Biological Assessment

Indeck Wharton Energy Center Project
Wharton County, Texas

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ACCRONYMS AND ABBREVIATIONS

APAD	Air Permits Allowable Database
AQA	Air Quality Analysis
BA	Biological Assessment
BACT	best available control technology
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best management practices
CAA	Clean Air Act
CO	carbon monoxide
DoD	U.S. Department of Defense
EPA	United States Environmental Protection Agency
ERCOT	Electric Reliability Council of Texas
ESA	Endangered Species Act
ESLs	effect screening levels
GCP	Good Combustion Practices
GEP	Good Engineering Practice
GHG / GHGs	greenhouse gas / greenhouse gases
GTGs	gas turbine generators
H_2SO_4	sulfuric acid
Indeck	Indeck Wharton, LLC
kV	kilovolt
MBTA	Migratory Bird Treaty Act
MMPA	Marine Mammal Protection Act
mph	mile per hour
msl	mean sea level
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NED	National Elevation Data
NLCD	National Land Cover Database
NMFS	National Marine Fisheries Service

NO_2	nitrogen dioxide
NOAA NMFS	National Oceanic and Atmospheric Administration National Marine Fisheries Service
O_3	ozone
Pb	lead
Project or Facility	Indeck Wharton Energy Center Project
PSD	Prevention of Significant Deterioration
SER	significant emission rate
SILs	Significant Impact Levels
SO_2	sulfur dioxide
TCEQ	Texas Commission of Environmental Quality
TPWD	Texas Parks and Wildlife Department
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 INTRODUCTION

Indeck Wharton, LLC (Indeck) proposes to construct and operate a nominal, net 650 megawatt (MW) natural gas-fired, simple-cycle generating facility at a new site located in the vicinity of the unincorporated community of Danevang, in Wharton County, Texas. A general location map and project outline is provided in Figure 1. Construction of the proposed Indeck Wharton Energy Center (Project or Facility) is scheduled to begin in mid-2014 and continue for a period of approximately 24 months. The Facility is expected to commence commercial operations in mid-2016.

The proposed Project will include three (3) natural gas turbine generators (GTGs); a natural gas pipeline heater, an emergency diesel generator, and a fire pump diesel engine. Indeck has applied for a Prevention of Significant Deterioration (PSD) permit from both the Texas Commission of Environmental Quality (TCEQ) for criteria pollutant emissions, and from the United States Environmental Protection Agency (EPA) Region 6 for greenhouse gas (GHG) emissions.

Beginning on January 2, 2011, the U.S. Environmental Protection Agency (USEPA) began permitting greenhouse gases (GHGs) through the PSD program of the Clean Air Act (the CAA). Most states directly issue GHG PSD permits, but USEPA currently retains authority to issue GHG permits in Texas. Because the USEPA retains authority to issue PSD permits, the requirements of the Endangered Species Act (ESA) became part of the PSD permitting process. Section 7 of the ESA requires that federal agencies consult with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) (collectively referred to as the Service) to "insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species.

Because Indeck is seeking a PSD permit for GHG emissions from EPA, they are required to meet the ESA requirements administered by the EPA. This Biological Assessment (BA) provides the results of an assessment of the potential effects of the proposed action on federal species that are protected under the ESA. Protected species include endangered, threatened, candidate species, migratory birds, bald and golden eagles and marine mammals. This BA is based on a review of the proposed Project and relevant data, both current and historic, as well as field investigations to evaluate the Project site and surrounding area to determine whether suitable habitat exists for protected species within the Action Area. Action Area is defined as all areas that may be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. It encompasses the geographic extent of environmental changes (i.e., the physical, chemical and biotic effects) that will result directly and indirectly from this action.

