plan will ensure a monitor is in place to deploy turbidity barriers to minimize downstream sedimentation and minimize potential impacts to the Guadalupe River and any mussel species that might be present. As such, the Project is not expected to adversely affect these species of candidate freshwater mussels.

4.16.6 Preliminary Determination

Based on the above analysis, implementation of the proposed Project **may affect but is not likely to adversely affect** the **golden orb, smooth pimpleback, Texas fatmucket, Texas fawnsfoot,** and **Texas pimpleback**.

4.17 Black lace cactus (*Echinocereus reichenbachii* var *albertii*)

The black lace cactus (*Echinocereus reichenbachii* var *albertii*) is a small member of the Cactaceae (cactus) family. The outer spines of this plant are straight and white with dark purple tips. The stems are one to six inches tall and one to two inches wide (TPWD 2013i). This cactus can have either a single cylindrical stem or five to twelve stems. Mature black lace cacti in Refugio County are highly branched (USFWS 1986). The stems have 10-13 ribs and elliptic areoles, typically with no central spines (but occasionally with a single central spine) and 14-16 closely pectinate radial spines (NatureServe 2012d). The Refugio County population lacks the central spine (USFWS 2009b). Flowers are pink to purple and 2 to 3 inches wide (TPWD

2013i). The black lace cactus was first listed as endangered in 1979 under the protection of the ESA (USFWS 2013d). It remains listed as endangered under the ESA (USFWS 2012a).

4.17.1 Distribution

Whereas the lace cactus (*E. reichenbachii*) occurs among rocks in limestone, the black lace cactus occurs in sandy-loam brush in Texas, specifically east central Jim Wells, northern Kleberg, and southern Refugio Counties. All three populations are found on private land (USFWS 1986).

4.17.2 Endangerment Factors

Brush clearing for cropland and improved pastures has resulted in a considerable loss of habitat for the black lace cactus (USFWS 1986). Another significant threat to this cactus is poaching by cactus collectors (USFWS 1986, NatureServe 2012d, and TPWD 2013i). Cattle grazing in pastures containing this cactus will trample it if it is not protected by surrounding vegetation (USFWS 1986).

4.17.3 Life History Requirements

The black lace cactus is only found in Texas and inhabits grassy openings of rangeland invaded by mesquite (*Prosopis* spp.) and other shrubs (TPWD 2013i). All known populations are within several hundred meters of a water source, such as the Aransas River or Jaboncillos Creek (USFWS 2009b). The vegetation where this cactus occurs is characterized by scattered open shrubs, subshrubs, prickly pear cactus (*Opuntia* spp.), grasses, and annuals. In Refugio County, the population of the black lace cactus occurs only in large open areas of running mesquite (typically not taller than three feet above the ground) and prickly pear cactus. It is not found in tall, dense mesquite brush. It occurs in grasses and herbs or under small shrubs and prickly pear (USFWS 1986).

