BIOLOGICAL ASSESSMENT
FOR
M&G/CHEMTEX JUMBO PROJECT
NUECES COUNTY, TEXAS

Submitted To:

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TABLES

APPENDICES

Appendix A:

ACRONYMS

AOI	area of significant impact
AQRV	air quality related values
AVO	olfactory
BA	biological assessment
BACT	best available control technology
BMP	best management practices
CO	carbon monoxide
dBA	decibels
DLN	Dry Low NO_x
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESL	effects screening level
FCAA	Federal Clean Air Act
FEMA	Federal Emergency Management Agency
FHPM	Federal-Aid High Program Manual
FIRM	flood insurance rate map
GAT	Geologic Atlas of Texas
GE	General Electric
GHG	greenhouse gas
HRSG	heat recovery steam generator
LAER	Lowest Achievable Emission Rate
MGD	million gallons per day
MMPA	Marine Mammal Protection Act
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NH_3	ammonia
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NRCS	Natural Resources Conservation Service
NSR	New Source Review
NWI	National Wetland Inventory
NWS/AHPS	National Weather Service/Advanced Hydrologic Prediction Service
Pb	lead
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers
ppmvd	parts per million by volume, dry basis
PSD	Prevention of Significant Deterioration

RACT	Reasonably Available Control Technology
RO	reverse osmosis
SCR	selective catalytic reduction
SIL	significant impact level
SO_2	sulfur dioxide
TCAA	Texas Clean Air Act
TCEQ	Texas Commission on Environmental Quality
TPDES	Texas Pollutant Discharge Elimination System
TSP	total suspended particulate
TWDB	Texas Water Development Board
TXNDD	Texas Natural Diversity Database
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compounds

EXECUTIVE SUMMARY

M&G Resins USA, LLC (M&G) is proposing to construct a new plastic resin manufacturing plant at its site located in Corpus Christi, Nueces County, Texas. The facility will consist of a PET Plant (a polyethylene terephthalate (PET) unit and a terephthalic acid (PTA) unit) owned and operated by M&G, and a new heat and power utility plant (Utility Plant) that will be owned and operated by NRG Development Company, Inc.(NRG). Separate GHG permits are being obtained for the proposed PET Plant and the Utility Plant. This BA is provided to assist in the required biological investigation for both of the above-mentioned GHG permit applications. Although two separate permits are being obtained, this BA addresses the impact of the entire proposed project (PET and Utility Plant). This BA and the accompanying Cultural Resources Survey (attached) are provided to assist in the required biological and cultural resources investigation for both of the above-mentioned GHG permit applications.

The TCEQ is responsible for issuance of Prevention of Significant Deterioration (PSD) permits for all pollutants that have National Ambient Air Quality Standards (NAAQS). Since the TCEQ has not received PSD delegation for GHG, Environmental Protection Agency (EPA) is responsible for issuing GHG PSD permits.

This Biological Assessment (BA) is an evaluation of the associated potential environmental impacts that the proposed project may have on federally-protected species and/or their potential habitat within the projected area of impact. Protected species included in this document include federally-threatened and endangered species of Nueces and San Patricio County. Habitat evaluations for this BA were accomplished via a pedestrian survey of the proposed site as well as a windshield assessment of publicly accessible portions of the land-based Action Area. Subsequently, an evaluation of those resources based on air quality modeling results, construction and operational methodologies, and National Pollutant Discharge Elimination System (NPDES) information determined or gathered by Zephyr was accomplished.

Construction for the proposed facility, associated infrastructure, and auxiliary equipment will take place within approximately 190 acres owned by M&G on the north bank of the Viola ship Channel in Corpus Christi, Texas. Additional earth disturbance required for the project will occur for construction of rail lines and an approximate 1.6 mile pipeline right-of-way (ROW) (approximately 13 acres) west from the property to a nearby industrial facility. All areas experiencing construction are developed or have been created to be developed for industrial purposes.

Federally-listed and other managed species considered in this BA include Eskimo Curlew, Northern Aplomado Falcon, Piping Plover, Sprague's Pipit, Whooping Crane, Jaguarundi, Ocelot, Red wolf, West Indian manatee, Slender rushpea, South Texas ambrosia, Smalltooth sawfish, Atlantic Hawksbill sea turtle, Green sea turtle, Kemp's Ridley sea turtle, Leatherback sea turtle, Loggerhead sea turtle and five cetacean species overseen by the National Oceanic and Atmospheric Administration (NOAA). The habitat evaluation included a pedestrian survey of the proposed construction site. The habitat evaluation also included a windshield survey of all

land-based (upland) habitats visible from M&G property as well as those visible from public roadways within the Action Area. Data were collected to describe resident vegetation communities and assess the potential for occurrence of protected species. The dominant habitat is coastal grasslands.

To determine the Action Area for this BA, M&G performed dispersion modeling of the air pollutants that will be emitted as a result of the proposed project in accordance with the PSD Permit Air Quality Analysis requirements. The definition of the Action Area boundary was based on predicted impacts for pollutants for which a National Ambient Air Quality Standard (NAAQS) has been established. Based on this modeling, the Action Area was defined to extend to a maximum of 1.12 miles from the proposed project construction area.

Construction of the proposed project will have no direct impact on federally-listed species habitat. M&G will utilize the Best Available Control Technology (BACT) to control emissions and thus minimize impacts to the surrounding environment to the maximum extent practicable. Controls proposed for each pollutant are consistent with both the TCEQ BACT guidance and the most stringent limits in the EPA RACT/BACT/LAER Clearinghouse (RBLC).

Based on the background research described in Section 6.1 and the determinations described in Section 6.4, it is Zephyr's opinion that the proposed construction project will likely have no direct or indirect adverse impact on federally-listed species or their habitat.

This BA provides the results of an evaluation of the potential for the proposed project to impact species within the Action Area that are protected under the Endangered Species Act (ESA). The following table summarizes the effect determination for each federally listed species with the potential to occur within Nueces and San Patricio Counties according to the Annotated County Lists of Rare Species from TPWD.

Summary of Recommended Determinations of Effect		
Federally-listed Species	**Listing/Managing Agency**	**Recommended Determination of Effect**
Eskimo Curlew	USFWS	No effect
Northern Aplomado Falcon	USFWS	No effect
Piping Plover	USFWS	May effect, not likely to adversely effect
Whooping Crane	USFWS	May effect, not likely to adversely effect
Jaguarundi	USFWS	No effect
Ocelot	USFWS	No effect
Red wolf	USFWS	No effect
West Indian manatee	USFWS	May effect, not likely to adversely effect
Slender rushpea	USFWS	No effect
South Texas ambrosia	USFWS	No effect
Atlantic Hawksbill sea turtle	USFWS/NOAA	May effect, not likely to adversely effect
Green sea turtle	USFWS/NOAA	May effect, not likely to adversely effect
Kemp's Ridley sea turtle	USFWS/NOAA	May effect, not likely to adversely effect

Summary of Recommended Determinations of Effect		
Federally-listed Species	**Listing/Managing Agency**	**Recommended Determination of Effect**
Leatherback sea turtle	USFWS/NOAA	May effect, not likely to adversely effect
Loggerhead sea turtle	USFWS/NOAA	May effect, not likely to adversely effect
Smalltooth sawfish	NOAA	No effect
Blue whale	NOAA	No effect
Fin whale	NOAA	No effect
Humpback whale	NOAA	No effect
Sei whale	NOAA	No effect
Sperm whale	NOAA	No effect

1.0 INTRODUCTION

M&G Resins USA, LLC (M&G) is proposing to construct a new plastic resin manufacturing plant at its site located in Corpus Christi, Nueces County, Texas. The facility will consist of a PET Plant (a polyethylene terephthalate (PET) unit and a terephthalic acid (PTA) unit) owned and operated by M&G, and a new heat and power utility plant (Utility Plant) that will be owned and operated by NRG Development Company, Inc.(NRG). Separate GHG permits are being obtained for the proposed PET Plant and the Utility Plant. This BA is provided to assist in the required biological investigation for both of the above-mentioned GHG permit applications. Although two separate permits are being obtained, this BA addresses the impact of the entire proposed project (PET and Utility Plant). This BA and the accompanying Cultural Resources Survey (attached) are provided to assist in the required biological and cultural resources investigation for both of the above-mentioned GHG permit applications.

The M&G facility (which includes the PET Plant and the Utility Plant) triggers PSD review for GHG pollutants because the GHG emissions from the project will be more than 100,000 tons/yr making the site a new major source. Therefore, the entire Project Jumbo is subject to PSD review for GHG pollutants. The applications for GHG PSD air permits for this project have been submitted to the EPA. The applications for criteria pollutant PSD permits have been submitted to the Texas Commission on Environmental Quality (TCEQ) with copies for the EPA.

This Biological Assessment (BA) is an evaluation of the associated potential environmental impacts that the proposed construction project may have on federally-listed species and/or their potential habitat within the projected area of impact.

Protected species included in this document include federally-threatened and endangered species and NOAA monitored species. A description of the federal agency regulations for the various protected species evaluated in this BA is presented in Section 2.0.

This BA was developed to investigate, qualify, quantify, and report the possible effects, including: direct and indirect, interdependent and interrelated actions that the proposed project may have on federally-protected species within the Action Area. Habitat evaluations for this BA were accomplished via pedestrian survey of the project site as well as a windshield assessment of publicly accessed portions of the land-based Action Area. Subsequently, an evaluation of those resources based on air quality modeling results, construction and operational methodologies, and National Pollutant Discharge Elimination System (NPDES) information determined or gathered by Zephyr was accomplished.

Following a study of possible effects to federally listed species, a determination of effect will be stated. Per United States Fish and Wildlife Service (USFWS) guidelines, the three possible determinations as described by USFWS are as follows:

1. No effect - "No effect" means there will be no impacts, positive or negative, to listed or proposed resources. Generally, this means no listed resources will be exposed to action

and its environmental consequences. Concurrence from the USFWS/NOAA is not required.

2. May affect, but is not likely to adversely affect - "May affect, but is not likely to adversely affect" means that all effects are beneficial, insignificant, or discountable. Beneficial effects have contemporaneous positive effects without any adverse effects to the species or habitat. Insignificant effects relate to the size of the impact and include those effects that are undetectable, not measurable, or cannot be evaluated. Discountable effects are those extremely unlikely to occur. These determinations require written concurrence from the USFWS or NOAA.

3. May affect, is likely to adversely affect - "May affect, and is likely to adversely affect" means that listed resources are likely to be exposed to the action or its environmental consequences and will respond in a negative manner to the exposure.

   Note: A finding of "may affect, is likely to adversely affect" by an action agency and the USFWS/NOAA requires "formal consultation" between the action agency and the USFWS. Formal consultation results in the USFWS/NOAA issuing a biological opinion as to whether or not the action, as proposed, will jeopardize the continued existence of any listed species.

2.0 FEDERAL & STATE REGULATIONS

2.1 REGULATIONS AND STANDARDS

2.1.1 Clean Air Act

Both the Federal Clean Air Act (FCAA) and Texas Clean Air Act (TCAA) require that maximum ambient air quality concentration limits be established that are designed to protect public health, welfare and the environment. Ambient air is the air to which the general public has access, as opposed to air within the boundaries of an industrial facility.

The FCAA ambient standards are the National Ambient Air Quality Standards (NAAQS) and are established by the U.S. Environmental Protection Agency (EPA). The NAAQS are maximum concentration limits for specific pollutants in ambient air over a specific averaging time established in federal regulation (40 CFR 50). The NAAQS are classified into two categories: primary and secondary standards. Primary standards are established to protect public health, including "sensitive" populations such as asthmatics, children and the elderly. Secondary standards are established to protect public welfare, including visibility, animals, crops, vegetation and buildings. The FCAA requires periodic review of the science upon which the standards are based and the standards themselves to assure protection of the nation's public health and environment. This review is thorough and extensive involving a science policy workshop to identify key policy-relevant science issues to review, an integrated science assessment which is a comprehensive review, synthesis and evaluation of the science including risk and exposure assessments. Therefore these existing primary and secondary standards represent the current science related to protection of public welfare.

The EPA has established NAAQS for six principal air pollutants, also referred to as criteria air pollutants. These six criteria air pollutants are carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone, particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}), particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$), and sulfur dioxide (SO_2). The FCAA also establishes that geographic areas be classified as either having ambient concentrations above or below the established NAAQS. A geographic area whose ambient air concentration for a criteria pollutant is equal to or less than the primary standard is an attainment area. A geographic area with an ambient air concentration greater than the primary standard is a nonattainment area. A geographic area will have a separate designation for each criteria pollutant. There is no NAAQS pollutant for which Nueces County (where the M&G plant is proposed to be located) is designated nonattainment; therefore Nueces County is considered unclassified/attainment.

In addition to NAAQS, the EPA has established PSD increment consumption limits prevent the air quality in attainment areas from deteriorating to the level set by the NAAQS
.

In order to obtain a PSD permit for criteria pollutants, an applicant is required to demonstrate with computer air dispersion modeling that the emissions from their proposed project will not exceed the NAAQS and the PSD Increment for each pollutant. This demonstration is conducted in a two-step process. First the emissions from the new project are modeled to determine maximum off-property impacts. If those impacts are below a defined significant impact level (SIL) for a specific pollutant and averaging period, then the increase in ambient concentration is considered to be insignificant and no further evaluation is required for that pollutant and averaging period. If the project impacts are above the SIL, then additional dispersion modeling is required in which the project emission increases are modeled along with other emissions sources in the area and that predicted impact is added to a background level and compared to the NAAQS and PSD Increment.

2.1.2 Endangered Species Act

Regulation of the Endangered Species Act (ESA) is accomplished by the USFWS and the National Oceanic and Atmospheric Administration - National Marine Fisheries Service (NOAA-NMFS). "The purpose of the ESA is to protect and recover imperiled species and the ecosystems on which they depend." Imperiled species specifically includes those listed by the USFWS as threatened or endangered. Candidate species are those "the FWS has enough information to warrant proposing them for listing but is precluded from doing so by higher listing priorities."

Section 7 of the ESA requires Federal agencies to insure that any action authorized, funded or carried out by them is not likely to jeopardize the continued existence of listed species or modify their habitat.

The ESA prohibits the "take" of threatened and endangered species. "Take" is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." "Harm" is defined as "…an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

3.0 PROJECT DESCRIPTION

3.1 PROJECT PURPOSE

The purpose of this project is the construction of a new polyester complex composed of two new plants, a PET plant and a PTA with their associated utilities. The proposed project is located on Joe Fulton International Trade Corridor/E. Navigation Blvd approximately 5 miles south of the I-37 intersection (Figure 3-1, Appendix A).

3.2 CONSTRUCTION INFORMATION

Construction for the proposed facility, associated infrastructure, and equipment installation will take place within approximately 200 acres of 431 acres owned by the M&G Group on the north bank of the Viola ship Channel in Corpus Christi, Texas. Additional earth disturbance required for the project will occur for construction of rail lines and an approximate 1.6 mile pipeline ROW west from the property to a nearby industrial facility. All areas experiencing construction are developed or have been created to be developed for industrial purposes. The construction area is shown on Figure 3-2 (Appendix A).

The projected construction start date is 1st quarter, 2014. The projected operation start date is 1st quarter 2016.

3.2.1 Construction Activities

The total time estimated to complete the construction and equipment installation for the whole project is approximately 24 months and includes the following list of general construction activities:

1. Site preparation, erosion control and drainage (which includes all earthworks activities, such as cuts and fills, as well as borrowing material from other approved nearby location if required)
2. New tie-ins
3. Install piles for foundations
4. Place concrete for permanent facilities and roadways
5. Install/assembling steel structures and heavy equipment and associated electrical, instrumentation
6. Install interconnecting piping and pipe racks
7. Final piping tie-ins
8. Completion of instrumentation & electrical work
9. Rail yard implementation
10. Thermal insulation for piping and equipment
11. Touch-up painting
12. Pre-commissioning, commissioning, start-up and troubleshooting

The project will be constructed on approximately 190-acres located along the Joe Fulton Corridor. This property is currently undeveloped and was formed from dredging spoils deposited during the construction and maintenance of the adjacent Viola ship channel.

The expansion project addressed in this document will involve mechanical excavation within the Viola Ship Channel (Corpus Christi Ship Channel) and will be similar to ongoing maintenance dredging. However, no construction in or over water is proposed as described below:

1. No shipping/docking modifications are proposed;
2. No construction is proposed within a waterbody;
3. No overwater structures are proposed;
4. No pilings or sheet piles are proposed within water;
5. No boat slips are proposed;
6. No boat ramps are proposed;
7. No shoreline armoring is proposed;
8. No blasting is proposed;
9. No work on or near artificial reefs is proposed; and
10. No critical habitat is located within the construction area.

3.2.2 Emission Controls

As required by 30 Texas Administrative Code (TAC) §116.111(a)(2)(c), new or modified facilities must apply BACT, with consideration given to the technical practicability and economic reasonableness of reducing or eliminating the emissions from the facility and thereby minimizing the impact of emissions on the ambient air. TCEQ has established BACT guidance by emission source type and the EPA RACT/BACT/LAER Clearinghouse was consulted to determine if any additional controls should be considered. The new facilities associated with this project and their associated emission controls for each pollutant are summarized in Section 7.2.1 below. These performance levels reflect emission control levels consistent with TCEQ guidance and the information available in EPA's RACT/BACT/LAER Clearinghouse database. Section 7.0 (Conclusions) provides specific information on the project emission controls.

3.3 OPERATION AND MAINTENANCE INFORMATION

3.3.1 Operation

M&G will make Purified Terephthalic Acid (PTA) as an intermediate product with potential for external sale and Polyethylene Terephthalate (PET) as the primary product consuming the majority of PTA production. The following emission sources will be installed as part of this project.

- Cogeneration facility consisting of a natural gas fired turbine for electricity and steam generation, and two natural gas fired auxiliary boilers.

- Heat transfer fluid (HTF) heaters combusting natural gas (primary fuel), biogas generated in the waste water treatment system (secondary fuel), and process waste gas PTA Plant regenerative thermal oxidizers (RTOs) combusting natural gas (startup and supplemental fuel) and process waste gas controlled by thermal destruction.
- Diesel fired emergency generators and firewater pump engines
- Flare for the control of biogas from the waste water treatment system when the HTF heaters are not in operation.
- Cooling towers equipped with mist eliminators
- Equipment leak fugitives with leak detection program
- Process vents routed to control device or recycle
- Fixed roof storage tanks routed to scrubbers
- Floating roof storage tanks that are drain dry and routed to scrubbers
- Fixed roof diesel tanks with submerged filling

3.3.2 Water Use

All water used by M&G for Project Jumbo will be obtained from the Corpus Christi Inner Harbor. The saline sea water will be processed by M&G to produce process and non-process water supplies for the M&G facility and for the on-site electric power generation plant.

In accordance with the requirements of 40 CFR 316(b), the water intake flow to the desalinization plant will be at a level commensurate with that achievable with a closed-cycle, recirculating cooling system and the through-screen intake velocity will be less than or equal to 0.5 feet per second. These technology-based performance requirements are intended to minimize potential impingement mortality of fish and shellfish. In the event that it is determined by the TCEQ, EPA, or any fishery management agency that meeting the technology-based performance requirements for the intake will not be sufficient to prevent unacceptable stress to the protected species, critical habitat of those species, or other species of concern, then additional design technologies or operational measures will be provided by M&G.

3.3.3 Noise Effects

The noise from construction and operations would be perceptible to humans and wildlife to some extent immediately adjacent to the facility. Noise levels from project activities should be comparable to noise levels currently generated by the ship channel traffic. No noise effects to wildlife are expected as a result of the proposed project since the noise sources are constant and limited, rather than abrupt and excessive.

3.3.4 Infrastructure-related Effects

Land use impacts of the construction and operation of the proposed project will be limited to the site. Any increased noise, dust, and traffic from construction will be short-term for the duration of the project.