2.0 AGENCY REGULATIONS

2.1 Clean Air Act

The purpose of the CAA, enacted in 1970, is to protect public health and welfare by regulating air emissions from stationary and mobile sources. The CAA authorized the EPA to establish National Ambient Air Quality Standards (NAAQS) to regulate emissions of air pollutants. The NAAQS are set at two categories: primary and secondary standards. Primary standards are established to protect public health, whereas secondary standards are set to prevent environmental and property damage. The EPA maintains NAAQS for six principal air pollutants (criteria pollutants) including nitrogen dioxide, ozone, sulfur dioxide, particulate matter, carbon monoxide, and lead. A geographic area with ambient air quality that is better than the primary standard is designated an attainment area; areas that do not meet the primary standard are designated nonattainment areas (EPA 2007).

Under the CAA, the EPA has established Significant Impact Levels (SILs) that can be applied to predicted pollutant impact concentrations for proposed facilities that have applied for a permit to emit a regulated pollutant in an attainment area. The EPA and the applicable state agency must determine if emissions from that facility will result in a worsening of air quality. If the modeled concentration for a given pollutant is less than the SIL, the project is determined to have no significant impact on ambient air quality, and no further analysis is required for that pollutant. If the model predicted concentration for a given pollutant is greater than the SIL, further analysis is required to estimate total ambient concentrations when the facility's emissions are combined with existing concentrations in the area. The air quality impact analysis must prove that the total concentration does not exceed the applicable NAAQS (EPA 2011).

2.2 Endangered Species Act

The purpose of the ESA, enacted in 1973, is to protect and support the recovery of imperiled species and the ecosystems upon which they depend. The ESA is jointly administered by the USFWS and the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA NMFS). The USFWS is responsible for terrestrial and freshwater species, while NOAA NMFS is responsible for marine wildlife and anadromous fish. Under the ESA, species may be listed as endangered, meaning that a species is in danger of extinction throughout all or a significant portion of its range, or threatened, meaning a species is likely to become endangered within the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing under the ESA. In addition to maintaining a list of threatened and endangered species, USFWS and NOAA NMFS maintain a list of candidate species for which there is enough information to warrant listing but higher listing priorities prevent the agencies from an actual listing (USFWS 2013a).

According to the ESA, it is unlawful for a person to take a listed animal without a permit. Section 9 of the ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, or collect or attempt to engage in any such conduct". Harm is further defined as "an act which actually kills or injures wildlife," which 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" (16 U.S.C. §1532). Section 7 of the ESA requires federal agencies to promote the conservation purposes of the ESA and to consult with USFWS and NOAA NMFS, as needed, to ensure that effects of actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of listed species.

The ESA requires that agencies must file a BA that analyzes and determines whether a proposed project may affect relevant listed species (50 CFR 402). The BA will specify one of three possible determinations:

- No effect. A "No effect" determination means there will be no impacts, positive or negative, to listed or proposed resources. Generally, this means no listed resources will be exposed to the action and its environmental consequences.
- May affect, not likely to adversely affect. A "may affect, not likely to adversely affect" determination may be reached for a proposed action where 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 effects and should not reach the scale where take occurs. Discountable effects are those that are extremely unlikely to occur.
- May affect, likely to adversely affect. A "may affect, likely to adversely affect" determination means that all adverse effects cannot be avoided. A combination of beneficial and adverse effects is still "likely to adversely affect: even if the net effect is neutral or positive".

2.3 Migratory Bird Treaty Act

The purpose of the Migratory Bird Treaty Act (MBTA), enacted in 1918, is to protect migratory birds and their habitat through careful monitoring and effective management. Almost all of the birds that naturally occur in the U.S. are protected under the MBTA. The MBTA does not protect nonnative species introduced into the U.S. via human interference. As of November 1, 2013, 1,026 bird species are protected under the MBTA (USFWS 2011).

According to the MBTA, it is unlawful for a person to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird...or any part, nest, or egg of any such bird" (16 U.S.C. §703). The MBTA permits USFWS to issue permits authorizing otherwise prohibited activities for scientific, educational, cultural, and other purposes (USFWS 2002).