The black lace cactus prefers sandy, loamy, and possibly somewhat saline soils (NatureServe 2012d). The soil at known populations can be level and poorly drained or sloped and well drained. Nueces and San Patricio Counties also contain habitat that would help establish new populations (USFWS 1986). Typical mesquite brush constants (and potential associates to black lace cactus) are blackbrush (*Vachellia rigidula*), huisache (*Vachellia farnesiana var. farnesiana*), whitebrush (*Aloysia gratissima*), spiny hackberry (*Celtis pallida*), Brazilian bluewood (*Condalia hookeri*), Texas persimmon (*Diospyros texana*), lantana (*Lantana horrida*), honey mesquite, Spanish dagger (*Yucca treculeana*), lime pricklyash (*Zanthoxylum fagara*), and lotebush (*Ziziphus obtusifolia*). Other commonly found brush and tree associates of the cactus are catclaw (*Senegalia greggii*), twisted acacia (*Vachellia schaffneri*), agarito (*Berberis trifoliolata*), Texan goatbush (*Castela texana*), hog plum (*Colubrina texensis*), clapweed (*Ephedra antisyphilitica*), leatherstem (*Jatropha dioica*), wolfberry (*Lycium berlandieri*), retama (*Parkinsonia aculeata*), Texas lignum-vitae (*Guaiacum angustifolium*), tornillo (*Prosopis reptans*), and rougeplant (*Rivina humilis*). Common cacti include horsecrippler (*Echinocactus texensis*), Turk's head (*Ferocactus hamatacanthus*), tasajillo (*Opuntia leptocaulis*), Texas prickly pear (*Opuntia engelmannii* var. *lindheimeri*), and devil's tongue (*Opuntia humifusa* var. *humifusa*). Herbs and subshrubs include Kleberg's saltbrush (*Atriplex klebergorum*), goldenweed (*Isocoma drummondii*), and roundleaf snakeweed (*Gutierrezia sphaerocephala*). Grasses commonly found near black lace cactus include Texas grama (*Bouteloua rigidiseta*), buffelgrass (*Cenchrus ciliaris*), California crabgrass (*Digitaria californica*), Texas cottontop (*Digitaria patens*), mourning lovegrass (*Eragrostis lugens*), tropical strangletop (*Leptochloa*

virgata), shoregrass (*Distichlis littoralis*), Hall's panicum (*Panicum hallii*), plains bristlegrass (*Setaria leucopila*), and whorled dropseed (*Sporobolus pyramidatus*) (USFWS 1986).

Bees and wasps help pollinate the black lace cactus. The plant blooms from April to June and fruits are produced after the blooms fall off (TPWD 2013i). The peak flowering period is from mid-April to early May (USFWS 2009b). The black lace cactus produces small, spiny green fruits that are probably not eaten but instead carried on the coats of mammals. Seeds probably fall to the ground or are washed to the ground by rainfall when the fruits deteriorate. The seeds are capable of floating (USFWS 1986). Native ants have also been observed mining black lace cactus seeds, transporting the seeds to their nest, and discarding the seeds outside of the mound. Feral hogs might also help disperse the seeds through their rooting (USFWS 2009b).

4.17.4 Field Survey Results

The population of black lace cactus in Refugio County is found along the Aransas River. The MEP Corridor crosses the Aransas River south of MP 15.5 and crosses through a small scrub-shrub upland containing Engelmann pricklypear and tasajillo, but dominated by a herbaceous stratum comprised of Roemer catclaw and Bermuda grass. It then crosses through a wetland dominated by bushy seaoxeye and butterweed before crossing into scrub-shrub upland dominated by huisache and honey mesquite. The soils in this location are primarily Aransas clay, saline (As) (see Appendix B).

4.17.5 Impact Analysis

The MEP Corridor is approximately 2.7 miles southeast of the known population of black lace cactus in Refugio County (TPWD and TXNDD 2013). While there is open scrub-shrub habitat at this location, most of the scrub-shrub is taller than three and a half feet, which is taller than what the only known Refugio County population prefers (USFWS 1986). The soils are mostly clay textures rather than the sandy loam in which the species grows. Given the proximity to the known population and the presence of some of the plants associated with the black lace cactus, it is possible that it could be encountered on the MEP Corridor, but given that no black lace cacti were found during the initial surveys and that this habitat is not ideal, it is highly unlikely it will be encountered.

On July 24-25, 2013, Tetra Tech biologists conducted species-specific surveys for the black lace cactus along the MEP Corridor. Potential habitats were selected for surveys after reviewing the available literature, TXNDD records (TPWD and TXNDD 2012 and 2013), georeferenced aerial photography, and USDA/NRCS soil data for Refugio and San Patricio Counties (USDA NRCS 2012a and b). No black lace cacti were observed during the survey.

4.17.6 Preliminary Determination

Based on the above analysis and based on the absence of the black lace cactus in species-specific surveys, implementation of the proposed Project is expected to have **no effect** on the **black lace cactus**.