3.3.5 Human Activity Effects

Peak construction activities may require up to 3,000 additional workers within the facility. Although there will be a significant increase of activity within the facility during construction, it is not anticipated to have additional effects within or outside the facility. Operation of the project will require fewer onsite personnel than construction. Human activity associated with construction and operation is not anticipated to have an adverse effect upon potential listed species or their habitats.

Some additional boat traffic within the ship channel may occur during construction of the intake/outfall structures. However, this is not certain as it may be possible to accomplish all work efforts from equipment located onshore. Construction of the facility does not include any shipping or docking modifications. However, the Port of Corpus Christi intends to construct a barge docking facility to the southeast of the facility site regardless of whether M&G constructs the plastic resins facility. Once constructed, M&G may utilize the barge dock for delivery of process materials. As such, some small increase in shipping traffic (relative to existing traffic) may occur. Impacts from this increase are anticipated to have no adverse effect on listed species based upon the current volume of shipping and the projected small increase in shipping for M&G facility needs. Products of the facility are expected to be purchased and used locally. The product that is not able to be used locally will be shipped off-site via available mechanisms (railway, ship/barge, pipeline, or semi-truck trailer on existing roadways). No additional effects to wildlife are expected due to increased human activity from the project.

3.4 WASTEWATER AND STORM WATER INFORMATION

It is proposed that the source water for the plant operations will be obtained from the Corpus Christi Inner Harbor near the Viola Turning Basin. The wastewater to be discharged from the Jumbo facility will be authorized by a permit under the Texas Pollutant Discharge Elimination System (TPDES) to discharge back to the Corpus Christi Inner Harbor that is identified by TCEQ as Water Quality Segment 2484 - from US 181 to Viola Turning Basin. Segment 2484 is a man-made channel that was created for industrial use. The TCEQ designates this segment to be for “noncontact recreation use”, i.e. primary and secondary contact recreation activities should not occur because of unsafe conditions, such as ship and barge traffic. With regard to aquatic life uses, the TCEQ classifies this segment as “Intermediate” in 30 TAC 307. Details regarding this classification contained in 30 TAC 307 are highlighted below:

Texas Commission on Environmental Quality
Chapter 307 - Texas Surface Water Quality Standards
Rule Project No. 2007-002-307-PR

TABLE 3

Aquatic Life Use Subcategories

Aquatic Life Use Subcategory	Dissolved Oxygen Criteria, mg/L			Aquatic Life Attributes					
	Freshwater mean/ minimum	Freshwater in Spring mean/ minimum	Saltwater mean/ minimum	Habitat Character-istics	Species Assemblage	Sensitive species	Diversity	Species Richness	Trophic Structure
Exceptional	6.0/4.0	6.0/5.0	5.0/4.0	Outstanding natural variability	Exceptional or unusual	Abundant	Exceptionally high	Exceptionally high	Balanced
High	5.0/3.0	5.5/4.5	4.0/3.0	Highly diverse	Usual asso-ciation of regionally expected species	Present	High	High	Balanced to slightly imbalanced
Intermediate	4.0/3.0	5.0/4.0	3.0/2.0	Moderately diverse	Some expected species	Very low in abundance	Moderate	Moderate	Moderately imbalanced
Limited	3.0/2.0	4.0/3.0		Uniform	Most regionally expected species absent	Absent	Low	Low	Severely imbalanced
Minimal	2.0/1.5								

- Dissolved oxygen means are applied as a minimum average over a 24-hour period.
- 24-hour minimum dissolved oxygen concentrations are not to extend beyond 8 hours per 24-hour day. Lower dissolved oxygen minima may apply on a site-specific basis, when

As can be seen in the above table, the aquatic life uses for species in this segment are considered to be relatively poor as compared to Exceptional and High aquatic life uses.

It is estimated that the Project Jumbo facility will have an average daily wastewater discharge of 9.403 million gallons per day (MGD) of which 8.284 MGD, or 88 percent of the total discharge volume, will be backwash from the reverse osmosis (RO) units used to treat the raw water supply. The remainder of the wastewater will be associated with treated industrial wastewater, cooling tower and boiler blowdown, treated sanitary wastewater, and some process area storm water.

The estimated concentrations of constituents in the wastewater proposed to be discharged to Corpus Christi Inner Harbor were calculated based upon the following assumptions:

- Assumed water quality of the Inner Harbor makeup water
- RO System Recovery = Y = *Flow In / Flow Reject* = 2 (i.e. 50% reject)
- RO Rejection = R = 98%
- Concentration reject = C_{reject} = *Concentration Input * R * Y*

- PTA & PET wastewater treatment efficiencies per vendor and similar M&G facilities
- TCEQ secondary treatment design standards for sanitary wastewater

The proportional volumes and estimated effluent concentrations were combined for the discharge via a common outfall structure, i.e. Outfall 001. The resulting surrogate concentrations for the Jumbo facility discharge are listed on Column 1 of Table 3 -1 below. This table includes a listing of typical conventional, metals, and aquatic life toxic parameters that are used by the TCEQ for Texas Pollutant Discharge Elimination System (TPDES) permit considerations.

Outfall 001 will be provided with a diffuser to provide mixing of the effluent with the water in the Inner Harbor. The concentrations of Outfall 001 effluent at a boundary 200 feet from the point of discharge are presented in Column 2 of Table 3-1. This boundary is the Zone of Initial Dilution (ZID) for bays and estuaries per 30 TAC§307.8(b)(2).

Column 3 of Table 3-1 presents the water quality of the Inner Harbor based upon the following data sources:

(1) EPA *STORET* (short for STOrage and RETrieval) Data Warehouse for the Inner Harbor,
(2) Water quality information provided by the TCEQ for Segment 2484, and
(3) A water sample of the Corpus Christi Inner Harbor that was collected by Zephyr on January 7, 2013.

Comparison of Columns 2 and 3 in Table 3 -1 indicates that there may be negligible increases in the concentrations of conventional constituents within the Inner Harbor at the edge of the ZID. Additionally, further dilution of these constituents within the Inner Harbor will have a negligible effect of the receiving waters.

TABLE 3-1
Comparison of Concentrations

Parameter	Column 1	Column 2	Column 3
	Project Jumbo Discharge Avg. Concentration (mg/l)	**Project Jumbo Discharge Zone of Initial Dilution** Avg. Concentration (mg/l)	**Segment 2484 Corpus Christi Inner Harbor** Avg. Concentration (mg/l)
Conventional			
BOD (5-day)	60	<2.00	<2.00
CBOD (5-day)	49.5	<2.00	<2.00
Chemical Oxygen Demand	100	42.7	39.7
Total Organic Carbon	33	2.1	0.491
Dissolved Oxygen	6.9	3.2	3.0
Ammonia Nitrogen	0.84	0.5	0.463
Total Suspended Solids	53	30.4	29.2

Parameter	Column 1 **Project Jumbo Discharge** Avg. Concentration (mg/l)	Column 2 **Project Jumbo Discharge Zone of Initial Dilution** Avg. Concentration (mg/l)	Column 3 **Segment 2484 Corpus Christi Inner Harbor** Avg. Concentration (mg/l)
Nitrate Nitrogen	0.4	<2.06	<2.00
Total Organic Nitrogen	11.2	6.5	6.23
Total Phosphorous	0.2	0.1	0.072
Oil and Grease	4.1	2.4	2.27
Total Residual Chlorine	0.002	<0.07	<0.07
Total Dissolved Solids	72,276	42,193	40,600
Sulfate	8,333	4863.7	4680
Chloride	44,503	25,980	25,000
pH	6.0 - 9.0	6.5 - 9.0	6.5 - 9.0
Temperature	98	90.5	95
Bacteria	N/A	<35 (#/100 ml)	35 (#/100 ml)
Fluoride	0.56	0.8	0.76
Metals			
Total Aluminum	2.029	1.185	1.14
Total Antimony	<0.00161	<0.00161	<0.00161
Total Arsenic	0.007	0.004	0.00398
Total Barium	0.135	0.079	0.0758
Total Beryllium	<0.00124	<0.00124	<0.00124
Total Cadmium	<0.000854	<0.000854	<0.000854
Total Chromium	<0.00140	<0.00140	<0.00140
Trivalent Chromium	<0.00500	<0.00500	<0.00500
Hexavalent Chromium	<0.00360	<0.00360	<0.00360
Total Copper	<0.00200	<0.00200	<0.00200
Cyanide	0.046	0.027	0.026
Total Lead	0.022	0.002	0.00129
Total Mercury	<0.000130	<0.000130	<0.000130
Total Nickel	<0.00217	<0.00217	<0.00217
Total Selenium	0.005	0.003	0.00266
Total Silver	<0.000693	<0.000693	<0.000693
Total Thallium	<0.010	<0.010	<0.010
Total Zinc	0.039	0.015	0.0135
Aquatic Life Toxics			
Aldrin	<.00005	<.00005	<.00005
Carbaryl	<.005	<.005	<.005
Chlordane	<0.00015	<0.00015	<0.00015
Chlorpyrifos	<0.00005	<0.00005	<0.00005
Copper	0.039	0.039	0.039
4,4'-DDT	<.0001	<.0001	<.0001

Parameter	Column 1	Column 2	Column 3
	Project Jumbo Discharge Avg. Concentration (mg/l)	**Project Jumbo Discharge Zone of Initial Dilution** Avg. Concentration (mg/l)	**Segment 2484 Corpus Christi Inner Harbor** Avg. Concentration (mg/l)
Demeton	<.0002	<.0002	<.0002
Diazinon	<.0005	<.0005	<.0005
Dicofol	<.020	<.020	<.020
Dieldrin	<.0001	<.0001	<.0001
Diuron	<0.0001	<0.0001	<0.0001
Endosulfan (alpha)	<0.0001	<0.0001	<0.0001
Endosulfan (beta)	<0.0001	<0.0001	<0.0001
Endosulfan sulfate	<0.0001	<0.0001	<0.0001
Endrin	<.0001	<.0001	<.0001
Guthion	<0.0001	<0.0001	<0.0001
Heptachlor	<.00005	<.00005	<.00005
Hexachlorocyclohexane (Lindane)	<0.0001	<0.0001	<0.0001
Malathion	<0.0001	<0.0001	<0.0001
Mercury	<0.0002	<0.0002	<0.0002
Methoxychlor	<.002	<.002	<.002
Mirex	<.0002	<.0002	<.0002
Nonylphenol	<0.0001	<0.0001	<0.0001
Parathion (ethyl)	<0.0001	<0.0001	<0.0001
Pentachlorophenol	<.05	<.05	<.05
Phenanthrene	<.01	<.01	<.01
Polychlorinated Biphenyls (PCBs)	<.01	<.01	<.01
Toxaphene	<.005	<.005	<.005
Tributyltin (TBT)	<0.0001	<0.0001	<0.0001
2,4,5 Trichlorophenol	<.05	<.05	<.05

3.4.1 Effects of Discharge of Wastewater to Aquatic Habitat

An assessment of the aquatic life impacts that would be associated with the M&G discharge was performed using the TCEQ TEXTOX MENU No. 5 model for bays and estuaries. This model is used by the TCEQ to calculate water quality-based effluent limitations for TPDES permits using:

- Table 1, 2010 Texas Surface Water Quality Standards (30 TAC 307) for Freshwater Aquatic Life
- Table 2, 2010 Texas Surface Water Quality Standards for Human Health (except Mercury)
- Table 3, 2000 Texas Surface Water Quality Standards for Human Health (Mercury)

- Procedures to Implement the Texas Surface Water Quality Standards," Texas Commission on Environmental Quality, January 2003
- "Procedures to Implement the Texas Surface Water Quality Standards," Appendix D, Texas Commission on Environmental Quality, June 2010

The model determines the daily average and daily maximum effluent limits required to maintain the surface water quality standards for a wastewater discharge based upon the most recent in stream criteria established in 30 TAC §307.6 (c) and (d) and upon mixing zone and toxicological assumptions built into the model. With regard to toxic effects on aquatic life that would result from a wastewater discharge, numerical criteria were established by the TCEQ for those specific toxic substances where adequate toxicity information is available and that have the potential for exerting adverse impacts on water in the state. The appropriate criteria for aquatic life protection were derived in accordance with current EPA guidelines for deriving site-specific water quality criteria. Column 1 of Table 3-2 (below) provides the TEXTOX outputs for effluent limitations for the proposed discharge by the Project Jumbo facility to the Corpus Christi Inner Harbor.

Using this data, the TCEQ assumes that a permit effluent limitation would be needed if the water quality of a proposed wastewater discharge is equal to or exceeds a concentration that is 70% of the concentration calculated using TEXTOX (see Column 2 of Table 3-2 for these limits). Comparing these 70% screening level values to the surrogate effluent quality of the proposed Jumbo facility discharge prior to mixing (Column 1 of Table 3-1) indicates that no unacceptable toxicity that would result in the Corpus Christi Inner Harbor as a result of the discharge from the Jumbo facility. Please note that the Column 1 / Table 3-1 concentrations were converted from milligrams per liter to micrograms per liter for purposes of this comparison.

TABLE 3-2
AQUATIC LIFE ASSESSMENT
TEXAS WATER QUALITY SEGMENT NO. 2484

Parameter	COLUMN 1 Segment 2484 Allowable Effluent Limitations Daily Avg. (µg/L)	COLUMN 2 Segment 2464 70% of Allowable Effluent Limitations Daily Avg µg/L)	COLUMN 3 Project Jumbo Outfall 001 Effluent Quality (µg/L)
Aldrin	2.04	1.427	<.00005
Aluminum	N/A	N/A	N/A
Arsenic	233.63	163.542	7
Cadmium	71.19	49.831	<1
Carbaryl	961.18	672.829	<5
Chlordane	0.04	0.031	<0.15
Cblorpyrifos	0.02	0.012	<0.05
Chromium (+3)	N/A	N/A	N/A
Chromium (+6)	555.95	389.168	0.12
Copper	24.10	16.871	3.1

Parameter	COLUMN 1 Segment 2484 Allowable Effluent Limitations Daily Avg. (µg/L)	COLUMN 2 Segment 2464 70% of Allowable Effluent Limitations Daily Avg µg/L)	COLUMN 3 Project Jumbo Outfall 001 Effluent Quality (µg/L)
Copper (oyster waters)	N/A	N/A	N/A
4,4'-DDT	8.78	0.010	<.1
Dementon	0.01	0.785	<.2
Dicofol	1.12	N/A	<20
Dieldrin	N/A	0.016	<.1
Diuron	0.02	N/A	N/A
Endosulfan (alpha)	N/A	0.037	
Endosulfan II (beta)	0.05	0.037	<0.1
Endosulfan sulfate	0.05	0.037	<0.1
Endrin	0.02	0.016	<.1
Guthion	0.11	0.078	<0.1
Heptachlor	0.04	0.031	<.05
Hexachlorocyclohexane (Lindane)	0.25	0.176	<0.1
Lead'	157.14	109.998	<5
Malathion	0.11	0.078	<0.1
Mercury	3.29	2.305	<0.2
Methoxychlor	0.34	0.235	<2
Mirex	0.01	0.008	<.2
Nickel	146.83	102.784	0.93
Parathion (ethyl)	N/A	N/A	<0.1
Pentachlorophenol	23.68	16.574	<5
Phenanthrene	12.07	8.452	<10
Polychlorinated Biphenyls (PCBs)	0.34	0.235	<10
Selenium	884.35	619.046	4.87
Silver	82.11	57.474	<2
Toxaphene	0.00	0.002	<5
Tributyltin (TBT)	0.38	0.263	<0.04
2,4,5 Trichlorophenol	134.51	94.154	<50
Zinc	250.62	175.435	39.5

Although it is estimated that there will be an increase in some Corpus Christi Inner Harbor water quality parameters as a result of the proposed discharge, Project Jumbo is neither expected to exceed any established water quality based effluent limitations (WQBELs) nor as the table above indicates result in any toxic effects on aquatic life. Additionally, the discharge will continue to comply with applicable State of Texas water quality standards for the receiving segment. Therefore, the wastewater discharge is anticipated to have a negligible effect on the water quality of the Corpus Christi Inner Harbor.

Storm Water

During construction a TCEQ Construction General Permit – TXR150000 will be obtained. The CGP requires the implementation of storm water runoff control measures that are designed to protect the quality of surface waters.

Following construction, a Multi-Sector General Permit (MSGP) will be required for the discharge of uncontaminated storm water runoff from the site. The MSGP requires the implementation of storm water controls, inspections, reporting, and training necessary to prevent impacts to the surface waters of the State.

Other Water Quality Controls

The Jumbo facility will have an Oil and Hazardous Materials Spill Prevention, Control, and Countermeasure Plan and Storm Water Pollution Prevention Plan in place prior to operation and the facility employees will be trained to implement these plans.

4.0 ACTION AREA

4.1 ACTION AREA DEFINITION

The 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 C.F.R. 402.02). The analysis of species or designated critical habitat likely to be affected by the proposed project is focused on effects within the project's Action Area. For this BA, the Action Area was determined by identifying the maximum area in which the proposed project may result in significant direct and indirect impacts in and around the Project Site. Both construction and operation phases of the proposed combustion equipment were considered. Indirect impacts to surrounding areas may include noise, lighting, dust, erosion, stream sedimentation, air emissions, and physical disturbances. Because air emissions have the potential for widest impact away from the project site, the Action Area was based on determining a de minimis effects boundary (see Section 2.1.1).

Through air-dispersion modeling efforts, the Action Area boundary was defined to extend to a maximum distance of 1.12 miles (1.79 kilometers) from the Project Site (see Figure 4-1, Appendix A). This irregular-shaped area is defined to include any point outside the facility boundary where the modeling suggests that a pollutant would exceed a SIL for one of the criteria pollutant. The potential impacts to federally threatened and endangered species and designated critical habitat were evaluated within the identified Action Area. The following sections describe the methodology used to delineate the Action Area for this BA.

4.2 ACTION AREA DEFINITION METHODOLOGY

The Action Area was established using air emission dispersion modeling in such a manner as to ensure that any potential impact from emissions beyond the defined boundary of the Action Area would, by regulatory definition, be de minimis or trivial.

The boundary of the Action Area was conservatively delineated by using EPA's SIL for criteria pollutants. A SIL is established for each NAAQS, at a concentration significantly less than the corresponding NAAQS. By establishing such a de minimis threshold, EPA can ascertain when a potential impact is considered to be so low as to be insignificant.

The boundaries of the Area of Significant Impact (AOI) for a given pollutant and averaging period are defined by the number of modeling receptors for which predicted concentrations are greater than the respective EPA SIL. The Action Area for the biological assessment is the cumulative number of modeling receptors for all pollutants and averaging periods for which predicted concentration are greater than the respective SIL.

4.2.1 Ambient Air Dispersion Modeling

The following is a summary of modeling results of NAAQS pollutants submitted for the PSD application. The modeling results in this report are preliminary. Final modeling results will be included in a modeling report which will be submitted to the TCEQ. Emissions associated with the proposed project were modeled using the EPA AERMOD air dispersion model in support of the PSD and state New Source Review (NSR) applications. Emissions from all M&G and NRG sources proposed to be installed were modeled. The ambient air concentration results were then compared with SIL levels associated with the Primary NAAQS and Secondary NAAQS (Table 4-1).

All short-term modeling concentrations correspond to the maximum proposed emission rates during normal operations. All annual modeling concentrations correspond to the proposed annual emission rates. The results of these modeling efforts are summarized in Table 4-1. As the table indicates, the Action Area extends up to 1.79 kilometers (1.12 miles) from the Project Site. It is important to note that the Action Area is not defined by compliance with the NAAQS but rather the SILs which are a fraction of the NAAQS. The Action Area is identified on Figure 4-1 (Appendix A).