2.4 Bald and Golden Eagle Protection Act

The purpose of the Bald and Golden Eagle Protection Act (BGEPA), enacted in 1940, is to provide for the protection of the bald and golden eagle. According to the BGEPA, it is unlawful for a person to "take" a bald or golden eagle, or any part, nest or egg of a bald or golden eagle, without a permit. The BEGPA defines "take" as to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb" (16 U.S.C. §668c). This definition includes indirect impacts that result from human-induced alterations at a previously used nest site, even when eagles are not present, if these actions harass a bald or golden eagle to the degree that it interferes with or interrupts normal breeding, feeding, or sheltering behaviors (USFWS 2012). The BGEPA permits USFWS to issue permits for otherwise prohibited activities for scientific, educational, cultural, or other purposes (16 U.S.C. §668a).

2.5 Marine Mammal Protection Act

The purpose of the Marine Mammal Protection Act (MMPA), enacted in 1972, is to maintain the health and stability of the marine ecosystems by managing marine species for their benefit rather than commercial use. Under the MMPA, NOAA NMFS is responsible for protecting whales, dolphins, porpoises, seals, and sea lions. The USFWS is responsible for protecting walruses, manatees, otters, and polar bears.

Under the MMPA, it is unlawful for a person to "take", or attempt to take, any marine mammal. Section 3 of the MMPA defines "take" as to "harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill" (16 U.S.C §1362). The MMPA permits NOAA NMFS and USFWS to issue permits otherwise for prohibited activities for scientific, educational, cultural, or other purposes (16 U.S.C. §1374).

3.0 ACTION AREA

Federal rule defines the Action Area as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" [50 CFR 402.02]. The Action Area was determined by identifying the maximum area potentially impacted, either directly or indirectly, by the proposed action. Direct impacts to species and habitat within the property boundaries may result from the construction and operation of the Facility due to land disturbance and vehicular traffic. Indirect impacts to species and habitat from construction and operation due to noise, light, and air emissions may result off property. Stormwater discharges will be associated with the Project; however, no impacts to species or their habitats within or outside of the property boundaries will occur as a result of this action. Evaluation of potential impacts determined that air emissions from operation of the emission units have some potential to impact species and habitat. As such, the Action Area is defined based on the extent of air quality impacts as demonstrated by ambient air quality dispersion modeling. The dispersion modeling demonstrated that maximum predicted potential pollutant concentrations are less than the corresponding EPA SILs for all pollutants except nitrogen dioxide (NO_2), which has a significant impact area which extends approximately 2.1 kilometers. Therefore, the Action Area is defined as the property boundary directly. However, an assessment has also been conducted to account for potential air quality impacts to species and habitat. This assessment is presented in Section 7. To account for potential impacts on adjacent properties associated with construction and operation of the Project an additional 1,000 feet surrounding the property boundary's and 100 feet on either side of the gas line that will be constructed within the Farm to Market Road 441 right-of-way was evaluated to account for indirect impacts from noise, lighting and incidental physical disturbance. Figure 1 depicts the direct and indirect Action Area that was evaluated in this BA.

4.0 PROJECT DESCRIPTION

The Project is a natural gas-fired, simple cycle power generating facility. The Facility will be located west of State Route 71 and north of Farm to Market Road 441 in the unincorporated community of Danevang, Texas approximately 70 miles southwest of Houston. The Project will occupy approximately 20 acres of a 150-acre cotton field. There are two high voltage transmission lines that bisect the Project area from northeast to southwest.

The Project area is bordered by a single family residence with several buildings, and State Highway 71 to the west; a one lane dirt access road, agricultural fields of corn and cotton, and the Danevang Farmer's Society Hardware (a coop) to the north; a cotton field and Juanita Creek[1] to the west, and Farm to Market Road 441 and agricultural fields to the south. The township of Danevang is located approximately one mile to the north and the city of El Campo is located ten miles to the north of the Project area.

4.1 Facility Description

The Facility will be constructed on approximately 20 acres within the Project area. The Facility will be configured as three (3) operating units. Each unit will be able to operate independently to respond to dispatch requirements. The Facility will include a variety of power plant equipment including: three (3) GTGs; air inlet structures (including necessary silencers) for each unit, electrical equipment including generator step-up transformers; lube oil systems; evaporative inlet air cooling systems, water tanks (raw and treated); an emergency diesel generator; a natural gas heater; and a fire pump diesel engine. In addition, the Facility will include buildings for the operation, maintenance and administration tasks of the Facility including a control room, offices, maintenance shop, and water treatment.