4.18 Slender rush-pea (*Hoffmannseggia tenella*)

Slender rush-pea (*Hoffmannseggia tenella*) is a small member of the Fabaceae (pea) family. It has alternate, bipinnate, compound leaves and short pink-orange flowers. It is rarely more than six inches tall (USFWS 1988). Slender rush-pea was first listed as endangered in 1985 under

the protection of the ESA (USFWS 2012p). It remains listed as endangered under the ESA (USFWS 2012a).

4.18.1 Distribution

In the US, the slender rush-pea is only known in Texas. Currently, there are only four known populations (TPWD 2013b) in two Texas counties: Nueces and Kleberg (USFWS 1988). One large population was discovered in 1985 with 10,000 individuals (USFWS 1988).

4.18.2 Endangerment Factors

The primary limiting factor for slender rush-pea is permanent loss of Gulf Coast Prairie habitat (USFWS 2008 and TPWD 2013j). Most of the Gulf Coast Prairie lands have become agricultural fields or pasture lands. Grasses grown on pasture lands were aggressive (e.g., Bermuda grass and King Ranch bluestem [*Bothriochloa ischaemum* var. *songarica*]) (USFWS 1988) and out-competed slender rush-pea.

4.18.3 Life History Requirements

Slender rush-pea flowers in late winter until midsummer (February to July). After the initial flowering, this species sporadically flowers again after rainy periods. It only produces two to four seeds per fruit, but each plant will produce several fruits each year (TPWD 2013j).

Habitat for this species is found in areas with clay soils and short native grasses. It is likely this is a pioneer species, one that can inhabit recently disturbed areas. It is intolerant of competition (USFWS 1988).

4.18.4 Field Survey Results

The field survey revealed the Project Action Area traversed no Gulf Coast prairie lands or native grasslands in San Patricio County. Within San Patricio County, the MEP Corridor primarily crosses agricultural, maintained, pastureland, and saltmarsh land uses and habitats. Grassy areas are minimal and Bermuda grass and King Ranch bluestem are commonly found throughout the pipeline corridor.

4.18.5 Impact Analysis

Slender rush-pea is a species of the blackland prairie. The Project Action Area in San Patricio County primarily contains cropland, maintained, pastureland, and saltmarsh land uses and habitats and does not contain any blackland prairie. The few areas of shrubland habitat would not be suitable for the slender rush-pea because it is dependent on open grasslands. Bermuda grass and King Ranch bluestem are very competitive and are frequently found in the grassland habitat of the Project Action Area. Slender rush-pea is a competition-intolerant plant. It cannot compete with successional or invasive plants and it is highly unlikely that it would be found in the Project Action Area and therefore, would likely not be affected by the Project.

On July 24-25, 2013, Tetra Tech biologists conducted species-specific surveys for the slender rush-pea along the MEP Corridor. Potential habitats were selected for surveys after reviewing the available literature, TXNDD records (TPWD and TXNDD 2012 and 2013), georeferrenced aerial photography, and USDA/NRCS soil data for Refugio and San Patricio Counties (USDA NRCS 2012a and b). No slender rush-peas were observed during the species-specific survey.

4.18.6 Preliminary Determination

Based on the above analysis and based on the absence of the slender rush-pea in species-specific surveys, implementation of the proposed Project is expected to have **no effect** on the **slender rush-pea**.

4.19 South Texas ambrosia (*Ambrosia cheiranthifolia*)

South Texas ambrosia (*Ambrosia cheiranthifolia*) is a small member of the Asteraceae (sunflower) family. It blooms (small clusters of yellow flowers) in the fall and has one- to two-inch oval leaves with a ranked spiral phyllotaxy. It grows to approximately one foot in height. South Texas ambrosia was first listed as endangered in 1994 under the protection of the ESA (USFWS 2012q). It remains listed as endangered under the ESA (TPWD 2013a).

4.19.1 Distribution

In the US, South Texas ambrosia is endemic to Texas. It is believed to be present in four counties: Nueces, Kleberg, Jim Wells, and Cameron (USFWS 2012q). The Five-Year Review of the species indicates that its range is Nueces and Kleberg Counties (USFWS 2010e). Currently, there are only six known populations of South Texas ambrosia (TPWD 2013k).