TABLE 4-1
MODELING RESULTS

Pollutant	Averaging Period	NAAQS		Significant Impact Level (SIL)	AOI Modeling Results	
		Primary	Secondary		Maximum Predicted Concentration	Distance to Furthest Receptor Within Area of Significant Impacts (AOI)
		($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	(km)
NO_2	1-Hour	188	None	7.5	21.2	1.79
	Annual	100	100	1	2.38	0.9
CO	1-Hour	40,000	None	2,000	610	---
	8-Hour	10,000	None	500	150	---
SO_2	1-Hour	196	None	7.8	14.4	0.5
	24-Hour	365	None	5	7.8	0.5
	Annual	80	None	1	0.378	---
PM_{10}	24-Hour	150	150	5	4.55	---
$PM_{2.5}$	24-Hour	35	35	1.2	4.30	1.6
	Annual	12	15	0.3	0.646	1.2

5.0 EXISTING CONDITIONS

5.1 NATURAL RESOURCES

5.1.1 Regional Setting

The proposed project site is located in northeast Nueces County where the Nueces River feeds into the Nueces Bay. The site is northwest of Corpus Christi and within the Gulf Coast Prairies and Marshes eco-region of Texas.

The climate of the Gulf Coast Prairies and Marshes eco-region is mild and warm with high humidity. Average annual rainfall varies from 30 to 50 inches per year distributed fairly uniformly throughout the year. The growing season is usually more than 300 days. The Gulf Coast Prairies and Marshes region is a nearly level, slowly drained plain less than 150 feet in elevation, dissected by streams and rivers flowing into the Gulf of Mexico (TPWD 1996. Exploring Texas Ecoregions http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_bk_w7000_0030.pdf, Accessed June 2, 2013). The region includes barrier islands along the coast, salt grass marshes surrounding bays and estuaries, remnant tall grass prairies, oak parklands and oak mottes scattered along the coast, and tall woodlands in the river bottomlands.

The climate of the western gulf coastal plain is mild, rainfall averages about 35 inches annually in Nueces County, the growing season is approximately 315 days. The area is drained by the Nueces River. The region has been greatly modified. A significant portion of the state's population and industrial development is located within the western gulf coastal plain.

The original vegetation of the coastal prairies was mostly grasslands with a few clusters of oaks, known as oak mottes or maritime woodlands. Little bluestem, yellow Indiangrass, brownseed paspalum, gulf muhly, and switchgrass were the dominant grassland species. Almost all of the coastal prairies have been converted to cropland, rangeland, pasture, or urban land uses. The exotic Chinese tallow tree and Chinese privet have invaded large areas in this region. Some loblolly pine occurs in the northern part of the region

5.1.2 Land Use

Land use in Nueces County varies with location. Fisheries, petrochemical plants and agricultural processing dominate the coastal economy while land inward from the coast is dedicated to agriculture and oil and gas (TSHA, Accessed 1/8/13).

Land uses within the Action Area of the proposed project site are listed in Table 5-1 and illustrated in Figure 5-1.

TABLE 5-1
LAND USE WITHIN THE ACTION AREA

Land Use	Acres	Percent
Industrial	52.58	5.95
Undeveloped	642.47	72.81
Open Water	187.45	21.24
TOTAL	883.50	100

5.1.3 Topography

Topography of Nueces County and the Western Gulf Coastal Plain is predominantly flat, sloping gently southeast towards the Gulf Coast. Elevations in Nueces County range from sea level to 146 feet at the highest point (USDA Soil Survey, 1965). Elevations within the project area range from 0 – 15 feet above mean sea level (USGS 1968 and USGS 1969). Less than a fifth of the county drains north to the Nueces River and Nueces Bay and the remainder of the county drains southeast to multiple creeks that drain directly to Corpus Christi Bay (USDA Soil Survey, 1965)

According to the Federal Emergency Management Agency (FEMA) flood insurance rate map (FIRM) and digital Q3 flood data, the proposed project site is located in Zone X and Zone A. Zone X are designated as areas of minimal flood hazard above the 500-year floodplain. Zone A are areas designated within the 100-year floodplain. FEMA flood zone designations within and surrounding the proposed project site are illustrated in Figure 5-2.

5.1.4 Geology

The Geologic Atlas of Texas (GAT) indicates the proposed project site is underlain by fill and spoil deposits. Fill and spoil are man-made lands built above alluvium and barrier islands along waterways from dredged materials (GDbT, Accessed 4/20/13). Other geologic units in the area are sand and clay deposits generated in an estuarine environment.

Oil and natural gas are important geologic resources in the area and numerous gas plant and oil refineries are located in the county (TSHA, Accessed 1/8/13). The geologic units found within and surrounding the proposed project area are listed and described below in Table 5-2 and illustrated in Figure 5-3.

TABLE 5-2
GEOLOGIC UNITS SUMMARY

Map Unit	Formation Name	Description
Fs	Fill and Spoil	Dredged materials
Qal	Quaternary Alluvium	Recent clay, silt, sand and gravel stream deposits
Qbc	Beaumont Formation	Barrier island and beach deposits; dominantly clay
Qbs	Beaumont Formation	Barrier island and beach deposits; dominantly sand
Qd	Deweyille Formation	Older stream deposits above current floodplain

5.1.5 Soils

Dominant soils in this area of Nueces and San Patricio Counties include saline, hydric clays and fine sands of a tidal, estuarine environment. Most are very gently sloping, deep soils with poor drainage and permeability in the clays and high drainage and permeability in the sands (USDA, 6/18/13). The NRCS soil units mapped within the action area of the proposed project area are listed and described below in Table 5-3 and illustrated in Figure 5-4 (NRCS, 2013).

TABLE 5-3
NRCS SOIL UNITS SUMMARY

NRCS Map Unit Name	NRCS Unit Characteristics	USDA Classification				NRCS Hydric Soil
		Depth	Drainage	Permeability	Landform	
Aransas clay (As/Lo)	0-1% slopes; saline, Capability unit VIIs-1, 6w	Deep	Poor	Mostly in water table	Floodplains	Yes
Barrada-Tatton association (BT)	0-1% slopes; clay, Capability unit 8s	Deep	Very poor	Low	Deflation and tidal flats	Yes
Galveston & Mustang fine sands (Gm)	0-8% slopes; Capability unit Vlle-2	Deep	Excessive	Very high	Coastlines & islands-dunes	Yes
Made land (Ma)	Not placed in land capability unit	NA	NA	NA	Piles of excavated material	No
Tidal flats (Ta)	0-1% slopes, Capability unit 8s	NA	Very poor	High	Tidal flats	Yes

5.1.6 Vegetation

Vegetated portions of the Action Area currently include M&G owned property as well as Port of Corpus Christi Authority (POCCA) owned property to the east and west as well as the Nueces River delta to the north of the project site. All other areas within the Action Area would be described as developed for industry with open spaces regularly modified for facility use such as lay down yards and settling basins or maintained lawns. Within the M&G and POCCA owned property, the vegetation would generally be described as coastal savannas dominated by bluestem, panicum, bufflegrass and prickly pear with interspersed mesquite and huisache. Small depressions and margins along the ship channel are dominated by sea-oxeye daisy, saltgrass, and cordgrass. Areas within the Nueces River delta are dominated by sea-oxey daisy, saltgrass, cordgrass, and seepweed.

5.1.7 Water Resources

The proposed project site is located just south of Nueces Bay, and approximately 5 miles northwest of the City of Corpus Christi. The Nueces River terminates at Nueces Bay just north of the proposed project site and the Viola Channel is immediately southwest.

The Nueces and Corpus Christi Bays are large, saltwater estuaries at the mouth of the Nueces River. These waterways provide an environment for recreation and industrial use interconnected by the Gulf Intracoastal Waterway (TSHA, Accessed 1/8/13). Neither seagrass beds, mangrove wetlands, nor coral reefs are present within the construction area or action area.

The USFWS National Wetland Inventory (NWI) data within and immediately adjacent to the proposed project area is demonstrated in Figure 5-5.

5.1.8 Climate

The climate of coastal Nueces County is sub-tropical, with cool summer nights and mild winters influenced by the gulf winds. The average annual precipitation in the region is 32.25 inches. The average annual growing season is 335 days near the coast. In winter, the average temperature is 56.6°F. In summer, the average temperature is 84.2°F. Prevailing winds are from the south-southeast with an average speed of 7.5 miles per hour except in January when polar air brings northerly winds (USDA Soil Survey, 1965).

At the time of this review, the U.S. Drought Monitor indicated the region is experiencing extreme to exceptional drought conditions (USDM, Accessed 6/13/13), and the Long-Term Palmer Drought Severity Index rates this area as being in a severe drought less -3.0 to -3.9 inches of rain from normal (CPC, 2013). According to the National Weather Service/Advanced Hydrologic Prediction Service (NWS/AHPS), the region has received approximately 2 to 4 inches rain within the 30 days prior to this review. This is approximately 2 to 3 inches below the average rainfall for this time of year (NWS/AHPS, 6/18/13).

5.2 FEDERALLY-LISTED THREATENED AND ENDANGERED SPECIES OF POTENTIAL OCCURRENCE WITHIN NUECES AND SAN PATRICIO COUNTIES, TEXAS

Table 5-4 lists all federal threatened, endangered or candidate species listed by USFWS and the TPWD as having the potential to occur in Nueces and San Patricio Counties.

TABLE 5-4
SPECIES HAVING POTENTIAL TO OCCUR IN NUECES AND SAN PATRICIO COUNTIES

Summary of Recommended Determinations of Effect		
Federally-listed Species	**Scientific Name**	**Status**
Eskimo Curlew	*Numenius borealis*	Endangered
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	Endangered
Piping Plover	*Charadrius melodus*	Endangered
Whooping Crane	*Grus americana*	Endangered
Jaguarundi	*Herpailurus yaguarondi*	Endangered
Ocelot	*Leopardus pardalis*	Endangered
Red wolf	*Canis rufus*	Endangered
West Indian manatee	*Trichechus manatus*	Endangered
Slender rushpea	*Hoffmannseggia tenella*	Endangered
South Texas ambrosia	*Ambrosia cheiranthifolia*	Endangered
Atlantic Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered
Green sea turtle	*Chelonia mydas*	Threatened
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Loggerhead sea turtle	*Caretta caretta*	Endangered
Smalltooth sawfish	*Pristis pectinata*	Endangered
Blue whale	*Balaenoptera musculus*	Endangered
Fin whale	*Balaenoptera physalus*	Endangered
Humpback whale	*Megaptera novaeangliae*	Endangered
Sei whale	*Balaenoptera borealis*	Endangered
Sperm whale	*Physeter macrocephalus*	Endangered

Source: Texas Parks and Wildlife Department Annotated County Lists of Rare Species, Accessed 6/2/13.

5.2.1 Eskimo Curlew

The Eskimo curlew is about 12 inches in length and is generally brown with white speckles. They have long, dark green, dark brown, or dark grey-blue legs.

Historically, huge flocks of Eskimo Curlew migrated north from South America to their nesting grounds in the Alaskan and Canadian Arctic feed on grasshoppers and other insects as they migrated. Important habitats for the curlews include Arctic tundra while nesting and open grasslands for the remainder of the year. Hunting pressure followed by conversion of native grasslands to cropland, throughout the wintering and migration habitat, is thought to be the reason for the birds' decline (USFWS, 2011a). There is currently no designated critical habitat for the species.

5.2.2 Northern Aplomado Falcon

The aplomado falcon has a steel grey back, red breast, black "sash" on its belly, and striking black markings on the top of its head, around its eyes, and extending down its face.

Aplomado falcons are usually seen in pairs. They use stick nests built by other birds instead of building a nest. Aplomados hunt as pairs and eat mostly birds and insects. They are fast fliers, and often chase prey animals as they try to escape into dense grass.

Aplomado falcons inhabit open grassland or savannah from Texas to Arizona and south and to the southern tip of South America. Recent re-introduction efforts within Texas Counties have re-established breeding populations of the species (Texas Parks and Wildlife Department Northern Aplomado Falcon (Falco femoralis) http://www.tpwd.state.tx.us/huntwild/wild/species/aplomfal/ (Accessed 7/26/12b). There is currently no designated critical habitat for the species.

5.2.3 Piping Plover

Piping Plover Piping Plovers are small, migratory shorebirds approximately 5-7 inches in length with a wingspan of approximately 15 inches. These birds have a short, black and orange bill that varies in color depending on the time of year, orange legs, pale gray back and dorsal wings, white undersurface, black breastband, and white collar.

Studies have shown that birds from the Great Lakes and Northern Great Plains nesting regions primarily winter along the Gulf Coast with an occasional bird from the Atlantic Coast population. Few birds remain on the Texas coast year round, but they are thought to be non-breeders.

Wintering habitat includes foraging and roosting habitat types. Most preferred foraging habitats are dynamic systems that fluctuate with the tide and wind such as wet sand in the wash zone, bare to sparsely vegetated, intertidal ocean beaches, wrack lines, shorelines of streams, ephemeral ponds, lagoons, salt marshes, emergent seagrass beds, wash-over passes, mudflats, sandflats, or algal flats. Preferred roosting habitat can also be dynamic but with more clutter and debris. These areas include sandy beaches, with driftwood, seaweed clumps, small dunes, and debris. Also utilized are spoil islands along the Intracoastal Waterway. Designated critical habitat exists approximately eight (8) miles east along the north shore of Nueces and Corpus Christi bays as well as 25 miles to the east on Padre Island (USFWS Critical Habitat for Threatened & Endangered Species http://criticalhabitat.fws.gov/crithab/ Accessed 6/15/2013).

Plovers forage on exposed beach substrates, feeding on marine worms, beetles, flies, spiders, aquatic invertebrates, crustaceans, and mollusks, as well as their eggs and larvae.

5.2.4 Whooping Crane

At nearly 5 feet (1.5 m) tall, whooping cranes are the tallest birds in North America. They have a wingspan of 7.5 feet (2.3 m). The whooping crane is also one of North America's rarest bird species with fewer than 400 birds remaining in wild population according to a count conducted in July 2010 (USFWS 2012). Whooping cranes are white with rust-colored patches on top and back of head, lack feathers on both sides of the head, yellow eyes, and long, black legs and bills. Their diet consists of blue crabs, clams, frogs, minnows, rodents, small birds, and berries.

There is only one self-sustaining wild population, the Aransas-Wood Buffalo National Park population, which nests in Wood Buffalo National Park and adjacent areas in Canada, and winters in coastal marshes in Texas at Aransas. The migration corridor for the whooping crane includes Nueces County. The cranes winter in the Aransas National Wildlife Refuge approximately 40 miles northeast of the Action Area. There are no documented sightings of whooping cranes within the Action Area (TXNDD 2013).

5.2.5 Jaguarundi

The jaguarundi is a small, short rusty-brown or charcoal gray cat historically found from Argentina to Arizona. Within the USA, jaguarundis were most often reported in the brushlands of South Texas where they were reported to hunt for birds and rodents within the dense brush. Generally, jaguarundis are solitary except during the mating season of November and December (USFWS, 1990).

The last confirmed report of a jaguarundi in the USA occurred in Brownsville in 1986. It is generally assumed that jaguarundis are endangered in the USA because the dense brush that provided habitat has been cleared for farming or for the growth of cities.

5.2.6 Ocelot

The ocelot is a small spotted cat that historically ranged from Arizona to Argentina. Within the USA, ocelots were most commonly reported from the brushlands of South Texas. Prior to 1900, ocelots could be found in the cedar brakes of the Texas Hill Country as well as the dense thickets of east Texas (USFWS, 1990).

Ocelots hunt at night for rabbits, rodents, and small birds and spend the day resting. Ocelots are endangered because their preferred habitat, dense brush has been cleared for farming and growth of cities. Approximately 100 ocelots are believed to still occur within the USA. About 30 to 35 of these are found at Laguna Atascosa National Wildlife Refuge near Brownsville, Texas.

5.2.7 Red Wolf

A rather small, slender, long-legged wolf resembling the coyote in color but often blackish; typically larger, with wider nose pad, larger feet and coarser pelage; smaller and more tawny than the gray wolf.

Formerly, red wolves ranged throughout the southeastern USA but their numbers and range quickly declined under pressure of intensive land use (USFWS 1989). Also, land management practices allowed the coyote to expand its range east; hybrid offspring of interbreeding red wolves and coyotes more closely resembled coyotes and the genetic identity of the red wolf was gradually lost.

Red wolves inhabited brushy and forested areas, as well as the coastal prairies where they preyed upon rabbits, deer, rodents, prairie chickens, fish and crabs, as well as upon domestic livestock, especially free-ranging pigs.

The red wolf was apparently extinct in the wild by 1980. The last six pure blood red wolves that could be found were captured in southeast Texas and moved to a canine breeding facility. Eventually, after the successful breeding of pure blood red wolves was accomplished, small packs were re-established upon barrier islands of North and South Carolina. Additional re-introduction efforts have occurred with the goal of creating a viable red wolf population large enough so that the red wolf can be removed from the endangered species list.

5.2.8 West Indian Manatee

A large, gray, nearly hairless, aquatic mammal with a broad rounded tail and paddlelike front limbs. West Indian manatees are found in rivers, estuaries, and coastal areas of the tropical and subtropical New World from the southeastern United States coast along Central America and the West Indies to the northern coastline of South America.

These animals occur chiefly in the larger rivers and brackish water bays. They are able to live in salt waters of the sea, however, and travel from one island to another or from place to place along the coast. Manatees are opportunistic, aquatic herbivores that feed exclusively on aquatic vegetation. Wild manatees seem to prefer submergent vegetation, followed by floating and emergent species. Manatees consume 30-50 kg of food per day. In saline waters, they feed on seagrasses. Manatees occur in loosely knit groups, but are not gregarious by nature. Breeding and calving occurs year round with the gestation period lasting 12-13 months.

They are extremely sensitive to cold and may be killed by a sudden drop in the temperature of the water to as low as 8°C. Their irregular occurrence along the Texas coast suggests that they do considerable wandering — specimens from Texas probably represent migrants from coastal Mexico (NSRL, West Indian Manatee http://www.nsrl.ttu.edu/tmot1/txmammal.htm Accessed 5/20/13) while those observed in the central and upper Texas coast are likely from Florida populations (Deutsch, C.J. et. al. 2008). Designated critical habitat for the species exists in Florida.

5.2.9 Slender Rushpea

Slender rushpea is a perennial legume with orange flowers approximately 6 inches tall. Flowering usually occurs from early March to June. Rushpea is found in disturbed areas where low native grasses persist in clayey soils of blackland prairies and creek banks of the coastal prairie (USFWS, 1988).

Rushpea is currently known to occur at only two locations in southwest Nueces County. Other previously identified populations in Nueces and Kleberg Counties have either been lost or are no longer accessible to determine population status.

The primary threats to slender rushpea are conversion of coastal prairie to cropland or improved pasture. Slender rushpea appears unable to compete with Bermuda grass and King Ranch bluestem. As a result, slender rushpea occurs in only remnant coastal prairie. There is currently no designated critical habitat for the species.

5.2.10 South Texas Ambrosia

A member of the aster family, south Texas ambrosia is an erect, silvery to grayish-green, perennial, herbaceous plant, 4 to 12 inches in height. The ambrosia's simple leaves, about 3 inches long and 1.5 inches wide, are usually opposite on the lower portion of the plant and alternate above. Male and female flowers are separate but occur on the same plant. Male flowers are in heads arranged along a terminal, elongated stem. Flower stalks contain 10-20 small, yellowish, bud-like flowers, about 1/4 inch across and shaped like hanging bowls. Female flowers are in small clusters at the leaf bases below the male flowering stalks.

South Texas ambrosia blooms in late summer and fall, but its flowers are not showy and may be missed by the casual observer. It spreads through rhizomes (underground stems), and a single individual plant may be represented by hundreds of stems forming close-spaced colonies. The plant occurs in open grasslands or savannas with soils ranging from clay loam to sandy loam commonly associated with Texas gama, Texas wintergrass and buffalo grass. Today the species occurs at six known locations in Nueces and Kleberg counties (USFWS, 2011b). There is currently no designated critical habitat for the species.