The Project will include three "F" class stationary gas turbines, either Siemens 5000F or GE Frame 7FA. The GTG will include an advanced firing combustion turbine air compressor, gas combustion system (dry low NOx combustors), power turbine, and an electric generator. Each GTG is designed to produce in excess of 200 MW of electrical power.

The GTG is the heart of the power system. First, air is filtered and compressed in a multiple-stage axial flow compressor. Compressed air and natural gas are mixed and combusted in the turbine combustion chamber. Dry, low NOx combustors are used to minimize NOx formation during combustion. Exhaust gas from the combustion chamber is expanded through a multi-stage power turbine that drives both the air compressor and the electric power generator.

The production of electricity using a combustion turbine engine coupled with a shaft driven generator is referred to as a Brayton Cycle. This power generation cycle has a thermodynamic efficiency that generally approaches 40 percent. This process is also referred to as "simple-cycle" and has been traditionally utilized for peaking generation of electricity since the unit and its output can be brought on line very quickly. The largest energy loss from this cycle is from the turbine exhaust in which heat exits out of the turbine at approximately 1,000°F. Operation of each unit will be limited to 2,500 hours per year.

The electricity generated by the Facility will be connected to a step-up transformer where the electricity will be converted to 345 kilovolt (kV). A transmission line will be connected from the transformer to the 345 kV CenterPoint transmission line that bisects the property. The Facility will also include a 12-inch

[1] Juanita Creek is identified as Little Tres Palacios Creek on the Wharton County Assessors map.

gas pipeline constructed from the southwestern edge of the Facility proceeding west ½ mile and due south 1/3 mile where it connects to the Kinder Morgan, 30-inch gas pipeline. This pipeline will supply the Facility with fuel to generate the electricity.

4.2 Project Purpose

The Project is conceived as a nominal, net 650 MW peaking power project. The Project is based on three "F" class combustion turbines in simple cycle. It will be classified as a wholesale electric generator selling power into the Electric Reliability Council of Texas (ERCOT) region. In terms of size and demand, ERCOT has a peak load of approximately 68.3 GW (actual 2011). This is slightly larger than the peak load of California and twice the peak load of either New York or New England.

Supply shortages are expected in the next five years within ERCOT. In particular, the Houston region has been identified as the most likely to be affected in this regard. The Project is designed to respond to this potential shortage. In that the electric shortage is forecasted within the near term, a peaking power project such as the Project is ideally suited to respond to this condition. Its shorter construction schedule and favorable operational characteristics would enable the Project to be in operation prior to other power production options and to more fully respond to the perceived need. Other power options such as combined cycle gas turbines or base load steam plants are hampered by longer lead times and less flexible operating parameters. Intermittent renewable projects such as wind and solar are unable to meet the reliability requirements of a peaking project. Options to the selected "F" class turbines, such as internal combustion engines, or differing combustion turbines, lack the advantages of the selected technology from either environmental and/or operational characteristics.

4.3 Construction

Construction of the proposed Project will occur within the 20 acres identified as the Facility footprint. Another 20 acres to the north and west of the existing transmission lines will be used as a laydown and staging area. A trench for the gas pipeline will be constructed by Kinder Morgan but, is considered as part of this project. The trench will be 4 feet wide and 4 feet deep. The construction area is shown on Figure 1.

The following general construction activities will include:

- Site dirt work
- Access road construction
- Installation of drilled foundations and spread footings
- Installation of pipes and infrastructure
- Construction of main plant
- Installation of instruments and associated wiring
- Controls testing
- Plant startup and commissioning

The construction is anticipated to take one year.

4.4 Noise Levels

The Project area is located in a rural farm setting where noise is characterized by farm activities and relatively minor car/roadway noise. It is anticipated that noise levels associated with the Project may raise ambient noise levels moderately at or near the property line during facility operations. However, no impacts to threatened or endangered species are expected from the Project due to its intermittent moderate noise emissions.