4.19.2 Endangerment Factors

The primary limiting factor for South Texas ambrosia is fragmentation and permanent loss of Gulf Coast Prairie habitat. Most of the Gulf Coast Prairie lands have become agricultural fields or pasture lands. Grasses that were permitted to grow in the newly maintained lands were aggressive and have outcompeted South Texas ambrosia in most areas (USFWS 2010e).

4.19.3 Life History Requirements

South Texas ambrosia flowers in fall. It is a monoecious plant (has both male and female flowers). Neither the male or female flowers are very pronounced. There are 10–20 male flowers on a stalk. Male flowers are 0.25-inch wide with a yellowish color. Female flowers are small, axillary clusters below the male stalks (TPWD 2013k). It also reproduces vegetatively through root sprouts (rhizomatic). This makes identification of a population or an individual difficult. Due to its similarity in habitat requirements, this species might occur with the slender rush-pea.

Habitat for this species is found in clay or sandy loam soils in open grasslands. It is a characteristic species of grassland and savannah habitats. It is intolerant of competition with nonnative grass species (King Ranch bluestem and buffelgrass) and invasion of grasslands by shrubs and trees, like honey mesquite, although the South Texas ambrosia does occur among scattered woody plants (TPWD 2013k and USFWS 2010e).

4.19.4 Field Survey Results

The field survey revealed the MEP Corridor traversed no Gulf Coast prairie lands or native grasslands in San Patricio County. Within San Patricio County, the MEP Corridor primarily crosses agricultural, maintained, pastureland, and saltmarsh land uses and habitats. Grassy areas are minimal and Bermuda grass and King Ranch bluestem are commonly found throughout the pipeline corridor. Mowed grassy roadside boundaries exist within the survey area. An experiment on the species' response to growing was performed at Naval Air Station

Kingsville in 1993. The results for weekly mowing indicated South Texas ambrosia was not able to thrive, especially in hot, dry weather. It was found mower-tolerant if it could grow to flowering height. Therefore, regular mowing could result in increased density of clonal stands, but only if it is not frequent enough to keep the plants from flowering (USFWS 2010e).

4.19.5 Impact Analysis

Because this species can vegetatively reproduce, it can potentially be found in mowed areas, but surveys revealed no presence of this species. If the species was present in these areas, its natural history indicates there would be clonal stands, due to the regular mowing.

The Project Action Area in San Patricio County primarily contains cropland, maintained, pastureland, and saltmarsh land uses and habitats and does not contain any Gulf Coast prairie. Bermuda grass and King Ranch bluestem are very competitive and are very frequently found in the grassland habitat of the Project Action Area. The South Texas ambrosia cannot compete with invasive plants and it is highly unlikely that it would be found in the Project Action Area.

The few areas of shrubland habitat in San Patricio County would not be suitable for South Texas ambrosia because the species is dependent on open grassland and prairie habitat. Honey mesquite, a successional plant, is present in the shrubland habitat. While the South Texas ambrosia can be found among scattered woody plants, invasion of grasslands by shrub and tree species does contribute to a loss of habitat for this species, making these small patches of shrubland habitat suboptimal habitat for the South Texas ambrosia.

Additionally, in those areas where suitable soils are present, they are located in agricultural fields where soils have been disturbed and non-native plant species have been introduced or in scrub-shrub areas where successional plants are abundant. Based on these reasons, it is highly unlikely South Texas ambrosia is found within the Project Action Area and therefore, it is unlikely it would be affected by the Project.

4.19.6 Preliminary Determination

Based on the above analysis, implementation of the proposed Project is expected to have **no effect** on the **South Texas ambrosia**.

5.0 CUMULATIVE EFFECTS

The Project Action Area for the Project is limited to the area within the OxyChem Facility fence line, the approximately 114.5-mile-long, 100-foot-wide MEP Corridor, and the approximately 18.5-mile-long, 100-foot-wide SPP Corridor. OxyChem is unaware of any future State, tribal, local or private actions, not involving Federal activities, proposed within the Project Action Area. Accordingly, the proposed Project, combined with other non-federal reasonably foreseeable future actions, will not result in any cumulative effects on water quality or air quality within the Project Action Area.