5.2.11 Atlantic Hawksbill Sea Turtle

The USFWS describes the hawksbill sea turtle as a small to medium-sized marine turtle commonly 2.5 feet in length and weighing between 95 to 165 pounds.

Hawksbill hatchlings are ocean going, and often found in the weedlines that accumulate at convergence zones. Juveniles will return to a coastal environment when their carapace reaches approximately 20-25 centimeters in length. Juveniles and adults will spend most of their time foraging on sponges in coral reefs (NOAA – Office of Protected Resources, Hawksbill Turtle (Eretmochelys imbricata), http://www.nmfs.noaa.gov/pr/species/turtles/hawksbill.htm, Accessed 7/20/2012a).

Hawksbill turtle nesting occurs between April and November on low and high energy beaches in tropical oceans. Nesting habitat is often shared with green sea turtles. Hawksbills are typically associated with rocky areas and coral reefs in water less than 65 feet. Mexico is now considered the most important region for hawksbills in the Caribbean yielding 3,000 to 4,500 nests/year. The Hawksbill is an occasional visitor to the Texas coast.

5.2.12 Green Sea Turtle

Green Sea Turtles range throughout the tropical ocean regions. During the day, Green Sea Turtles feed in the seagrass beds that grow in shallow waters with small amounts of sponges, crustaceans, sea urchins, and molluscs. The turtles migrate from nesting areas to feeding grounds, which are sometimes several thousand miles away. The major nesting beaches are always found in places where the seawater temperature is greater than 25° C.

Adults reach sexual maturity between 8 and 13 years of age. Adults mate every 2 to 3 years during the nesting season just off the nesting beaches. Green sea turtles are reported to live for 50 years or more and can grow to 850 pounds.

Sharks and humans are predators of the Green Sea Turtle. Exploitation of the nesting grounds either by human interference or pollution poses the greatest threat to these turtles (NOAA – Office of Protected Resources, Green Turtle (*Chelonia mydas*), http://www.nmfs.noaa.gov/pr/species/turtles/green.htm, Accessed 7/20/2012b). In the past, Green Sea Turtles were often killed in large shrimp trawl nets. The Green Sea Turtle is an occasional visitor to the Texas coast. Designated critical habitat for the species exists near Puerto Rico.

5.2.13 Kemp's Ridley Sea Turtle

The Kemp's Ridley sea turtle is considered the smallest sea turtle with an olive-gray carapace and a triangular shaped head and a hooked beak. Adults can grow to about two feet in length and weigh up to 100 pounds. This turtle is a shallow water benthic feeder with a diet consisting primarily of shrimp, jellyfish, snails, sea stars, and swimming crabs.

Most nesting occurs on the eastern coast of Mexico, however a small number consistently nest at Padre Island National Seashore in Texas and various other locations along the Gulf and lower Atlantic coasts. Nesting occurs from May to July during daylight hours (NOAA – Office of Protected Resources, Kemp's Ridley Turtle (*Lepidochelys kempii*), http://www.nmfs.noaa.gov/pr/species/turtles/kempsridley.htm, Accessed 7/20/2012c). Large numbers of females emerge for a synchronized nesting event referred to as "arribada". Arribadas are thought to be caused by female pheromone release, offshore winds, and/or lunar cycles. Females nest up to 4 times per season at intervals of 10 to 28 days. The preferred nesting beaches are adjacent to extensive swamps or large bodies of open water.

The Kemp's Ridley turtles range includes the Gulf coasts of Mexico and the USA, and the Atlantic coast of North America as far north as Nova Scotia and Newfoundland. There is currently no designated critical habitat for the species.

5.2.14 Leatherback Sea Turtle

The leatherback sea turtle is the largest sea turtle. The adult leatherback can get up to 8 feet in length and up to 2000 pounds. The turtle lacks a "normal" turtle shell and is covered by firm, rubbery skin that is approximately 4 inches thick. Coloration is predominantly black with varying degrees of pale spotting; including a notable pink spot on the dorsal surface of the head in adults. Diet is primarily jellyfish and salp, but it is also known to feed on sea urchins, squid, crustaceans, tunicates, fish, blue-green algae, and floating seaweed.

Leatherbacks are highly migratory and the most pelagic of all sea turtles. Females prefer high energy, sandy beaches with vegetation immediately upslope and a beach sloped sufficiently so the crawl to dry sand is not too far. Preferred beaches have deep, unobstructed oceanic access on continental shorelines.

In the United States, nesting occurs from March to July. Females nest on average 6 times per season at 10 day intervals. Most leatherbacks return to their nesting beaches at 2 to 3- year intervals. (NOAA – Office of Protected Resources, Leatherback Turtle (Dermochelys coriacea), http://www.nmfs.noaa.gov/pr/species/turtles/leatherback.htm, Accessed 7/20/2012d).

Distribution is worldwide in tropical and temperate waters of the Atlantic, Pacific, and Indian Oceans. The leatherback is also found in small numbers as far north as British Columbia, Newfoundland, and the British Isles and as far south as Australia and Argentina. The leatherback has a small presence in the U.S. with most nesting occurring on the Florida east coast, Sandy Point, U.S. Virgin Islands, and Puerto Rico. Designated critical habitat for the species exists near the U.S. Virgin Islands.

5.2.15 Loggerhead Sea Turtle

The loggerhead sea turtle is reddish-brown marine turtle characterized by a large head with blunt jaws. Adults can be up to 500 pounds and 4 feet in length. Adult loggerheads feed on jellyfish, floating egg clusters, flying fishes, mollusks, crustaceans, and other marine animals.

The nesting season in the U.S. is May through August. Nesting occurs every 2 to 3 years and is mostly nocturnal. Females can nest up to 5 times per season at intervals of approximately 14 days. Hatchling emergence is mostly nocturnal. Loggerheads nest on oceanic beaches between the high tide line and dune fronts and occasionally on estuarine shorelines with suitable sand. Females prefer narrow, steeply sloped, coarse grained beaches.

Distribution of the loggerhead includes the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. Although the majority (-80%) of the U.S. nesting activity occurs in south Florida, loggerheads nest along the Gulf and Atlantic coastlines from Texas to Virginia (NOAA – Office of Protected Resources, Loggerhead Turtle (*Caretta caretta*), http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm, Accessed 7/20/2012e). Loggerheads are considered an occasional visitor to Texas. There is currently no designated critical habitat for the species.

5.2.16 Natural Diversity Database Results

On October 23, 2012, Zephyr forwarded a request to TPWD to provide Texas Natural Diversity Database information for reports of listed-species within and near the project area. On October 30, 2012, TPWD forwarded ArcGis shapefiles for all reported listed-species within and near the project area. A review of those shapefiles indicates that no federally-listed species has been reported within 6 miles of the proposed Action Area.

5.2.17 Listed Species Monitored solely by NOAA

Listed species monitored by NOAA within the Texas portion of the Gulf of Mexico include one fish, five sea turtle, and five whale species. These species have different and varied habitat requirements and survival strategies; however, all require aquatic marine habitats. A description of the fish and cetacean species is presented below. There is currently no designated critical habitat for any NOAA monitored species within the State of Texas (NOAA website: http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm. Accessed 6/24/2013).

5.2.18 Smalltooth Sawfish

Sawfish get their name from their "saws"--long, flat snouts edged with pairs of teeth which are used to locate, stun, and kill prey. Their diet includes mostly fish but also some crustaceans. Smalltooth sawfish is one of two species of sawfish that inhabit U.S. waters. Smalltooth sawfish commonly reach 18 ft (5.5 m) in length, and may grow to 25 ft (7 m). Little is known about the life history of these animals, but they may live up to 25-30 years, maturing after about 10 years.

Sawfish species inhabit shallow coastal waters of tropical seas and estuaries throughout the world. They are usually found in shallow waters very close to shore over muddy and sandy bottoms. They are often found in sheltered bays, on shallow banks, and in estuaries or river mouths. Designated critical habitat for smalltooth sawfish exists along the Florida gulf coast.

Juvenile sawfish use shallow habitats with a lot of vegetation, such as mangrove forests, as important nursery areas. Many such habitats have been modified or lost due to development of the waterfront in Florida and other southeastern states. The loss of juvenile habitat likely contributed to the decline of this species.

Smalltooth sawfish have been reported in the Pacific and Atlantic Oceans, and Gulf of Mexico; however, the U.S. population is found only in the Atlantic Ocean and Gulf of Mexico. Historically, the U.S. population was common throughout the Gulf of Mexico from Texas to Florida, and along the east coast from Florida to Cape Hatteras. The current range of this species has contracted to peninsular Florida, and smalltooth sawfish are relatively common only in the Everglades region at the southern tip of the state (NOAA – Office of Protected Resources, http://www.nmfs.noaa.gov/pr/species/fish/smalltoothsawfish.htm Accessed 6/20/2013).

Sawfish are extremely vulnerable to overexploitation because of their propensity for entanglement in nets, their restricted habitat, and low rate of population growth.

The decline in smalltooth sawfish abundance has been caused primarily by catch in various fisheries, especially in gill nets. Because adults can grow very large, and potentially damage fishing gear of even pose a threat to fishermen, many incidentally captured sawfish were killed before they were removed from fishing gear, even if the fishermen had no interest in keeping them.

5.2.19 Blue Whale

The blue whale is the largest of the whales with bluish dorsal side and paler yellowish sides. Estimated weight is up to 100 metric tons.

Blue whales occur in all oceans of the world. There are only two records from the Gulf of Mexico, both of questionable occurrence. The current North Atlantic population is estimated to number 100-1,500 animals.

Generally, blue whales migrate northward to arctic feeding grounds in the spring and summer. Small, shrimp-like crustaceans known as "krill" predominate in the diet, tremendous amounts of which are required to sustain a single whale. In fall and winter the whales move back to temperate waters where mating and nursing of young take place. Blue whales from the northern hemisphere and southern hemisphere do not interbreed.

Female blue whales give birth to a single calf in temperate or equatorial waters during the winter months. Gestation is about 11 months and females bear young every other year (Mammals of Texas Online - Blue whale http://www.nsrl.ttu.edu/tmot1/balamusc.htm, Accessed 6/25/13).

5.2.20 Fin Whale

The fin whale is a large, slender whale similar to the blue whale but with a V-shaped head instead of U-shaped. The upperparts of a fin whale are gray while the underparts are pure white. There are numerous grooves on the throat which extend beyond the navel. Weights in excess of 59 metric tons have been reported.

The fin whale is rare in Texas waters with only a single stranded animal reported for the state.
Fin whales move to high latitude feeding grounds during spring and summer and return to southerly, temperate waters for mating and calving during autumn and winter. As with other migratory whales, northern and southern hemisphere populations do not interbreed.

Like other baleen whale species, fin whales feed mainly on krill but also eat schooling fish including herring, cod, mackerel, pollock, sardine, and capelin when available.

The reproductive habits of fin whales are largely unknown. Females are thought to give birth at 3-year intervals with calving occurring from November to March in temperate waters after an 11 month gestation period (Mammals of Texas Online - Fin whale http://www.nsrl.ttu.edu/tmot1/balaphys.htm, Accessed 6/25/13).

5.2.21 Humpback Whale

Humpback whales typically reach lengths of approximately 45-feet and weigh up to 41 metric tons. Females are usually slightly larger than males. For their size, humpbacks tend to be greater in girth than the other baleen whales.

Humpback whales are generally black overall with irregular white markings on the throat, sides, abdomen, and occasionally dorsally. The flippers are very long and narrow. The flippers typically are white below but range from black to patterns of black and white dorsally, or even entirely white.

Humpback whales occur in all oceans of the world. Currently, about 800-1,000 humpback whales are believed to survive in the western North Atlantic. The only known occurrence along the Texas Coast is of a young, immature animal observed in 1992. No population estimates are available for Gulf humpbacks.

Humpbacks migrate to northern waters during the spring and summer and return south into Caribbean waters for mating and calving during the fall and winter.

Often congregating in groups of 20-30 to perhaps 100-200, humpbacks produce a number of unusual sounds arranged into complex and predictable patterns known as "songs." Humpback songs are thought to be broadcast by sexually mature, lone males and may have some purpose in mating rituals. Like other baleen whales, humpback whales eat krill and other schooling fish.

Every other year, female humpbacks give birth to a single calf in tropical or subtropical waters in winter after an 11 month gestation period (Mammals of Texas Online - Humpback whale http://www.nsrl.ttu.edu/tmot1/meganova.htm, Accessed 6/25/13).

5.2.22 Sei Whale

Sei whales (pronounced "say" or "sigh") are members of the baleen whale family and can reach lengths of about 40-60 ft and weigh 100,000 lbs. Sei whales have a long, sleek body that is dark bluish-gray to black in color and pale underneath.

Sei whales are usually observed singly or in small groups of 2-5 animals, but are occasionally found in larger (30-50) loose aggregations. Sei whales are capable of diving 5-20 minutes to opportunistically feed on plankton (e.g., copepods and krill), small schooling fish, and cephalopods (e.g., squid) by both gulping and skimming.

Females breed every 2-3 years, and after gestation period of 11-13 months and give birth to a single calf during the winter in equatorial waters. Sei whales prefer deeper subtropical waters on the continental shelf edge and slope worldwide.

Little is known regarding Sei whale distribution and movements, however they appear to have a cosmopolitan distribution and occur in subtropical, temperate, and subpolar waters around the world. This species may unpredictably and randomly occur in a specific area, sometimes in large numbers. These events may occur suddenly and then not occur again for long periods of time. Sei whales may seasonally migrate toward the lower latitudes during the winter and higher latitudes during the summer. Scientists estimate that worldwide Sei whale population is approximately 80,000; however, there are no current estimates for the stocks of Sei whales in the western North Atlantic (NOAA – Office of Protected Resources, Sei whale http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/seiwhale.htm, Accessed 6/25/13).

5.2.23 Sperm Whale

The sperm whale is a large, blackish-brown toothed whale with a large head. Males are generally larger with reported total lengths up to 20 m and weights of up to 39 metric tons.

Sperm whales in all oceans, but are primarily found in temperate and tropical waters of the Atlantic and Pacific Oceans. Sperm whales are the most numerous of the great whales in the Gulf of Mexico and sightings near the Texas coast are relatively common. Current estimates of sperm whale numbers in the Gulf of Mexico are approximately 1600 animals (NOAA, 2010).

Male sperm whales are highly migratory. Solitary adult males move into high latitude temperate waters during summer, while females remain grouped in tropical or subtropical waters. In winter, the bulls return to lower latitudes for mating.

Sperm whales regularly dive to depths of 1,000 m but are known to reach depths of over 2,100 m to hunt their primary prey - squid. These whales are known to produce a variety of "click sounds" occurring in sequence and termed "codas." Such sounds are probably used in echolocation and may play an important role in locating prey while feeding. Other than squid, these whales occasionally consume other deep-water prey including octopus, lobsters, crabs, jellyfish, sponges, and several varieties of fish.

Breeding behavior in sperm whales is similar to harem formation - a single, dominant male accompanies a group of females and defends the group against competing males. Twenty to thirty females may comprise a harem. Female sperm whales may give birth as infrequently as once every five years based upon an observed 15 months gestation period and an inferred three year nursing and weaning of the calf before breeding again (Mammals of Texas Online - Sperm whale http://www.nsrl.ttu.edu/tmot1/physmacr.htm, Accessed 6/25/13).

6.0 EFFECTS OF PROPOSED ACTION

6.1 AIR POLLUTION EFFECTS BACKGROUND RESEARCH

Zephyr performed an extensive search for research regarding the potential effects of air emissions on various flora and fauna. The various studies addressed general effects of airborne pollutants, but no research was found that quantified the toxicological effects of air emissions on any of the specific threatened or endangered species addressed in this biological assessment. The search was broadened to include taxonomical equivalents to those protected species occurring within the Action Area. The results of this search were limited to a study of poultry within confined animal feeding operations. The related purpose of the research conducted by Redwine, et. al. (2002) was to characterize particulate matter less than 10µm (PM_{10}). A study prepared by Smith and Levenson (1980) resulted in the creation of a screening procedure to assess the potential for air emissions to cause significant impacts on flora and fauna. The study determined that concentrations of airborne pollutants which exceed the screening concentrations may have adverse impacts on plants or animals. This study may be the most applicable of available research to assess the potential to impact the environment. This study is discussed further in the following section.

Another publication (Dudley and Stolton, 1996) summarized that the effects of air pollution on biodiversity, indicate generally, that air pollution has a greater impact on lower life forms such as: lichens, mosses, fungi, and soft bodied aquatic invertebrates. Impacts to higher life forms are typically linked with food loss and reproductive effects, rather than to direct toxic effects on adults. Possible secondary impacts include acidification, changes in food or nutrient supply, or changes to biodiversity and competition. The study also suggested that plant communities are generally less adaptable to changes in air pollution than animals. However, lower order animals, such as amphibians and fish, are known to be impacted by acidification as a result of the subsequent release of metals into water. Higher order animals often have the ability to move to more favorable conditions.

6.2 IMPACTS OF AIR POLLUTION ON PLANTS, SOIL, AND ANIMALS

A detailed literature review was conducted to identify any documentation, data, or research of the potential effects of air emissions on flora and fauna and specifically on the threatened and endangered species of potential occurrence in the Action Area. The methods and results of the literature review are presented above in Sections 6.1.

Guidance from A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals, EPA 450/2-81-078, December 12, 1980 (Screening Procedure) was followed to assess the potential for the project has for adversely affecting air quality related values (AQRV). Screening Procedure provides minimum levels at which adverse effects have been reported in the literature for use as screening concentrations. These screening concentrations can be

concentrations of pollutants in ambient air, in soils or in aerial plant tissues. A summary of the Screening Procedure requirements follow:

1. Estimate the maximum ambient concentrations for averaging times appropriate to the screening concentration for pollutants emitted by the source. Include background concentrations when appropriate
2. To determine potential effects from airborne pollutants, check the maximum predicted ambient concentrations against the corresponding AQRV screening concentration, PSD increments or NAAQS – whichever is most restrictive
3. To determine potential effects from trace metals, calculate the concentration deposited in the soil from the maximum annual average ambient concentrations assuming all deposited metals are soluble and available for uptake by plants
4. Compare the increase in metal concentration in the soil to the existing endogenous concentrations,
5. Calculate the amount of trace metal potentially taken up by plants
6. Compare the concentrations from Steps 3 and 5 with the corresponding screening concentrations,
7. Reevaluate the results of the Step 4 and 6 comparisons using estimated solubilities of elements in the soil recognizing that actual solubilities may vary significantly from the conservatively estimated values
8. If ambient concentration modeling results are unavailable, the significant levels for emissions may be used

No trace metals are associated with the proposed activities. Therefore, only Steps 1 and 2 of the Screening Procedure guidance were required for this analysis.

The results from the ambient air modeling analyses conducted in support of the PSD and State NSR modeling analysis are summarized in Table 6-1 for pollutants included in Screening Procedure. The predicted concentrations were compared with the AQRV screening concentrations.