4.5 Dust

Construction activities for this Project will take place entirely within an agricultural field. This area is located over ½ mile to the nearest habitat feature, Juanita Creek. Best management practices including periodic wetting of soils will keep dust mobilization at a minimum.

4.6 Water Use

An on-site water well will be drilled to provide water for the GTG's evaporative coolers and for sanitary water needs. The water will be drawn off of the Chicot aquifer and is anticipated to yield 100 gallons per minute, and stored in an onsite water tank for periods of potential elevated water use.

4.7 Wastewater

There will be an onsite septic system to handle sanitary waste that will be permitted through Wharton County. Water will also be used to by the GTG's evaporative coolers to cool the inlet air. This water will be evaporated and not discharged offsite. The only water discharge will be a result of stormwater discharge from impervious surfaces. These discharges will be directed to an on-site retention pond that will have best management practices (BMPs) to remove any suspended sediments. No impacts to species or their habitats are expected from stormwater runoff.

4.8 Air Pollutant Emission Controls

Any new major stationary source of air pollutant emissions subject to PSD review must undergo an analysis to ensure the use of best available control technology (BACT). The requirement to conduct a BACT analysis is set forth in 40 CFR 52.21 and 30 TAC 116.111(a)(2)(C). BACT is defined in 30 TAC 116 as:

> *"An air pollution control method for a new or modified facility that through experience and research, has proven to be operational, obtainable, and capable of reducing or eliminating emissions from the facility, and is considered technically practical and economically reasonable for the facility. The emissions reduction can be achieved through technology such as the use of add-on control equipment or by enforceable changes in production processes, systems, methods, or work practice."*

BACT is required for each new or modified emission unit having emissions exceeding the PSD significant emission rate (SER). Since the Facility's potential emissions exceed the PSD SER for CO, NO_X, PM_{10}, $PM_{2.5}$, and GHG, a BACT analysis has been conducted for each pollutant. This BACT analysis was presented in the PSD Air Permit application submitted to the TCEQ on June 21, 2013. The

TCEQ requires a “top-down” approach to BACT analyses. The five basic steps to a top-down BACT analysis are as follows:

(1) Identification of control technologies for each pollutant.

(2) Eliminate technically infeasible technologies.

(3) Rank the remaining technologies by control efficiency.

(4) Evaluate the technologies based on economic, energy and environmental impacts.

(5) If the most effective technology is eliminated based on these criteria, the next most stringent technology is evaluated until BACT is selected.

The results of the BACT analysis, including the proposed BACT emission limits for the combustion turbine units are shown in Table 4-1 below.

Table 4-1 Proposed Combustion Turbine BACT Emission Limits and Controls

Pollutant	Emission Limitation	Control Technology
NOx	9.0 ppmvd @ 15% O_2	Dry Low NOx Combustors
CO	9.0 ppmvd @ 15% O_2	Good Combustion Practices (GCP)
$PM/PM_{10}/PM_{2.5}$	9.7 lbs/hr	Natural Gas Fuel & GCP
VOC	1.4 ppmvd @ 15% O_2	GCP
GHG	0.67 ton/MWh	Natural Gas Fuel & GCP

5.0 EXISTING CONDITIONS

5.1 Field Inspection

Tetra Tech field specialists Rebecca Longley and David Hadersbeck conducted a field survey on November 13, 2013. The temperature was 37 degrees Fahrenheit with a 15 mile per hour (mph) wind on a sunny day. The Tetra Tech field specialists investigated the Project site and surrounding area to document Threatened and Endangered species or sensitive habitats present in the Action Area.

The Action Area and Project area were either walked or driven. It was confirmed that the Project site is a flat agricultural cotton crop field with no obvious low or wet areas. Notes were taken regarding surrounding areas regarding access, habitat, vegetation, and wildlife species observed. The Little Tres Placios Creek ½ mile west of the Project area was inspected. Notes were taken on the vegetation surrounding the creek as described in Section 5.10 and confirmed that the area would be considered a scrub/shrub wetland in accordance with Cowardin et al (USACE nomenclature).