6.0 CONCLUSIONS

6.1 Determination of Effect

6.1.1 Protected Species

The recommended determinations of effect for federally-listed species with the potential to occur within habitat located within the Project Action Area are summarized below in Table 6-1.

Table 6-1 Threatened, Endangered, and other Species of Concern with the Potential to Occur in Aransas, Calhoun, Jackson, Matagorda, Refugio, San Patricio, and Victoria Counties Based on Habitat Presence and their Preliminary Effect Determination

Common Name	Scientific Name	Preliminary Determination
Mammals		
Gulf Coast jaguarundi	*Herpailurus yaguarondi cacomitli*	May affect, not likely to adversely affect
Ocelot	*Leopardus pardalis*	May affect, not likely to adversely affect
Red wolf	*Canis lupus rufus*	No Effect
West Indian manatee	*Trichechus manatus*	No Effect
Mammals - Whales		
Blue whale	*Balaenoptera musculus*	No Effect
Fin whale	*Balaenoptera physalus*	No Effect
Humpback whale	*Megaptera novaeangliae*	No Effect
Sei whale	*Balaenoptera borealis*	No Effect
Sperm whale	*Physeter macrocephalus*	No Effect
Birds		
Attwater's prairie chicken	*Tympanuchus cupido attwateri*	May affect, not likely to adversely affect
Bald eagle	*Haliaeetus leucocephalus*	No Take
Eskimo curlew	*Numenius borealis*	No Effect
Interior least tern	*Sternula antillarum athalassos*	No Effect
Northern aplomado falcon	*Falco femoralis septentrionalis*	May affect, not likely to adversely affect
Piping plover	*Charadrius melodus*	May affect, not likely to adversely affect
Red knot	*Calidris canutus rufa*	Not likely to jeopardize continued existence
Sprague's pipit	*Anthus spragueii*	Not likely to jeopardize continued existence
Whooping crane	*Grus americana*	May affect, not likely to adversely affect
Reptiles		
Green sea turtle	*Chelonia mydas*	May affect, not likely to adversely affect
Hawksbill sea turtle	*Eretmochelys imbricata*	May affect, not likely to adversely affect
Kemp's Ridley sea turtle	*Lepidochelys kempii*	May affect, not likely to adversely affect
Leatherback sea turtle	*Dermochelys coriacea*	May affect, not likely to adversely affect
Loggerhead sea turtle	*Caretta caretta*	May affect, not likely to adversely affect
Mollusks		
Golden orb	*Quadrula aurea*	Not likely to jeopardize continued existence
Smooth pimpleback	*Quadrula houstonensis*	Not likely to jeopardize continued existence
Texas fatmucket	*Lampsilis bracteata*	Not likely to jeopardize continued existence
Texas fawnsfoot	*Truncilla macrodon*	Not likely to jeopardize continued existence
Texas Pimpleback	*Quadrula petrina*	Not likely to jeopardize continued existence
Plants		
Black lace cactus	*Echinocereus reichenbachii var. albertii*	No Effect
Slender rush-pea	*Hoffmannseggia tenella*	No Effect
South Texas ambrosia	*Ambrosia cheiranthifolia*	No Effect

Additionally, the Project is not anticipated to result in the "take" of migratory birds, bald eagles, or golden eagles as defined in the MBTA and BGEPA, respectively.

6.1.2 Critical Habitat and Other Sensitive Resources

The Project Action Area traverses the Refugio-Goliad Priority Management Zone of the Attwater's Prairie Chicken. The Project also crosses portions of the Aransas River, Mission River, Guadalupe River, Garcitas Creek, Lavaca River, West Carancahua Creek identified as Ecologically Significant River and Stream Segments (TPWD 2001). The Project does not cross any critical habitat for T&E species (USFWS 2013e).