TABLE 6-1
SCREENING ANALYSIS – IMPACTS ON PLANTS, SOIL, AND ANIMALS – DIRECT IMPACTS[1]

Pollutant	Averaging Period	Project Sources, Only			Project Sources, Nearby Sources Plus Background Concentration	
		Maximum Predicted Concentration ($\mu g/m^3$)	AQRV Screening Concentration[2] ($\mu g/m^3$)	PSD Class II Increment Consumption ($\mu g/m^3$)	Maximum Predicted Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
SO_2	1-Hour	14.4	917	---	46.0	196
	3-Hour	11.5	786	512	Not Required[3]	1,300

TABLE 6-1
SCREENING ANALYSIS – IMPACTS ON PLANTS, SOIL, AND ANIMALS – DIRECT IMPACTS[1]

Pollutant	Averaging Period	Project Sources, Only			Project Sources, Nearby Sources Plus Background Concentration	
		Maximum Predicted Concentration ($\mu g/m^3$)	AQRV Screening Concentration[2] ($\mu g/m^3$)	PSD Class II Increment Consumption ($\mu g/m^3$)	Maximum Predicted Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
	24-Hour	7.8	> 18[4]	91	16.1	365
	Annual	0.378	18	20	Not Required[3]	80
NO_2	1-Hour	21.2	>3,760[4]	---	Not Available[1]	188
	4-Hour	<21.2	3,760	---	---	---
	8-Hour	<21.2	3,760	---	---	---
	1-Month	<21.2	564	---	---	---
	Annual	2.38	100	---	Not Available[1]	100
CO	1-Hour	610	>1,800,000[4]	---	Not Required[3]	40,000
	8-Hour	150	>1,800,000[4]	---	Not Required[3]	10,000
	1-Week	<150	1,800,000	---	---	---

[1]PSD modeling analysis has not been finalized

[2]Table 3.1, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals, EPA 450/2-81-078, December 12, 1980 – (Smith & Levenson, 1980)*

[3]Project source concentrations are *de minimis* (insignificant) for this pollutant and averaging period. NAAQS modeling was not required.

[4]No AQRV screening value for this averaging period. Conservatively listing the AQRV for the next (longer) averaging period.

Screening Procedure (Smith and Levenson 1980) states that "no useable information other than that used to develop the ambient standards...was found in the review literature" for TSP matter and "EPA's current procedure for TSP should suffice for the review of generic TSP." The EPA's "current procedure" for TSP review corresponds to demonstrating compliance with the PM_{10} and $PM_{2.5}$ NAAQS. As discussed in Section 2.2, the Secondary NAAQS were developed to protect "public welfare" which includes effects on soils, water, crops and wildlife. Screening Procedure (Smith and Levenson, 1980) also states that "trace metals in TSP may have greater impacts on vegetation and soils than the total amount of particulates." However, no trace metals are associated with the proposed activities. The results from the PM_{10} and $PM_{2.5}$ NAAQS modeling analysis conducted in support of the PSD modeling analysis are summarized in Table 6-2.

TABLE 6-2
NAAQS MODELING RESULTS[1]

Pollutant	Averaging Period	Project Sources, Only	Project Sources, Nearby Sources Plus Background Concentration	
		Maximum Predicted Concentration (µg/m^3)	Maximum Predicted Concentration[2] (µg/m^3)	NAAQS[3] (µg/m^3)
PM_{10}	24-Hour	4.55	Not Required[4]	150
$PM_{2.5}$	24-Hour	4.30	Not Available[1]	35
	Annual	0.646	Not Available[1]	12 primary 15 secondary

[1]PSD modeling analysis has not been finalized

[2]This is a conservative estimate. The background concentrations utilized in the analysis included contributions from existing sources that were included in the modeling analysis (i.e. a double counting of their effects).

[3] 24-hour PM_{10} and $PM_{2.5}$ Primary and Secondary NAAQS have the same value

[4] Project source concentrations are *de minimis* (insignificant) for this pollutant and averaging period. NAAQS modeling was not required.

The predicted concentrations associated with the proposed project are less than the AQRV screening concentrations, PSD Class II increment consumption concentrations, Primary NAAQS and Secondary NAAQS. Therefore, according to the results of the analysis shown above, the proposed project will not cause significant impacts on soils, water, crops or wildlife.

Possible effects of airborne nitrogen dioxide (NO_2) on aquatic ecosystems include acidification and eutrophication (Lovett and Tear, 2007). Acidification effects water quality by increasing acidity, reducing acid neutralization capacity which results in hypoxia and the mobilization of aluminum. Larger aquatic ecosystems generally have a considerable buffering capacity. Increased acidity may result in increased algal growth by reducing organic carbon which allows increased light penetration and visibility of the water column. Eutrophication of an aquatic system can result from excess algal growth. Decomposition of the excess algae can result in a decrease in dissolved oxygen levels, which can be harmful to many aquatic organisms. Estuaries, bays, and salt marshes are generally not severely impacted by acid deposition as other aquatic ecosystems. However, they are subject to eutrophication caused by increased nitrogen which usually often results in increased plant growth. According to preliminary modeling, maximum predicted concentrations of sulfur dioxide (SO_2) and NO_2 associated with the project are two orders of magnitude lower than the Secondary NAAQS. As previously discussed, the Secondary NAAQS were developed to protect "public welfare" which includes effects on soils, water, crops and wildlife. Therefore, air emissions from the project are not expected to adversely affect aquatic habitat.

6.3 CONSTRUCTION EFFECTS

6.3.1 Onsite Habitat Effects

Construction for the proposed facility, associated infrastructure, and auxiliary equipment will take place within approximately 200 acres of 431 acres owned by M&G on the north bank of the Viola ship Channel in Corpus Christi, Texas. Additional earth disturbance required for the project will occur for construction of rail lines and an approximate 1.6 mile pipeline ROW west from the property to a nearby industrial facility. All areas experiencing construction are developed or have been created to be developed for industrial purposes. There are no significant or beneficial habitat communities or types within the project area and construction of the proposed facility is anticipated to have no effect on listed species potential habitat.

6.3.2 Noise Effects

The noise from construction and operations would be perceptible to humans and wildlife to some extent immediately adjacent to the facility. Noise levels from project activities should be comparable to noise levels currently generated by the ship channel traffic. No noise effects to wildlife are expected as a result of the proposed project since the noise sources are constant and limited, rather than abrupt and excessive.

6.3.3 Dust Effects

Dust mobilization will be minimized during construction and operations by routinely employed best management practices (BMPs), and is expected to be negligible.

6.3.4 Human Activity

Construction of the M&G facility will require a significant increase of human activity when compared to the current undeveloped land. Due to the already high human activity in the area around the M&G facility, there is no proposed increase of effects to wildlife.

6.4 FEDERALLY-LISTED THREATENED AND ENDANGERED SPECIES HABITAT EVALUATION

6.4.1 Eskimo Curlew

6.4.1.1 Potential of Occurrence

Within Texas, the Eskimo curlew was a spring migrant only. Flocks of the bird would pass through Texas on their migration from wintering grounds in South America to nesting grounds in the arctic. The birds would stop in the native prairies to feed on insects before continuing north. Conversion of the native prairies to other uses has been cited as one reason for the species decline. Currently, the Eskimo curlew is considered nearly extinct.

Habitats within the Action Area are generally dominated by early successional coastal prairie and estuarine open water with minor portions developed for industrial/commercial. The habitat necessary for the survival of this species (native prairie) does not occur within the Action Area. There are no documented occurrences of the Eskimo curlew within or near the Action Area (TXNDD 2012). The only confirmed reports of Eskimo curlew in Nueces County occurred in 1877 (CCS, 1996).

6.4.1.2 Potential Effect

As described above, there is no preferred or potential habitat for the Eskimo curlew in the Action Area, and furthermore, wastewater discharges, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on Eskimo curlew habitat. In addition, no impact is expected on the Eskimo curlew by direct effects such as noise, dust or human activities, or by indirect effects such as acidification or eutrophication of aquatic habitats associated with construction and operation of the project.

6.4.1.2.1 Recommended Determination of Effect

The proposed action will have no effect on the eskimo curlew.

6.4.2 Northern Aplomado Falcon

6.4.2.1 Potential of Occurrence

Northern aplomado falcons were extirpated from the United States until the 1990's when a re-introduction program was initiated. Reproducing populations of northern aplomado falcons currently exist near most current or former re-introduction sites in Texas. The project area is approximately 30 miles west of the nearest re-introduction site. There are no documented occurrences of the northern aplomado within or near the Action Are (TXNDD 2012). Discussion with USFWS – Corpus Christi personnel indicated that the Northern aplomado falcons would not be anticipated to occur in or near the project area.

6.4.2.2 Potential Effect

As mentioned above, there are no documented occurrences of the northern aplomado falcon within the project area. Additionally, USFWS does not anticipate that the proposed project would affect the aplomado falcon. Neither construction nor operation of the proposed facilities will have any impact on the northern aplomado falcon directly or indirectly.

6.4.2.3 Recommended Determination of Effect

The proposed action will have no effect on the northern aplomado falcon.

6.4.3 Piping Plover

6.4.3.1 Potential of Occurrence

Piping plovers winter along the Texas Gulf Coast. Plovers utilize bare, sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats in Nueces County as wintering sites. Habitats within the Action Area are generally dominated by early successional coastal prairie and estuarine open water with minor portions developed for industrial/commercial. The habitat necessary for the survival of this species (sandbars and gravel beaches) is rare within the Action Area. There are no documented occurrences of the piping plovers within or near the Action Area (TXNDD 2012). However, coordination with USFWS-Corpus Christi has indicated that piping plovers are known to utilize Tule Lake, a remnant coastal lagoon located to the south of the ship channel and partially within the Action Area.

6.4.3.2 Potential Effect

As described above, preferred or potential habitat for the piping plover within the Action Area is rare. Additionally, wastewater discharges, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on piping plover habitat. In addition, no impact is expected on the piping plover by direct effects such as human activities, or by indirect effects such as acidification or eutrophication of aquatic habitats associated with construction and operation of the project.

6.4.4.1.3 Recommended Determination of Effect

Due to the potential presence of the piping plover within the Action Area, the proposed project may affect but is not likely to adversely affect the piping plover.

6.4.4 Whooping Crane

6.4.4.1 Potential of Occurrence

The Action Area does not have any preferred habitat for the whooping Crane. The largest self-sustaining population winters in the Aransas National Wildlife Refuge approximately 40 miles northeast of the Action Area. The Action Area is within the migration corridor utilized by whooping cranes to travel between nesting and wintering areas. There are no documented occurrences of the whooping crane within or near the Action Area (TXNDD 2012). There is no whooping crane habitat or documented sightings of whooping cranes within the area of proposed construction (TXNDD 2012).

6.4.4.2 Potential Effect

Direct impacts to whooping cranes are not anticipated since no preferred habitat exists within the M&G property and/or the construction area is not proposed within the Nueces River delta.

Additionally, wastewater discharges, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on whooping crane habitat. In addition, no impact is expected on the whooping crane by direct effects such as human activities, or by indirect effects such as acidification or eutrophication of aquatic habitats associated with construction and operation of the project. However, construction and extension of overhead power lines in the area could potentially affect whooping cranes moving through the project area. Construction of overhead transmission lines with bird diverters would prevent or minimize any potential impacts to whooping cranes.

6.4.4.3 Recommended Determination of Effect

Due to the potential presence of the whooping crane within the Action Area, the proposed project may affect but is not likely to adversely affect the whooping crane.

6.4.5 Gulf Coast Jaguarundi

6.4.5.1 Potential of Occurrence

Little is known about the habitat of Gulf Coast jaguarundis in Texas. It is thought that they occur in the same dense thorny brush shrublands as the ocelot. Previous to 1970, Gulf Coast jaguarundis were occasionally killed by hunters in the Lower Rio Grande Valley (110 miles south of Action Area). After 1970, a Gulf Coast jaguarundi was not confirmed in the U.S. until a road-killed individual was discovered near Brownsville in 1986. Since that time, there have been several reports of Gulf Coast jaguarundi in Arizona, California, Florida, and Texas. However, none of the reports have been confirmed with a pelt or photographic evidence. Sunquist and Sunquist 2002, in “Wild Cats of the World” stated that the species is probably extinct in the U.S. Approximately 260 miles south of the Action Area, Gulf Coast jaguarundis are still encountered by hunters and are a problem for poultry farmers.

Habitats within the Action Area are generally dominated by early successional coastal prairie and estuarine open water with minor portions developed for industrial/commercial. While there is an effort underway in the LRGV by USFWS and other conservation agencies to create and restore viable habitat for the Gulf Coast jaguarundi, there is no verified evidence that this effort has prevented the extirpation of the Gulf Coast jaguarundi in Texas or led to an increase in jaguarundi numbers. There are no documented occurrences of the Gulf Coast jaguarundi within or near the Action Area (TXNDD 2012).

6.4.5.2 Potential Effect

Habitat for the jaguarundi is not present within the Action Area. As such, no impacts are anticipated for the jaguarundi.

There is no preferred or potential habitat for the jaguarundi in the Action Area, and furthermore, wastewater discharges, emissions, noise, and dust resulting from the planned construction and

operation would not be expected to have any impact on jaguarundi habitat. In addition, no impact is expected on the jaguarundi by direct effects such as noise, dust or human activities, or by indirect effects such as acidification or eutrophication of aquatic habitats associated with construction and operation of the project.

6.4.5.3 Recommended Determination of Effect

The proposed action will have no effect on the Gulf Coast jaguarundi.

6.4.6 Ocelot

6.4.6.1 Potential of Occurrence

In south Texas, the ocelot inhabits dense thornscrub communities in south Texas. The ocelot requires dense vegetation (>75% canopy cover), with 95% cover of the shrub layer preferred in Texas where it hunts rabbits, rodents, birds, and lizards. The nearest known population of ocelots is located approximately 90 miles south of the Action Area.

Habitats within the Action Area are generally dominated by early successional coastal prairie and estuarine open water with minor portions developed for industrial/commercial. The occurrence of ocelots within the Action Area is not anticipated. There are no documented occurrences of the ocelot within or near the Action Area (TXNDD 2012).

6.4.6.2 Potential Effect

There is no preferred or potential habitat for the ocelot in the Action Area, and furthermore, wastewater discharges, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on ocelot habitat. In addition, no impact is expected on the ocelot by direct effects such as noise, dust or human activities, or by indirect effects such as acidification or eutrophication of aquatic habitats associated with construction and operation of the project.

6.4.6.3 Recommended Determination of Effect

The proposed action will have no effect on the ocelot.

6.4.7 Red Wolf

6.4.7.1 Potential of Occurrence

Red wolves historically inhabited brushy and forested areas, as well as the coastal prairies in Texas. The red wolf is now extirpated from Texas and there is no potential of occurrence in the Action Area. There are no documented occurrences of the red wolf within or near the Action Area (TXNDD 2012).

6.4.7.2 Potential Effect

Because the red wolf is extirpated in Texas, neither construction nor operation of the proposed facilities will have any impact on the red wolf directly or indirectly.

6.4.7.3 Recommended Determination of Effect

The proposed action will have no effect on the red wolf.

6.4.8 West Indian Manatee

6.4.8.1 Potential of Occurrence

The West Indian manatee requires marine and riverine habitats for survival. Habitats within the Action Area are generally dominated by early successional coastal prairie and estuarine open water with minor portions developed for industrial/commercial. However, coordination with USFWS-Corpus Christi has indicated that manatees are known to occasionally occur within the Viola ship channel. There are no documented occurrences of the manatee within or near the Action Area (TXNDD 2012). However, coordination with USFWS-Corpus Christi has indicated that the manatee is known to occasionally utilize Viola ship channel.

6.4.8.2 Potential Effect

The intake structure, wastewater discharges, emissions, noise, and dust resulting from the planned construction and operation are not expected to have any impact on manatee habitat. In addition, no impact is expected on the manatee by direct effects such as human activities, or by indirect effects such as acidification or eutrophication of aquatic habitats associated with construction and operation of the project.

6.4.8.3 Recommended Determination of Effect

Due to the potential presence of the West Indian manatee within the Action Area, the proposed project may affect but is not likely to adversely affect the West Indian manatee.

6.4.9 Slender Rush Pea

6.4.9.1 Potential of Occurrence

Slender rush pea is found in disturbed areas where low native grasses persist in clayey soils of blackland prairies and creek banks of the coastal prairie. Slender Rush-pea (Hoffmannseggia tenella) http://www.tpwd.state.tx.us/huntwild/wild/species/rushpea/ Accessed 6/18/2013. Within Nueces County, rush pea is currently known to occur at only two locations in the southwest

quadrant of the county in remnant coastal prairie. Habitats within the Action Area are generally dominated by early successional coastal prairie and estuarine open water with minor portions developed for industrial/commercial. There is currently no designated critical habitat for the species. There are no documented occurrences of the slender rush pea within or near the Action Area (TXNDD 2012).

6.4.9.2 Potential Effect

As described above, there is no preferred or potential habitat for the slender rush pea in the Action Area, and furthermore, wastewater discharges, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on slender rush pea habitat. In addition, no impact is expected on the slender rush pea by direct effects such as noise, dust or human activities, or by indirect effects such as acidification of habitats associated with construction and operation of the project.

6.4.9.3 Recommended Determination of Effect

The proposed action will have no effect on the slender rush pea.

6.4.10 South Texas Ambrosia

6.4.10.1 Potential of Occurrence

South Texas ambrosia occurs at low elevations in open clay-loam and sandy-loam prairies and savannas. Today the species occurs at six known locations in Nueces and Kleberg counties (USFWS 2008). Habitats within the Action Area are generally dominated by early successional coastal prairie and estuarine open water with minor portions developed for industrial/commercial. All terrestrial habitats within the Action Area are either significantly modified for industrial purposes or are unsuitable for the South Texas Ambrosia. There is no preferred or potential habitat for south Texas ambrosia identified in the Action Area, and there are no documented occurrences of the south Texas ambrosia within or near the Action Area (TXNDD 2012).

6.4.10.2 Potential Effect

As described above, there is no preferred or potential habitat for the south Texas ambrosia in the Action Area, and furthermore, wastewater discharges, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on south Texas ambrosia habitat. In addition, no impact is expected on the south Texas ambrosia by direct effects such as noise, dust or human activities, or by indirect effects such as acidification of habitats associated with construction and operation of the project.

6.4.10.3 Recommended Determination of Effect

The proposed action will have no effect on the south Texas ambrosia.

6.4.11 Atlantic Hawksbill Sea Turtle

6.4.11.1 Potential of Occurrence

Personal communication with the Padre Island National Seashore Chief of the Division of Sea Turtle Science and Recovery (Dr. Donna Shaver) indicated that any of the five sea turtle species could be expected to occur within the Viola ship channel or Nueces Bay (Personal Communication from Dr. Donna Shaver to Clay V. Fischer, June 24, 2013). Dr. Shaver also indicated that use of the Viola ship channel or Nueces Bay by sea turtles would be for foraging only. Nesting would not be anticipated to occur within either water body. There are no documented occurrences of the Atlantic hawksbill sea turtle within or near the Action Area (TXNDD 2012).

6.4.11.2 Potential Effect

Minor construction such as the installation of intake/outfall piping within or adjacent to Viola ship channel will occur. All other project related construction will occur above the tide line and not impact aquatic habitats. Furthermore, the intake structure, wastewater discharges, emissions, noise, human activity, and dust resulting from the planned construction and operation would not be expected to have any impact on Atlantic hawksbill sea turtle habitat. In addition, no impact is expected on the Atlantic hawksbill sea turtle by indirect effects such as acidification or eutrophication of aquatic habitats associated with construction and operation of the project.

6.4.11.3 Recommended Determination of Effect

Due to the potential presence of the Atlantic hawksbill sea turtle within the Action Area, the proposed project may affect but is not likely to adversely affect the Atlantic hawksbill sea turtle.

6.4.12 Green Sea Turtle

6.4.12.1 Potential of Occurrence

Personal communication with the Padre Island National Seashore Chief of the Division of Sea Turtle Science and Recovery (Dr. Donna Shaver) indicated that any of the five sea turtle species could be expected to occur within the Viola ship channel or Nueces Bay (Personal Communication from Dr. Donna Shaver to Clay V. Fischer, June 24, 2013). Dr. Shaver also indicated that use of the Viola ship channel or Nueces Bay by sea turtles would be for foraging only. Nesting would not be anticipated to occur within either water body. There are no documented occurrences of the Green sea turtle within or near the Action Area (TXNDD 2012).