The public access roads were driven out to one to two miles from Project area to observe wildlife and inspect other potential habitats. Notes were taken of avian species observed (Section 5.11) and no other wildlife species were observed.

It was observed that habitat within the immediate Project area and Action Area does not contain habitat to support listed candidate, threatened or endangered species.

5.2 Regional

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources, including geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. The Project area is located within the Northern Humid Gulf Coastal Prairies Level IV ecoregion of Texas. This ecoregion is underlain by quaternary-age deltaic sands, silts, and clays, and is characterized by gently sloping, mostly flat, coastal plains and low gradient rivers and streams with sandy, silty, and clayey substrates. Drainage is generally poor due to the low relief and clay subsoils. Elevation in the ecoregion ranges from mean sea level (msl) to 300 feet above msl (TPWD 2007).

Historically, the Northern Humid Gulf Coastal Prairies ecoregion was dominated by mostly tallgrass grasslands with a few clusters of oaks, known as oak mottes or maritime woodlands. Historically dominant grassland species include little bluestem (*Schizachyrium scoparium*), yellow Indiangrass (*Sorghastrum nutans*), brownseed paspalum (*Paspalum plicatulum*), gulf muhly (*Muhlenbergia capillaris*), and switchgrass (*Panicum virgatum*), with hundreds of other herbaceous species across these prairies (TPWD 2007).

The Northern Humid Gulf Coastal Prairies ecoregion has a long history of human-directed alteration. Today, almost all of the ecoregion has been converted to cropland, rangeland, pasture, or urban and industrial land uses. Regional concerns relate to invasive species such as Chinese tallow tree and Chinese privet which have spread across many areas in this region, and encroachment of tallgrass prairie habitat which supports the federally endangered Attwater's prairie chicken (TPWD 2007).

The Northern Humid Gulf Coastal Prairies ecoregion is located within the Western Gulf Coastal Plain Level III ecoregion of Texas. The Western Gulf Coastal Plain is characterized by barrier islands, peninsulas, bays, lagoons, marshes, estuaries, and flat plains. The ecoregion is one of the most ecologically complex and biologically diverse regions of Texas with nearly 500 recorded species of resident and migratory birds. However, the region has experienced severe modification, and about 35 percent of the state's population and a majority of its industrial base and jobs are located within 100 miles of the coastline (EPA 2003).

5.3 Air Quality

The EPA has developed NAAQS Standards, for six air contaminants, known as criteria pollutants, for the protection of public health and welfare. These criteria pollutants are sulfur dioxide (SO_2), particulate matter, nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and lead (Pb). The TCEQ also has adopted these limits. The NAAQS have been developed for various durations of exposure. The NAAQS for short-term periods (24 hours or less) typically refer to pollutant levels that cannot be exceeded except for a limited number of cases per year. The NAAQS for long-term levels typically refer to pollutant levels that cannot be exceeded for exposures averaged typically over one year. The NAAQS include both "primary" and "secondary" standards. The primary standards are intended to protect human health and the secondary standards are intended to protect the public welfare from any known or anticipated adverse effects associated with the presence of air pollutants.

Danevang, located in Wharton County, is an attainment area for primary air quality pollutants. However, the Project will be a major air emissions source subject to PSD regulations, due to the significant increases in CO_2e, CO, NO_X, VOC, PM, PM_{10}, $PM_{2.5,}$ and GHG. As a result, dispersion modeling has been conducted for CO, NO_2, PM, PM_{10} and $PM_{2.5}$ to demonstrate compliance with the NAAQS and PSD Increments, as well as the additional Texas regulatory standards. In addition, SO_2 was modeled for compliance with TCEQ standards, and modeling was also conducted for potential emissions of air toxic pollutants as part of the State Effects Evaluation analysis. The dispersion modeling analysis pertinent to this BA is presented in Section 7.