6.2 Conservation Measures

This section provides a summation of conservation measures to ensure federally-listed T&E species in and surrounding the Project Action Area will not be affected by the Project. In addition to the use of the measures described below, the Ethane Cracker Facility, MEP Corridor, and SPP Corridor will comply with all conditions of the required regulatory permits necessary for their construction and operation.

6.2.1 Environmental Training

Conservation Measures/Management Practices – OxyChem will provide environmental training to all on-site construction personnel regarding federally-listed T&E species with the potential to occur in the vicinity of the Project. The training will also include conservation measures/management practices that will be complied with to ensure impacts to federally-listed T&E species are minimized or avoided.

Sensitive Snake Education and Management Plan – Although there are no federally-listed T&E snakes in Texas, USFWS expressed concerns regarding potential construction-related impacts to several sensitive snake species because potential suitable habitat exists within the Project site. Specifically, USFWS expressed concerns regarding impacts to the Texas indigo snake (*Drymarchon melanurus erebennus*), Texas scarlet snake (*Cemophora coccinea lineri*), Timber rattlesnake (*Crotalus horridus*) and gulf saltmarsh snake (*Nerodia clarkii*) during the February 2012 pre-application meeting for OxyChem's Fractionator Facility and San Patricio Pipeline Project. These species are also found in counties along the MEP Corridor.

To address USFWS's concerns regarding potential adverse impacts to sensitive snakes during Project construction, OxyChem will provide environmental training to on-site construction personnel. The intent of the training is to instruct construction personnel on how to identify and avoid snakes with the expectation that this will reduce snake fatalities. Additionally, the training will help reduce danger to workers during construction given the timber rattlesnake is venomous and other native venomous snakes might be encountered during construction. Appendix C provides the *Sensitive Snake Education and Management Plan* that outlines sensitive snake description/identification (including differences between venomous snakes and their non-venomous mimics), habitat/behavior, threats to each species, and actions to be taken if sensitive snakes are observed during Project construction. Implementation of this plan will minimize potential impacts to sensitive snakes during construction.

6.2.2 Ethane Cracker Facility

Air Quality – OxyChem will design the Ethane Cracker Facility to use the BACT to control the Project emissions and thus minimize impacts to the surrounding environment to the maximum extent practicable. As demonstrated by the Air Quality Modeling for the Facility, all concentrations of pollutants from the Ethane Cracker Facility Site are below the SILs at all

points beyond the Ethane Cracker Facility Site boundaries. The Ethane Cracker Facility will have no effect on air quality for federally-listed T&E species.

Wastewater – OxyChem will design the Ethane Cracker Facility to ensure the Project does not adversely affect the quality of waters potentially used by federally-listed T&E species (USFWS and NMFS promulgated ESA species), migratory birds, and bald and golden eagles. Spill containment areas will be provided at the new upland Ethane Cracker Facility. Contaminated water will be collected from process, storage, storage pump pads, loading areas, utilities, and firewater areas. The contaminated water will be stored in tanks and then fed to the contaminated water stripper to remove volatile hydrocarbons prior to treatment at the existing OxyChem Facility wastewater treatment unit (TPDES Permit No. WQ0003083000). It will subsequently be discharged to an outfall diffuser as required by the permit.

Stormwater Outfall – Uncontaminated stormwater that has not contacted the process area will be routed to the existing stormwater outfall. This uncontaminated stormwater includes runoff from roads and vegetated areas. There should be no process-related chemicals present in this stormwater because it will be segregated from the process areas. The stormwater outfall is typically tested for pH, oil & grease, and total organic carbon before the water is released and must meet the limitation established in the TPDES permit to maintain receiving water quality. As such, discharges associated with the proposed Project will not adversely affect receiving waters.

Operation of Ethane Cracker Facility – OxyChem will use its existing local municipal water source instead of surface waters for operation of the Ethane Cracker Facility. Surface water withdrawals from La Quinta Channel/Corpus Christi Bay will not be necessary, thereby avoiding impacts to surface waters used by protected species.