6.4.12.2 Potential Effect

Minor construction such as the installation of intake/outfall piping within or adjacent to Viola ship channel will occur. All other project related construction will occur above the tide line and not impact aquatic habitats. Furthermore, the intake structure, wastewater discharges, emissions, noise, human activity, and dust resulting from the planned construction and operation would not be expected to have any impact on Green sea turtle habitat. In addition, no impact is expected on the green sea turtle by indirect effects such as acidification or eutrophication of aquatic habitats associated with construction and operation of the project.

6.4.12.3 Recommended Determination of Effect

Due to the potential presence of the green sea turtle within the Action Area, the proposed project may affect but is not likely to adversely affect the green sea turtle.

6.4.13 Kemp's Ridley Sea Turtle

6.4.13.1 Potential of Occurrence

Personal communication with the Padre Island National Seashore Chief of the Division of Sea Turtle Science and Recovery (Dr. Donna Shaver) indicated that any of the five sea turtle species could be expected to occur within the Viola ship channel or Nueces Bay (Personal Communication from Dr. Donna Shaver to Clay V. Fischer, June 24, 2013). Dr. Shaver also indicated that use of the Viola ship channel or Nueces Bay by sea turtles would be for foraging only. Nesting would not be anticipated to occur within either water body. There are no documented occurrences of the Kemp's Ridley sea turtle within or near the Action Area (TXNDD 2012).

6.4.13.2 Potential Effect

Minor construction such as the installation of intake/outfall piping within or adjacent to Viola ship channel will occur. All other project related construction will occur above the tide line and not impact aquatic habitats. Furthermore, the intake structure, wastewater discharges, emissions, noise, human activity, and dust resulting from the planned construction and operation would not be expected to have any impact on Kemp's Ridley sea turtle habitat. In addition, no impact is expected on the Kemp's Ridley sea turtle by indirect effects such as acidification or eutrophication of aquatic habitats associated with construction and operation of the project.

6.4.13.3 Recommended Determination of Effect

Due to the potential presence of the Kemp's Ridley sea turtle within the Action Area, the proposed project may affect but is not likely to adversely affect the Kemp's Ridley sea turtle.

6.4.14 Leatherback Sea Turtle

6.4.14.1 Potential of Occurrence

Personal communication with the Padre Island National Seashore Chief of the Division of Sea Turtle Science and Recovery (Dr. Donna Shaver) indicated that any of the five sea turtle species could be expected to occur within the Viola ship channel or Nueces Bay (Personal Communication from Dr. Donna Shaver to Clay V. Fischer, June 24, 2013). Dr. Shaver also indicated that use of the Viola ship channel or Nueces Bay by sea turtles would be for foraging only. Nesting would not be anticipated to occur within either water body. There are no documented occurrences of the Leatherback sea turtle within or near the Action Area (TXNDD 2012).

6.4.14.2 Potential Effect

Minor construction such as the installation of intake/outfall piping within or adjacent to Viola ship channel will occur. All other project related construction will occur above the tide line and not impact aquatic habitats. Furthermore, the intake structure, wastewater discharges, emissions, noise, human activity, and dust resulting from the planned construction and operation would not be expected to have any impact on Atlantic hawksbill sea turtle habitat. In addition, no impact is expected on the leatherback sea turtle by indirect effects such as acidification or eutrophication of aquatic habitats associated with construction and operation of the project.

6.4.14.3 Recommended Determination of Effect

Due to the potential presence of the leatherback sea turtle within the Action Area, the proposed project may affect but is not likely to adversely affect the leatherback sea turtle.

6.4.15 Loggerhead Sea Turtle

6.4.15.1 Potential of Occurrence

Personal communication with the Padre Island National Seashore Chief of the Division of Sea Turtle Science and Recovery (Dr. Donna Shaver) indicated that any of the five sea turtle species could be expected to occur within the Viola ship channel or Nueces Bay (Personal Communication from Dr. Donna Shaver to Clay V. Fischer, June 24, 2013). Dr. Shaver also indicated that use of the Viola ship channel or Nueces Bay by sea turtles would be for foraging only. Nesting would not be anticipated to occur within either water body. There are no documented occurrences of the Loggerhead sea turtle within or near the Action Area (TXNDD 2012).

6.4.15.2 Potential Effect

Minor construction such as the installation of intake/outfall piping within or adjacent to Viola ship channel will occur. All other project related construction will occur above the tide line and not impact aquatic habitats. Furthermore, the intake structure, wastewater discharges, emissions, noise, human activity, and dust resulting from the planned construction and operation would not be expected to have any impact on Atlantic hawksbill sea turtle habitat. In addition, no impact is expected on the loggerhead sea turtle by indirect effects such as acidification or eutrophication of aquatic habitats associated with construction and operation of the project.

6.4.15.3 Recommended Determination of Effect

Due to the potential presence of the loggerhead sea turtle within the Action Area, the proposed project may affect but is not likely to adversely affect the loggerhead sea turtle.

6.4.16 Listed Species Monitored by NOAA

6.4.16.1 Potential of Occurrence

NOAA monitors 11 species along the Texas coast. These species include one fish species, five cetacean species and five sea turtle species. The five sea turtle species were discussed in Sections 6.4.14 through 6.4.18 previously. Species discussed in this section include the smalltooth sawfish and five cetaceans.

There is no preferred habitat for the smalltooth sawfish or cetacean species in the Action Area. There are no documented occurrences of the smalltooth sawfish or cetaceans in the Action Area (TXNDD 2012). The Action Area does not exhibit any deep water marine habitats necessary to support the cetacean species monitored by NOAA. The occurrence of cetacean species within the Action Area is not anticipated.

Personal communication with the NMFS Section 7 coordinator indicated that this species is not expected to occur along the Texas coast (Personal Communication from Dr. Roger Zimmerman to Clay V. Fischer, June 15, 2012). Currently this species is believed to be generally restricted to South Florida (NOAA, 2012a). The occurrence of the smalltooth sawfish within the Action Area is not anticipated.

6.4.16.2 Potential Effect

Due to lack of habitat for smalltooth sawfish and cetacean species, neither construction nor operation of the proposed facility is expected to have a direct or indirect impact on any of the NOAA monitored species directly or indirectly.

6.4.16.3 Recommended Determination of Effect

The proposed action will have no effect on these six NOAA monitored species.

6.5 CONSERVATION MEASURES

While M&G does not believe that construction of the project site will adversely affect the continued survival of any species listed for Nueces and San Patricio Counties, in order to aid USFWS efforts to conserve listed species, M&G will take the following protective actions:

1) Upon start of construction, educate construction workers and staff on potential endangered species in the area, including species identification, habitat, and measures to avoid or minimize impacts.
2) Mark transmission lines, during the construction and design if such lines are necessary.
3) If possible, lower construction cranes and other tall work equipment at night, or flag them to prevent collisions by whooping cranes.
4) Work activity will be suspended if whooping cranes are observed within 1000 feet of an active construction site.
5) Onsite treatment of wastewater per TCEQ permit rules will serve to prevent potential impacts to piping plovers, whooping cranes, manatees, and the sea turtles from acidification or eutrophication of aquatic habitats.
6) Adherence of the March 23, 2006 NOAA Sea Turtle and Smalltooth Sawfish Construction Conditions.
7) Notify the Service's Corpus Christi ES office (361-994-9005) or Matagorda Island NWR if an endangered species, as identified in Section 6.4, is observed or impacted within the Action Area.

Construction contracts will be written with specific requirements to educate construction personnel regarding the potential for occurrence of endangered species and require the contractor's environmental representatives to contact the local offices of the Fish and Wildlife Service in the event any of those species are encountered.

For the safety and security of the construction workers, the majority of construction activities will take place during daylight hours. The baseline construction schedules have been developed to reflect this philosophy and the contractors will be required to minimize night-time construction activities. M&G will work to minimize potential collisions and to discourage nesting or roosting on any associated structures or towers by installing bird diverters on the conductors.

6.6 DESIGNATED CRITICAL HABITAT ANALYSIS

Designated critical habitat for the piping plover exists approximately eight (8) miles east of the project area along the north shore of Nueces and Corpus Christi bays as well as 25 miles to the east on Padre Island (USFWS Critical Habitat for Threatened & Endangered Species http://criticalhabitat.fws.gov/crithab/ Accessed 6/15/2013).

7.0 CONCLUSIONS

The proposed facility will utilize appropriate technologies to control emissions and avoid and/or minimize potential impacts to the environment and its associated habitats. The corresponding technologies to be utilized are discussed below.

7.1 DETERMINATION OF EFFECT

The recommended determination of effect for all federally protected species, with the potential to occur within the Action Area is summarized below in Table 7.

Summary of Recommended Determinations of Effect		
Federally-listed Species	**Listing/Managing Agency**	**Recommended Determination of Effect**
Eskimo Curlew	USFWS	No effect
Northern Aplomado Falcon	USFWS	No effect
Piping Plover	USFWS	May effect, not likely to adversely effect
Whooping Crane	USFWS	May effect, not likely to adversely effect
Jaguarundi	USFWS	No effect
Ocelot	USFWS	No effect
Red wolf	USFWS	No effect
West Indian manatee	USFWS	May effect, not likely to adversely effect
Slender rushpea	USFWS	No effect
South Texas ambrosia	USFWS	No effect
Atlantic Hawksbill sea turtle	USFWS/NOAA	May effect, not likely to adversely effect
Green sea turtle	USFWS/NOAA	May effect, not likely to adversely effect
Kemp's Ridley sea turtle	USFWS/NOAA	May effect, not likely to adversely effect
Leatherback sea turtle	USFWS/NOAA	May effect, not likely to adversely effect
Loggerhead sea turtle	USFWS/NOAA	May effect, not likely to adversely effect
Smalltooth sawfish	NOAA	No effect
Blue whale	NOAA	No effect
Fin whale	NOAA	No effect
Humpback whale	NOAA	No effect
Sei whale	NOAA	No effect
Sperm whale	NOAA	No effect

7.2 POLLUTION CONTROL

7.2.1 Air Emissions

7.2.1.1 NO_x Emissions

The gas turbine and larger auxiliary boiler will utilize dry low-NO_x (DLN) combustors and Selective Catalytic Reduction (SCR) technology to control NO_x emissions. The smaller auxiliary boiler will utilize DLN combustors to control NOx emissions. The HTF heaters will utilize low NO_x combustors and Non-selective Catalytic Reduction (NSCR) technology for NO_x control. This meets BACT requirements for the State and PSD new source review air permit for NO_x emissions from natural gas fired combustion systems.

7.2.1.2 CO Emissions

To control CO emissions, the gas turbine will be equipped with a catalytic oxidation system. The PTA plant will have CO emissions controlled by combustion in the RTOs. The use of natural gas and maintenance of optimum combustion conditions and practices is considered BACT for the control of CO emissions from the other combustion units associated with this project.

7.2.1.3 Volatile Organic Compound (VOC) Emissions

VOC emissions from the process units are controlled through terminal destruction in either the RTOs for the PTA plant or the HTF heaters in the PTE plant. The use of natural gas and maintenance of optimum combustion conditions and practices is considered BACT for the control of VOC emissions from the combustion unit associated with this project.

7.2.1.4 $PM/PM_{10}/PM_{2.5}$ Emissions

Because the primary combustion units will only fire gaseous fuel, $PM/PM_{10}/PM_{2.5}$ emissions are anticipated to be relatively low. The use of gaseous fuel and the application of good combustion controls meet BACT requirements for the air permit for $PM/PM_{10}/PM_{2.5}$ emissions from the combustion units. The emergency engines (fire water pumps and generators) are not part of normal operations and will only emit during periods of testing or other MSS activities.

The material handling activities at the facility will be fully enclosed with all vents controlled by fabric filters or cyclones for particulate control. This level of control meets BACT requirements for the air permit for $PM/PM_{10}/PM_{2.5}$ emissions from the process vents.

7.2.1.5 Sulfur Compound Emissions

The formation of SO_2, H_2SO_4 and $(NH_4)_2SO_4$ will be minimized by using pipeline-quality natural gas. The use of gaseous fuel meets BACT requirements for the air permit for SO_2, H_2SO_4 and $(NH_4)_2SO_4$ emissions from the combustion sources.

7.2.1.6 NH_3 Emissions

M&G and NRG will operate the SCR and NSCR systems in such a manner that ammonia (NH_3) slip (i.e., the emission of unreacted ammonia to the atmosphere) is minimized while ensuring that the NO_x emissions limits are met. Careful control of the ammonia injection system and operating parameters will be maintained to control ammonia slip in the exhaust streams. This level of emissions control meets BACT requirements for the air permit for ammonia slip for gas fired combustion units.

7.2.1.7 Fugitive Emissions from Natural Gas and Ammonia Piping Components

To ensure that fugitive emissions from the piping components in ammonia service are adequately controlled, M&G and NRG will follow an audio, visual, and olfactory (AVO) inspection and maintenance program, performing periodic inspections supplemented by annual remote optical sensing. These measures meet BACT requirements for the air permit for VOC and ammonia emissions from piping components.

7.2.2 Wastewater and Storm Water

7.2.2.1 Mitigation of Construction Related Impacts to Surface Water

Construction of the proposed M&G facility will follow the TCEQ requirement to obtain a construction storm water permit for the proposed project. The site will employ best management practices to prevent contamination due to storm water runoff, including erosion control and stabilization, minimization of offsite vehicle tracking and dust generation, and other practices as warranted by site specific conditions. The site will also follow the notification, recordkeeping, and reporting requirements of TCEQ's construction storm water management program.

7.2.2.2 Mitigation of Operational Impacts to Surface Water

The water discharge from boiler blowdown and cooling tower blowdown from the M&G facility will be treated onsite and discharged to the Viola ship channel. M&G will obtain an individual TPDES permit for the discharge and follow the notification, recordkeeping, and reporting requirements of the permit.

The M&G facility will have an Oil and Hazardous Materials Spill Prevention, Control, and Countermeasure Plan and Storm Water Pollution Prevention Plan in place prior to operation and the facility employees will be trained to implement these plans.

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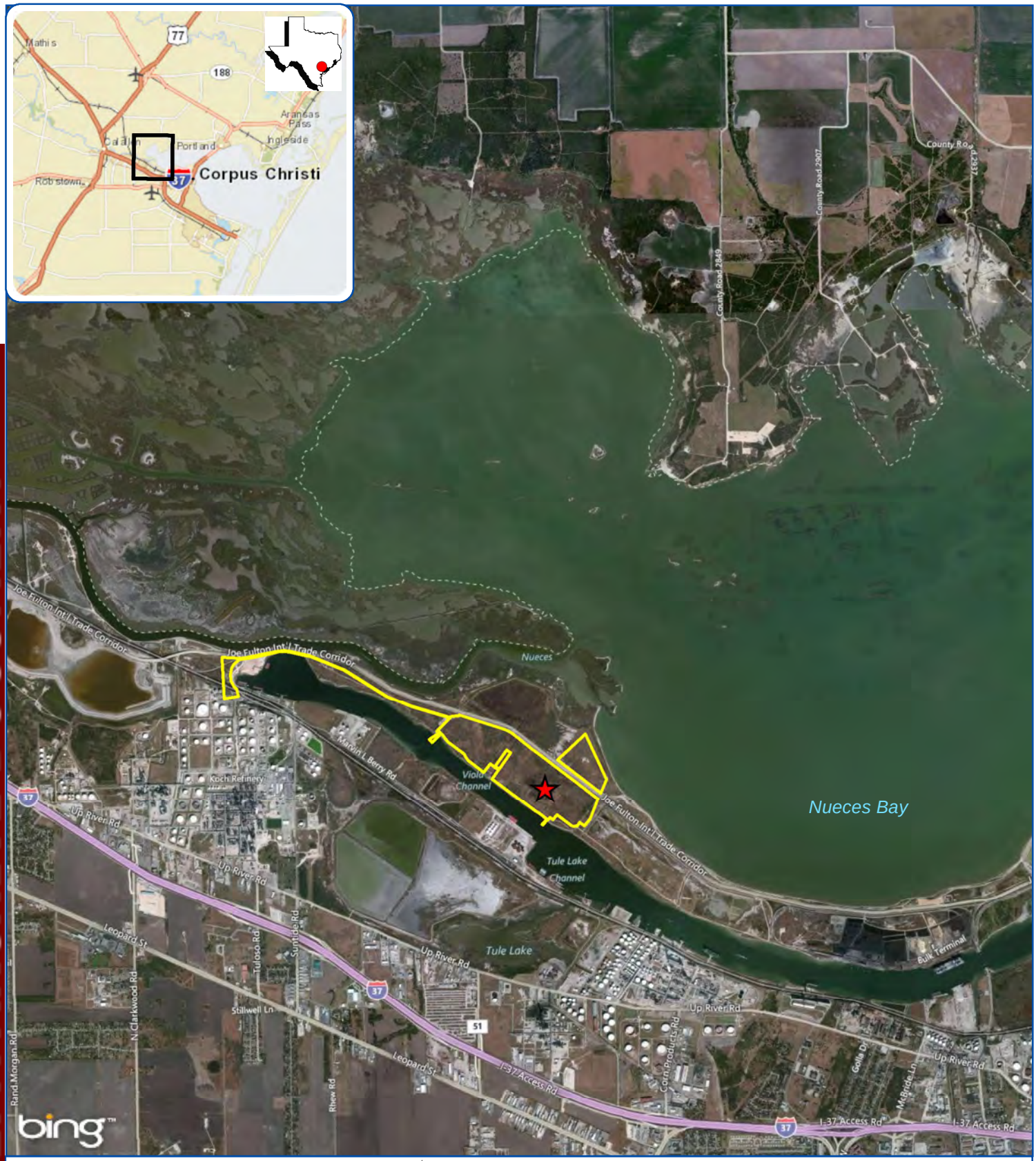
APPENDIX A

FIGURES



Data Sources:
ESRI-Bing Hybrid & Streets Basemaps; M&G Resins USA
Datum: GCS NAD 83
UTM Zone 14

Site

Project Area

N

0 1 2 **Kilometers**

0 1 2 **Miles**

zephyr

FIGURE 3-1
SITE LOCATION MAP

M&G Resins USA - Corpus Christi, Texas

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Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	06.14.2013

Data Sources:
ESRI-Bing Hybrid Basemap; M&G Resins USA
Datum: GCS NAD 83
UTM Zone 14

Kilometers: 0 0.5 1

Miles: 0 0.5 1

zephyr

FIGURE 3-2
PLOT PLAN and CONSTRUCTION AREA

M&G Resins USA - Corpus Christi, Texas

H:\Chemtex\Task 006 - Biological Assessment\Graphics\BA Figures

Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	03.03.2014

N

Scale 1:24,000

0 0.5 1 Kilometers

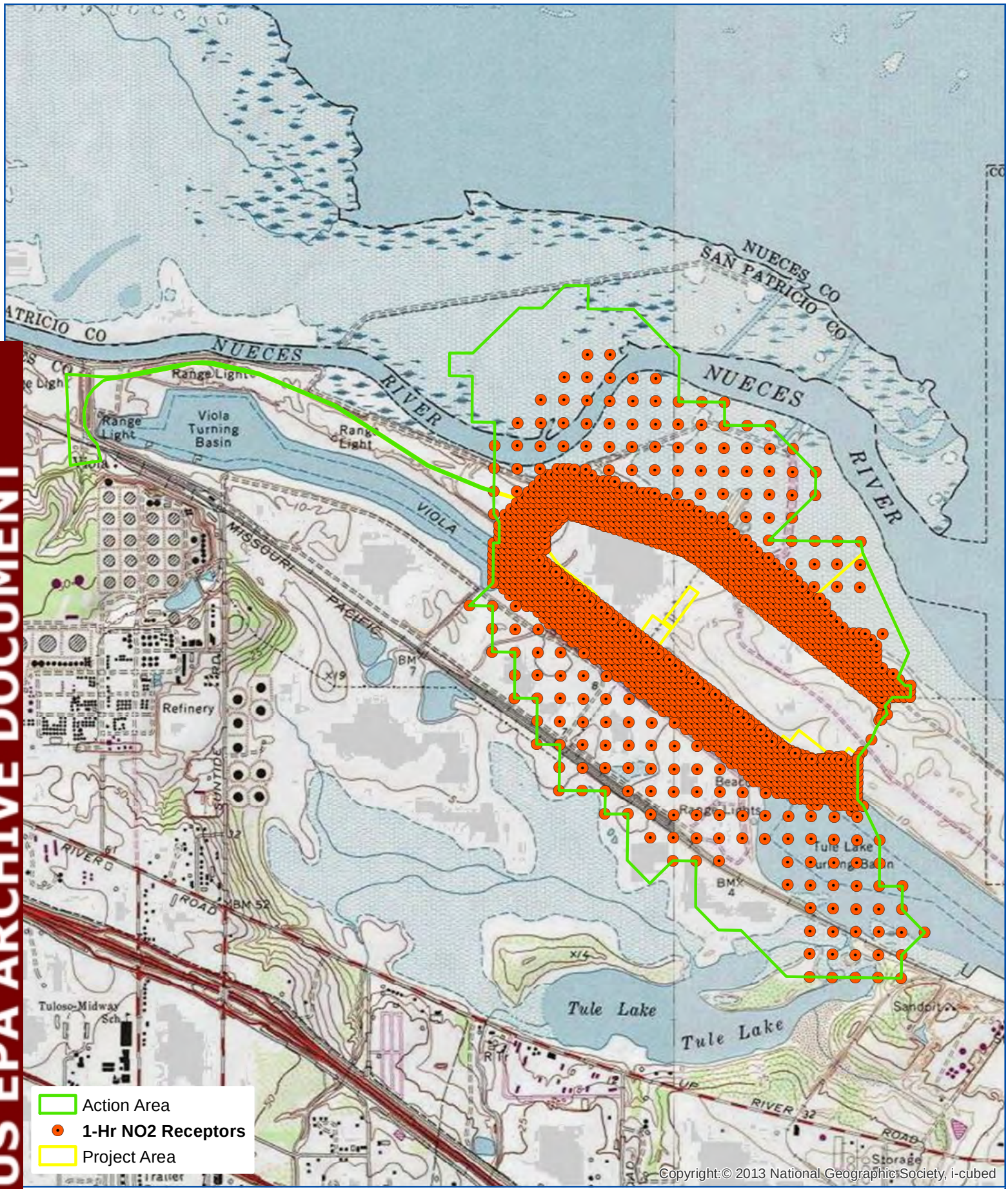
0 0.5 1 Miles

zephyr

FIGURE 4-1
ACTION AREA

M & G Resins USA - Corpus Christi, TX

Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	03.03.2014



N

Scale 1:24,000

0 0.5 1 Kilometers

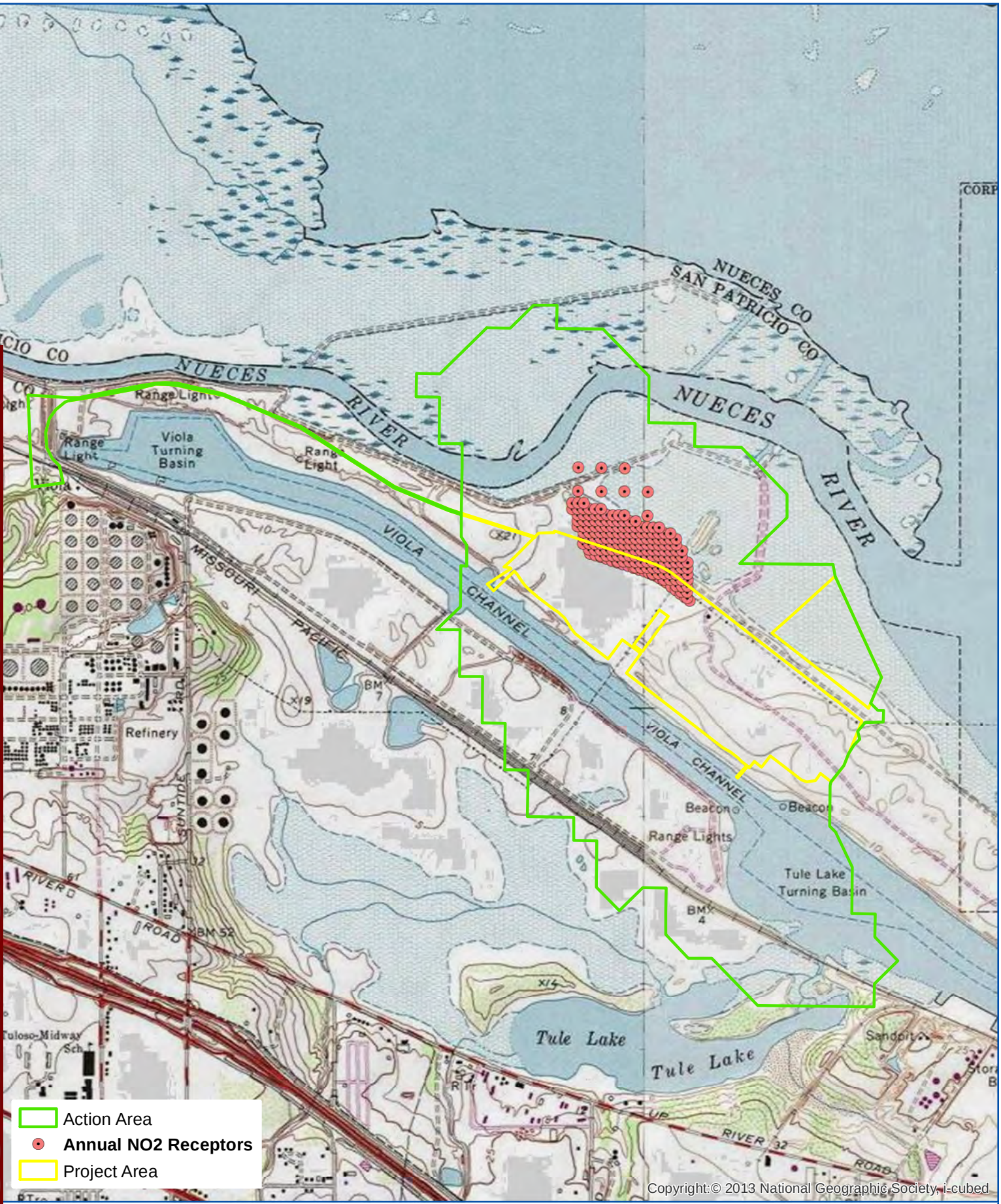
0 0.5 1 Miles

zephyr

FIGURE 4-2
1-Hr NO2 Receptors Above SIL

M & G Resins USA - Corpus Christi, TX

Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	03.03.2014



N

Scale 1:24,000

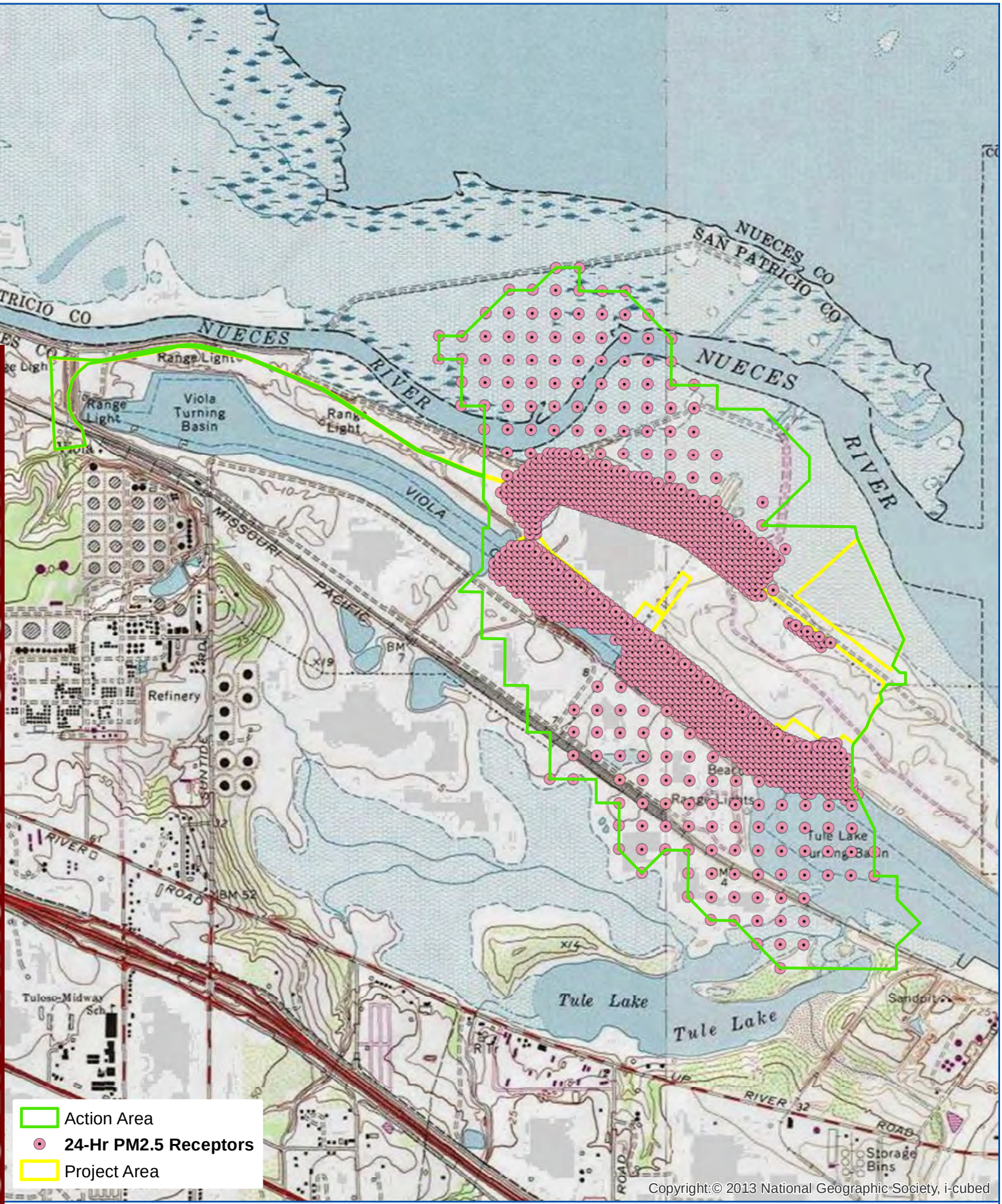
0 0.5 1 Kilometers

0 0.5 1 Miles

zephyr

FIGURE 4-3
Annual NO2 Receptors Above SIL
M & G Resins USA - Corpus Christi, TX

Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	03.03.2014



N

Scale 1:24,000

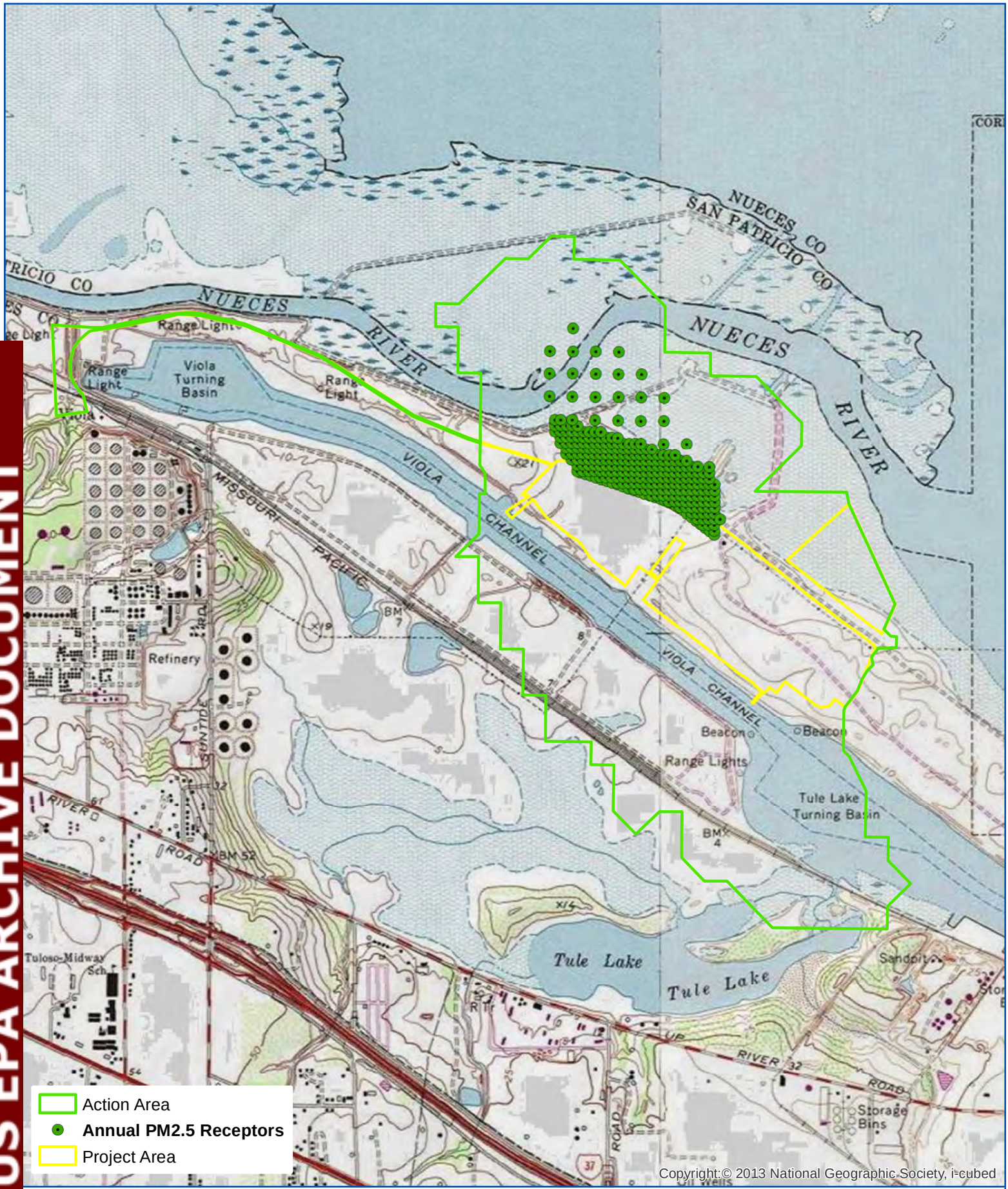
0 0.5 1 Kilometers

0 0.5 1 Miles

zephyr

FIGURE 4-4
24-Hr PM2.5 Receptors Above SIL
M & G Resins USA - Corpus Christi, TX

Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	03.03.2014



N

Scale 1:24,000

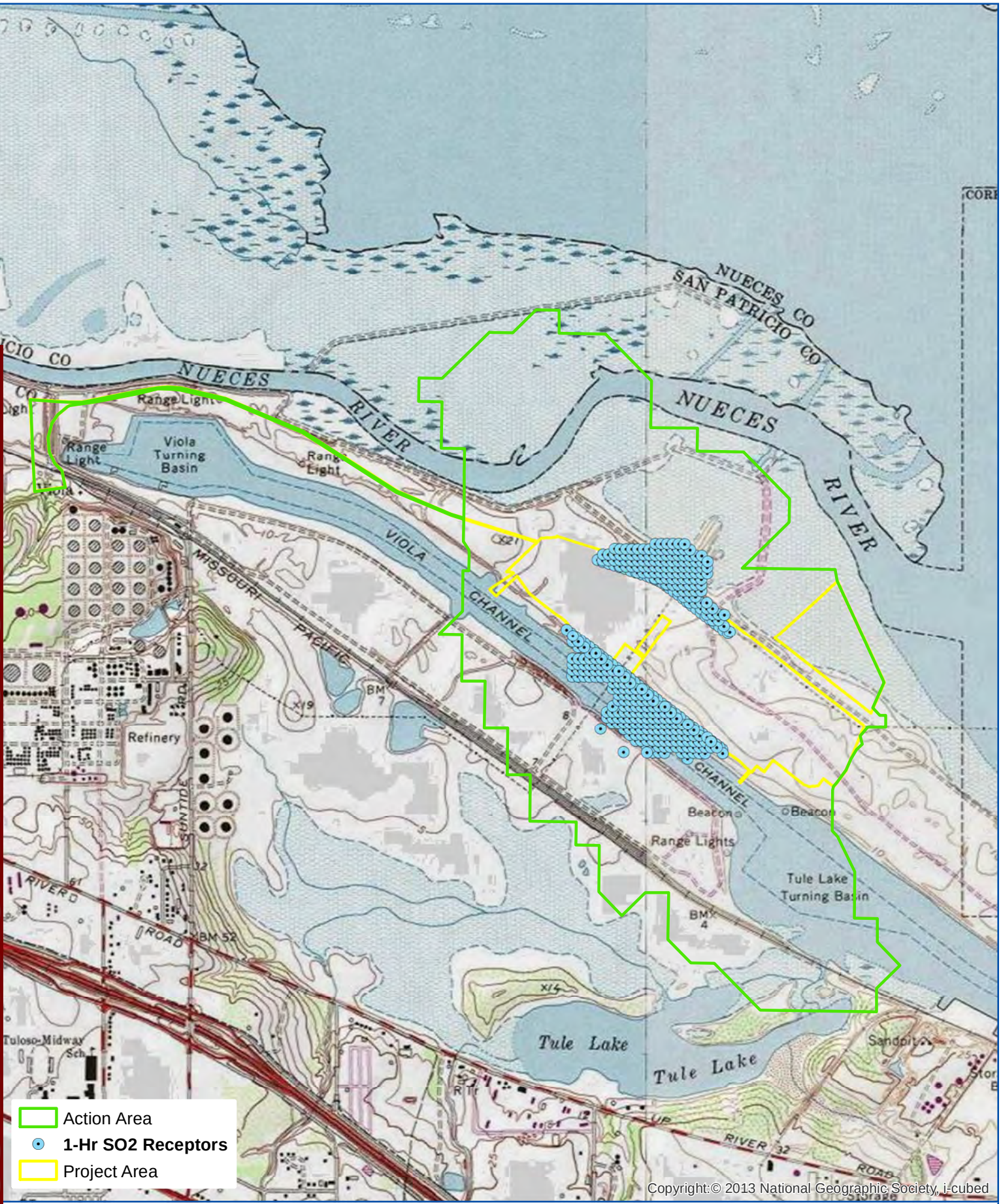
0 0.5 1 Kilometers

0 0.5 1 Miles

zephyr

FIGURE 4-5
Annual PM2.5 Receptors Above SIL
M & G Resins USA - Corpus Christi, TX

Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	03.03.2014



N

Scale 1:24,000

0 0.5 1 Kilometers

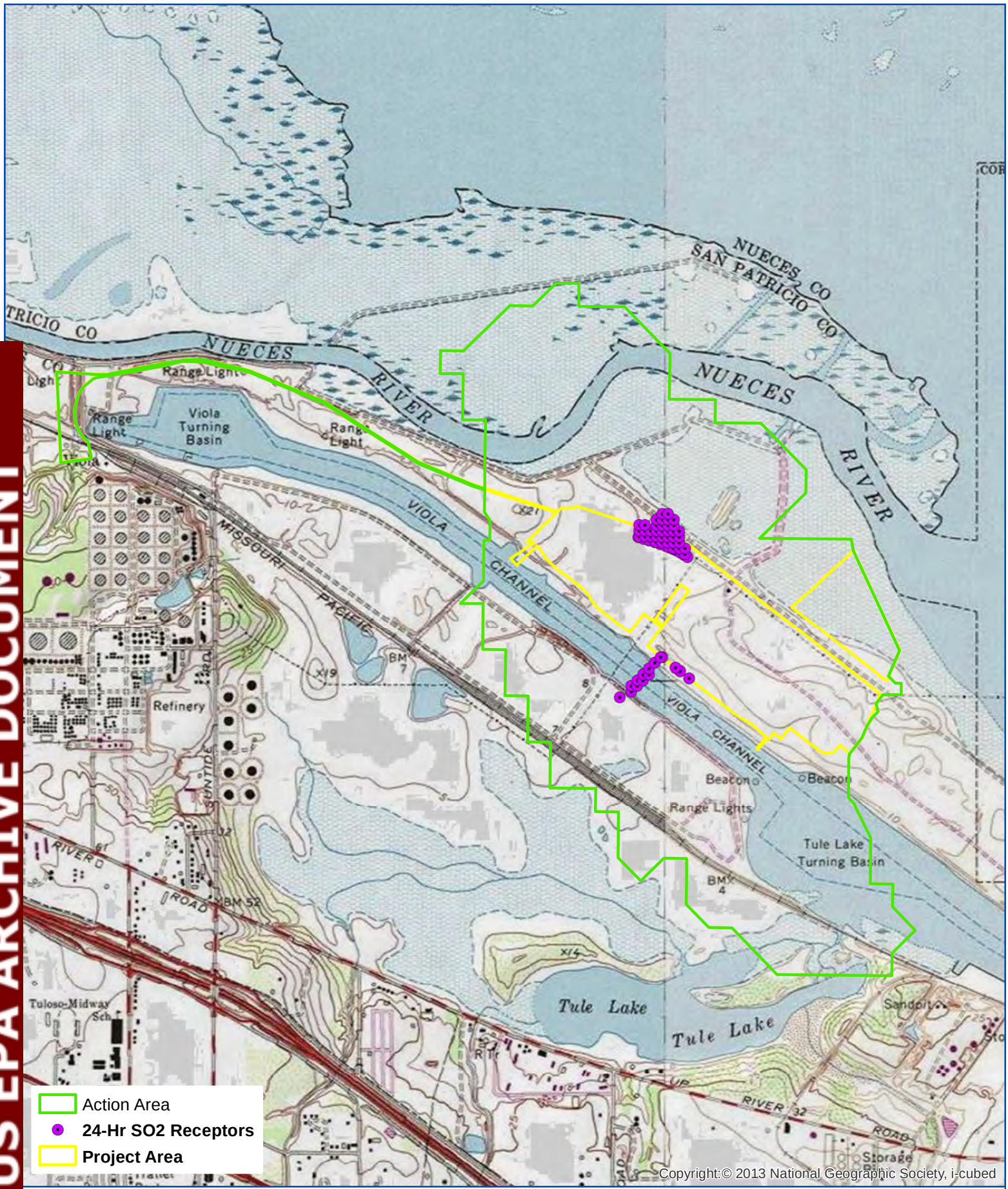
0 0.5 1 Miles

zephyr

FIGURE 4-6
1-Hr SO2 Receptors Above SIL

M & G Resins USA - Corpus Christi, TX

Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	03.03.2014



N

Scale 1:24,000

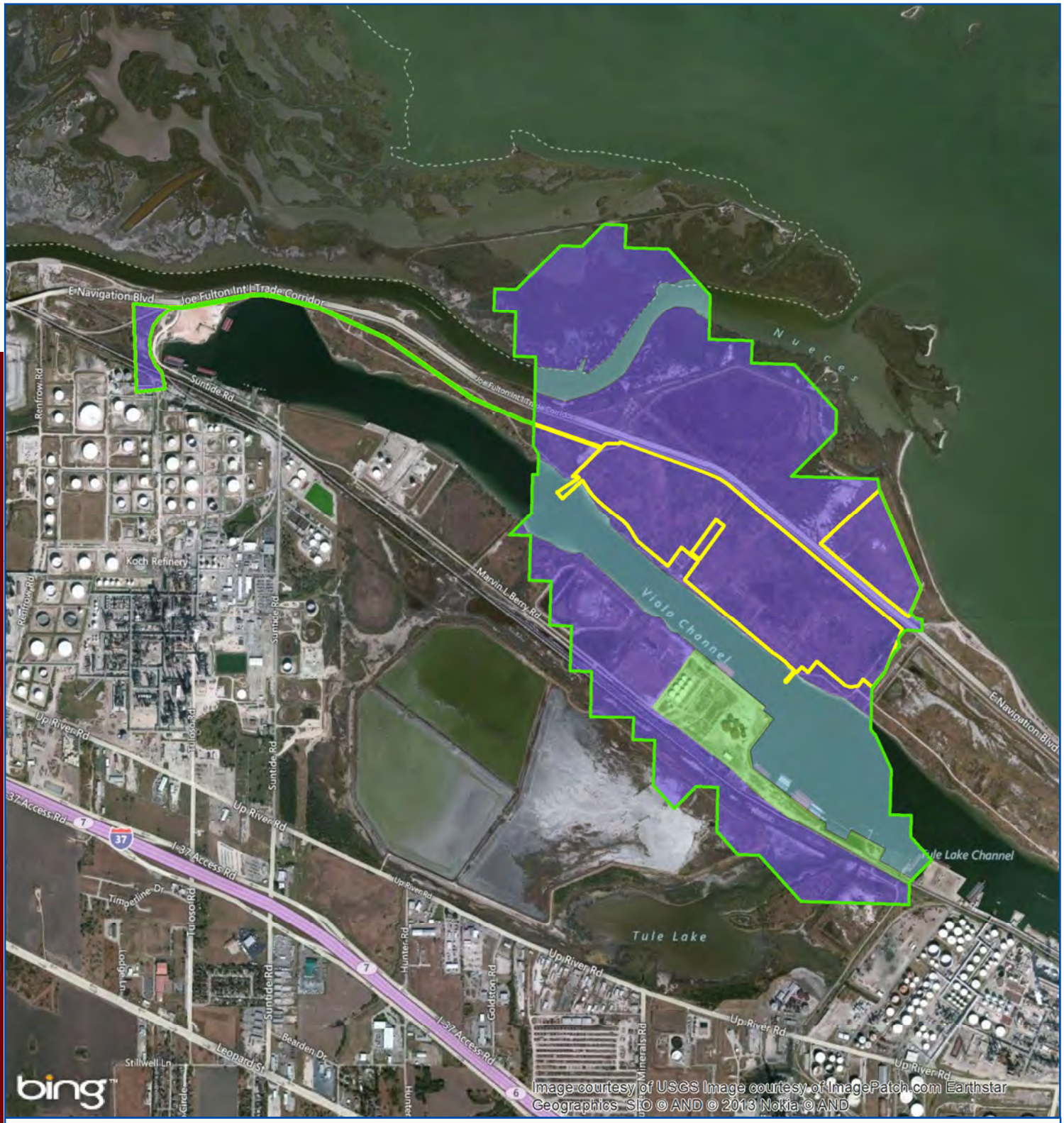
0 0.5 1 Kilometers

0 0.5 1 Miles

zephyr

FIGURE 4-7
24-Hr SO2 Receptors Above SIL
M & G Resins USA - Corpus Christi, TX

Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	03.03.2014



Project Area

Action Area

Land Use within Action Area

- **Industrial**
- **Open Water**
- **Undeveloped**

***Land Use generalized and determined remotely.**

Data Sources:
ESRI-Bing Hybrid & Streets Basemaps; M&G Resins USA
Datum: GCS NAD 83
UTM Zone 14

N

Scale 1:24,000

Kilometers: 0 0.5 1

Miles: 0 0.5 1

zephyr

FIGURE 5-1
LAND USE

M&G Resins USA - Corpus Christi, Texas

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Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	03.03.2014

Action Area

Project Area

FEMA Zones

- X- Areas outside floodplain
- A- 100-year floodplain
- X500- 500-year floodplain
- Undesignated (open water)

Data Sources:
ESRI BING Hybrid & Streets Basemaps;
FEMA Q3 Flood Data.
Datum: GCS NAD 83

N

Scale 1:24,000

Kilometers: 0 — 0.5 — 1

Miles: 0 — 0.5 — 1

zephyr

FIGURE 5-2
FEMA Zones

M&G Resins USA - Corpus Christi, Texas

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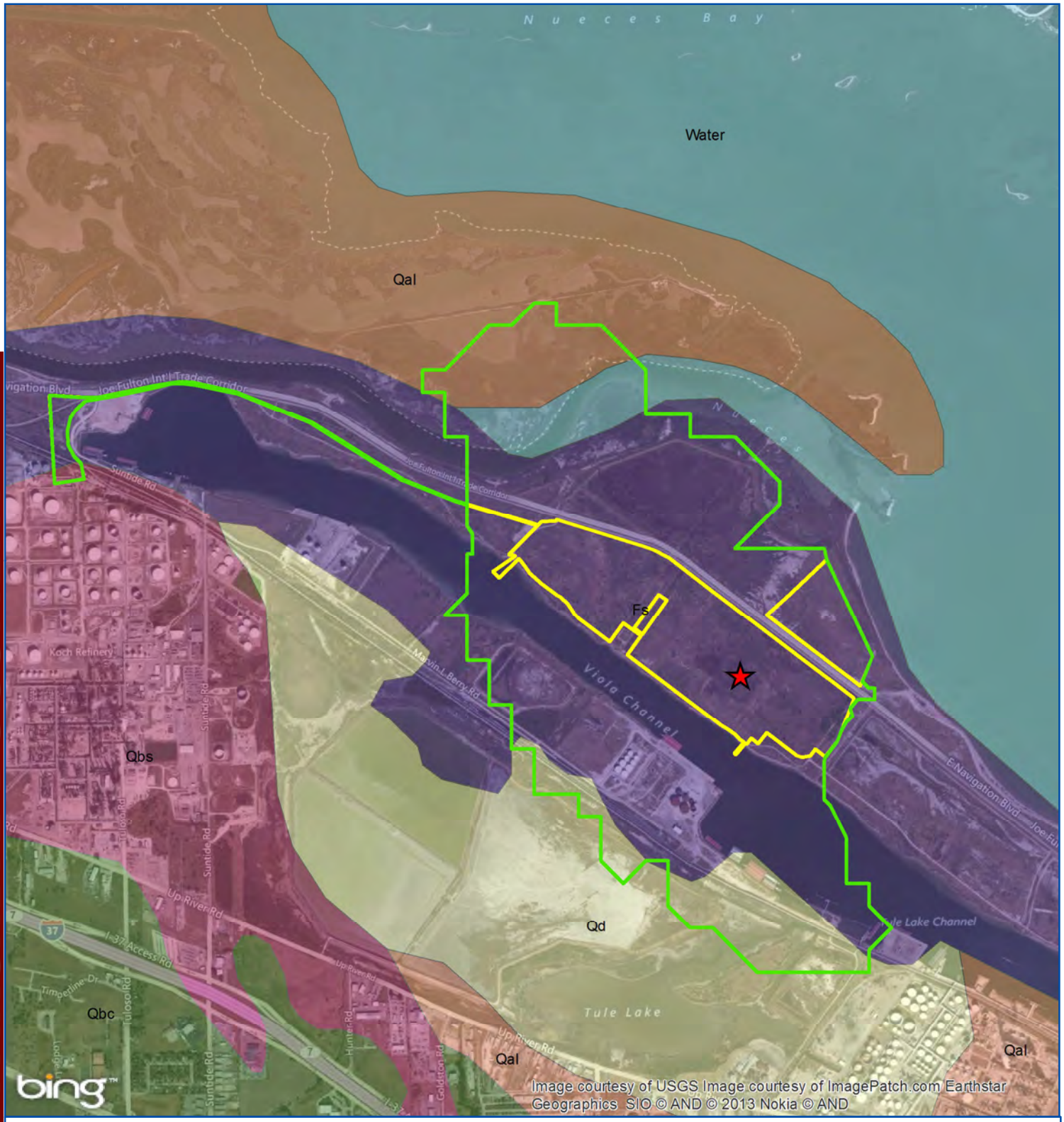
Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	03.03.2014



Action Area

Project Area

Geologic Units

- **Fs**
- **Qal**
- **Qbc**

NA

- **Qbs**
- **Qd**
- **Water**

Data Sources:
ESRI-BING Hybrid & Streets Basemaps, Geologic Atlas of Texas
Datum: GCS NAD 83

*** See Table 5-2 in Section 5.1.4 for unit descriptions**

Scale 1:24,000

N

Kilometers: 0 — 0.5 — 1

Miles: 0 — 0.5 — 1

zephyr

FIGURE 5-3
Geology

M&G Resins USA - Corpus Christi, Texas

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Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	03.03.2014

Action Area

Project Area

Soil Units

As	CcB	MgC	Pt	Vd2	
BT	Gm	Of	Sa	Vt	
CaA	Lo	PaA	Ta	W	
CcA	Ma	PaC	VcA		
	MgA	Ps	VcB		

Data Sources:
ESRI-BING Hybrid & Streets Basemaps,
NRCS- Soil Data Datum: GCS NAD 83

* Soils Units within Action Area are described in Table 5-3

Scale 1:24,000

N

0 0.5 1 Kilometers

0 0.5 1 Miles

zephyr

FIGURE 5-4
Soils

M&G Resins USA - Corpus Christi, Texas

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Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	06.14.2013

Action Area
Project Area

NWI Wetlands
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake

Data Sources:
ESRI-Bing Maps Hybrid Basemap, National Wetlands Inventory
Datum: GCS NAD 83

N

Scale 1:24,000

Kilometers: 0 — 0.5 — 1

Miles: 0 — 0.5 — 1

zephyr

FIGURE 5-5
Water Resources

M&G Resins USA - Corpus Christi, Texas

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Drafted By:	Reviewed By:	Project No.:	Date:
J. Knowles	C. Fischer	012453.006	03.03.2014

APPENDIX B

PHOTOGRAPHS

Photograph 1: November 6, Looking southwest from Carbon Plant Road across western end of the southern tract.

Photograph 2: November 6, Looking southeast from Carbon Plant Road along the northern boundary of the southern tract.

Photograph 3: November 6, Looking southeast from western end of the southern tract at typical onsite vegetation.

Photograph 4: November 6, Looking west from western end of the southern tract at the Viola ship channel and typical vegetation.

Photograph 5: November 6, Looking southeast across the tract at typical vegetation from western end of the southern tract.

Photograph 6: November 6, Looking northeast at vegetation within the onsite trapezoidal flow-way of the southern tract.

Photograph 7: November 6, Looking southwest at vegetation within the onsite trapezoidal flow-way of the southern tract.

Photograph 8: November 6, Looking southwest at the outfall of the onsite trapezoidal flow-way into the Viola ship channel.

Photograph 9: November 6, Looking southeast at typical view of Viola ship channel shoreline.

Photograph 10: November 6, Looking northeast across the tract at typical vegetation from central portion of the southern tract.

Photograph 11: November 6, Looking northeast across the tract at typical vegetation in the central portion of the southern tract.

Photograph 12: November 6, Looking northeast across the tract at typical vegetation from the eastern end of the southern tract.

Photograph 13: November 6, Looking southeast from the southern tract along the Viola ship channel at a typical view.

Photograph 14: November 6, Looking northeast from the east end of the southern tract at a typical vegetation.

Photograph 15: November 6, Looking east towards Carbon Plant Road from the east end of the southern tract.

Photograph 16: November 7, Looking southeast along the Nueces River from Carbon Plant Road at the west end of the northern tract.

Photograph 17: November 5, Looking northwest along Carbon Plant Road and southern boundary of the northern tract.

Photograph 18: November 5, Looking northeast from Carbon Plant Road across the east end of the northern tract.

Photograph 19: November 5, Looking northwest at typical vegetation from the east end of the northern tract.

Photograph 20: November 5, Looking southwest at typical vegetation from the central portion of the northern tract.

Photograph 21: November 5, Looking southwest at typical vegetation from the northeast corner of the northern tract.

Photograph 22: November 5, Looking northeast towards the Nueces River from the northeast corner of the northern tract.

APPENDIX C

FIELD NOTES SUMMARY

November 5, 2012

Weather: High temperature 89°F, Average humidity 72%, cloudy, wind speed 5 - 15 mph, no rain

November 6, 2012

Weather: High temperature 84°F, Average humidity 56%, clear, wind speed 9 - 21 mph, no rain

November 7, 2012

Weather: High temperature 88°F, Average humidity 54%, clear, wind speed 6 - 17 mph, no rain

Site inspection of Jumbo Project Action Area
Surveyors: Clay V. Fischer and Lance Gillaspie

Performed a windshield and pedestrian survey of north and south tracts along Carbon Plant Road (Jumbo Project action area). The action area was historically utilized as a spoil disposal area by the Port of Corpus Christi Authority. Use of the site appears to have terminated several years ago based upon the establishment of upland vegetation across the entirety of the site. Vegetation onsite is dominated by native and introduced grasses, forbs, shrubs, and trees.

Latitude	Longitude	Summary
27.842381	-97.504630	Approximate northwest corner of site
27.838934	-97.506639	Approximate southwest corner of site
27.835929	-97.489805	Approximate northeast corner of site
27.830339	-97.493181	Approximate southeast corner of site
27.837441	-97.496913	Approximate center of site

TERRESTRIAL FAUNA

Within the Project area, significant or sensitive wildlife habitats have been identified as those that potentially provide habitat for federally-listed species. The majority of the action area is comprised of re-vegetated spoil disposal areas. The remainder of the action area is comprised of tidal areas which surround the action area. The majority of federally-listed species for Nueces and San Patricio Counties are generally dependent on marine and tidally associated habitats.

Marine and tidally associated habitats occur at the boundaries of the site along the Viola ship channel and the Nueces River. The remainder of the action area is described as herbaceous vegetation dominated by grasses and forbs with scattered shrubs and small trees. Due to the historical use of the site as a spoil disposal location, unusual vegetation associations such as prickly pear with cattail can be observed.

No open waters, rivers, or streams are included within the action area. However, there is a trapezoidal flow-way designed to transport floodwaters from the site to the Viola ship channel. This feature exhibits ordinary high water marks as well as herbaceous hydrophytic vegetation. The flow-way transports flow to the Viola ship via three (3) thirty-six inch concrete culverts..

Review of TXNDD data revealed that no federally-listed species have been reported from within or near the action area.

FLORA

Analysis of Action Area vegetation indicated the presence of three distinct habitat/community types. The habitat/community types have been classified as marine/tidal, wetland, and shrub grasslands. The extent of each habitat/community type was identified during field reconnaissance and/or review of available aerial photography. Lists of representative plant species that occur in each of the remaining cover/habitat types are provided below.

The dominant species found within marine/tidal portions of the action area include, but are not limited to the following species:

- Spikerush (Eleocharis parvula)
- Gulf cord grass (Spartina alterniflora)
- Saltgrass (Distichlis spicata)

The dominant species found within wetland portions of the action area include, but are not limited to the following species:

- Longs sedge (*Carex longii*)
- Cattail *(Typha sp.)*

The dominant species found within shrub grassland portions of the action area include, but are not limited to the following species:

- Sea oxeye daisy (*Borrichia frutescens)*
- Camphor daisy *(Haplopappus phyllocephalus)*
- Frog-fruit *(Phyla lanceolata)*
- Bermuda grass (*Cynodon dactylon*)
- Three-awn grasses (*Aristida sp.)*

- Shoregrass (*Monanthochloe littoralis*)
- Mesquite (*Prosopis glandulosa*)
- Tepeguaje (*Leucanea pulverulenta*)
- Mexican fan palm (*Washingtonia* sp.)
- Huisache (*Acacia farnesiana*)
- Salt-cedar (*Tamarix* sp.)
- Carolina wolfberry (*Lycium carolinianum*)
- Prickly pear (*Opuntia* sp.)

FAUNA

Animal species observed within the Action Area were all avian and include the following:

- Great Blue Heron
- Cattle Egret
- Turkey Vulture
- Laughing gull
- Great-tailed Grackle