Ethane Cracker Facility Lighting/Avian Conservation Measures – Lights will be located throughout the Ethane Cracker Facility Site so new structures are visible during low-light conditions (dawn, dusk, and nighttime hours). As a matter of standard lighting procedures at the existing OxyChem Facility, OxyChem will ensure the Ethane Cracker Facility Site will be well-lighted for aircraft safety and to accommodate maintenance needs during nighttime hours. New overhead power lines will be located on one power supply line and adjacent to and at a similar height as existing overhead power lines at the Ethane Cracker Facility Site, thereby avoiding creation of a new potential strike hazard to migrating whooping cranes. The power lines are located between and amongst existing and new major aboveground industrial facilities and are not located in a highly used avian flight path. Additionally, because they are located in existing and new industrial facilities, the area will be well-lighted, thus making the power lines broadly visible even during low-light conditions. The new electrical substation will be located adjacent to the existing DuPont substation at the Ethane Cracker Facility Site and will be well lighted for clear visibility during nighttime hours. If a whooping crane is observed within 1,000 feet of an active work area, construction personnel will cease work until the bird moves out of harm's way. These actions particularly will avoid impacts to migrating whooping cranes that might use the Project Action Area or surrounding areas as stopping grounds. These actions will also avoid impacts to other migratory birds, the bald eagle, and the golden eagle. OxyChem has committed to this conservation measure per their cover letter to USFWS provided with this Biological Assessment.

6.2.3 Pipeline

Pipeline Corridors – OxyChem aligned the pipelines through man-altered areas as well as along existing pipeline corridors to minimize impacts to habitat which has the potential to be

used by T&E species. The majority of the pipelines will be located in cropland, maintained areas, and pastureland, collectively comprising 1,826.90 acres or 80% of the 2,274.78-acre Project Action Area. To further avoid impacts, HDD will be used to avoid certain wetlands, streams/rivers, and all saltmarshes traversed by the MEP Corridor.

Horizontal Directional Drilling/HDD Monitoring and Contingency Plan – OxyChem will use HDD technology to traverse saltmarsh wetland/waterbody complexes and perennial streams traversed by the MEP Corridor. This will avoid disturbance to aquatic features and T&E species habitat. It will also avoid impacts to water quality in these areas. OxyChem will implement their HDD Monitoring and Contingency Plan (see Appendix D) in the event of an inadvertent frac-out during HDD construction. The Plan includes best management practices to avoid or plug a potential frac-out, and in the unlikely event of a frac-out, provisions to monitor and respond with actions to minimize and contain a frac-out. Implementation of the HDD Monitoring and Contingency Plan will reduce the extent of a potential frac-out to a level that will result in no impact to T&E species.

Hydrostatic Testing – OxyChem will use water obtained from existing sources and transported to the MEP Corridor or nitrogen for hydrostatic testing of pipelines. Operational test waters will also be obtained from existing sources. It is not anticipated that surface water withdrawals will be necessary, thereby avoiding impacts to surface waters potentially used by protected species.

Jaguarundi/Ocelot Conservation Measures – In the event lighting is used during pipeline construction, it will be directed away from any brush that might be used as a travel corridor (vegetation along creeks or riparian areas) by the jaguarundi or ocelot. Additionally, during environmental training, construction personnel will be instructed to use slow speed while operating vehicles and equipment in the construction corridor.

Avian Conservation Measures - Removal of trees and heavy brush (scrub/shrub) will not occur during migratory bird nesting season (April 15 – August 1 of each year). Although no bald eagle nest trees or trees suitable for nesting were observed during the field survey, if a bald eagle nest is located within 660 feet of the construction area, compliance with the USFWS 2007 Bald Eagle Management Guidelines will occur. Upon completion of pipeline installation, a native seed mix suitable for APC will be used to revegetate the permanent and temporary ROW areas located in APC “good core area” (between approximately MPs 44.5 – 48). HDD will be used to cross saltmarshes/associated waterbodies as well as perennial streams to avoid disturbance to foraging habitat for federally-listed bird species.

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