5.4 Land Use

The National Land Cover Database (NLCD) indicates that the predominant land use within the Project area is cultivated crops, with a very small area of developed, open space and developed, low intensity, located along the roads. The land use data is presented in Figure 2. The Facility would be located entirely within area identified as cultivated crops land use. The area around the Project area is predominantly cultivated crops with some areas of developed low intensity, developed open space, barren land, pasture/hay, woody wetlands, grasslands/herbaceous, and deciduous forest (NLCD 2006).

5.5 Climate

Wharton County has a humid, subtropical climate that is characterized by warm to hot summers. The nearby Gulf of Mexico gives the county many of the characteristics of a mild, marine climate (USDA SCS 1974). The average temperature is 94°F during the summer and 42°F during the winter (Texas State Historical Association 2000). The growing season in the county is approximately 266 days with an annual rainfall of 38 to 44 inches. Prevailing winds are southeasterly to south-southeasterly, except in November through February when frequent high pressure systems bring polar air and prevailing winds are northerly. The average annual relative humidity ranges from 87 percent in the morning to 65 percent in the evening, with only minor variations from season to season (USDA SCS 1974).

Wharton County is subject to a few tropical disturbances in the late summer and early fall months, consisting of torrential rains and destructive winds, as well as infrequent tornadoes and hailstorms (USDA SCS 1974).

5.6 Topography

The Project area can be found on the Danevang, Texas U.S. Geological Survey (USGS) 7.5-minute quadrangle (2013). Elevation in Wharton County, Texas ranges from 50 to 200 feet above msl. The Colorado River runs from northwest to southeast and flows through Glen Flora and Wharton, Texas. The county is drained by the Colorado River in the central portions. Level to undulating plains rise toward the north and are marked by a timber belt of ash, pecan, live oak, and other varieties of hardwood trees along the Colorado River (Texas A&M AgriLife Extension No Date).

The Project area appeared primarily flat during the field surveys.

5.7 Geology

According to the USGS, the geologic formation within the Project area is the Beaumont Formation, which is made up of clay, mud, and silt (Qbc; USGS 2005). The following is the description of the geologic unit provided by the USGS:

> The Beaumont Formation, areas predominantly clay is described as light- to dark-gray and bluish- to greenish-gray clay and silt, intermixed and interbedded; contains beds and lenses of fine sand, decayed organic matter, and many buried organic-rich, oxidized soil zones that contain calcareous and ferruginous nodules. Very light gray to very light yellow-gray sediment cemented by calcium carbonate present in varied forms, veins, laminar zones, burrows, root casts, nodules. Locally, small gypsum crystals present. Includes plastic and compressible clay and mud deposited in flood basins, coastal lakes, and former stream channels on a deltaic plain. Disconformably overlies Lissie Formation. Thickness 5-10 meters along north edge of outcrop; thickens southward in subsurface to more than 100 meters (USGS 2004).

5.8 Soils

According to the USDA NRCS Wharton County soil survey, there is one soil type within the Project area: Lake Charles clay, 0 to 1 percent slopes. This soil type consists of deep, moderately well drained, very slowly permeable soils that are formed in clayey sediments. These soils are typical on broad coastal prairies. This soil type is not hydric (USDA SCS 1974).

Prime farmland is defined as “land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses”. Prime farmland is designated based on several factors including soil quality, growing season, and moisture supply (USDA NRCS 1993). The Project area is designated as prime farmland (USDA NRCS 2012).

5.9 Water Resources

The proposed Project site drains to the south to a shallow drainage ditch along the north side of Farm to Market Road 441. From there, surface water runoff flows west for about ½ mile and flows through two culverts into Juanita Creek[2].

Juanita Creek flows north to south and is approximately five feet wide and about ½ foot deep. Flow was observed to be sluggish during the field inspection. The water appeared very muddy and the substrate comprised of mostly silt and mud. The banks to the creek were about 7 feet in width at a less than a 2% grade. Vegetation along the banks was characteristic of a riparian corridor and would be considered a jurisdictional stream. A vegetation list is presented in Section 5.10.

Two miles to the west of Juanita Creek is Willow Creek which flows north to south. Willow Creek converges with Juanita Creek approximately two miles south of Farm to Market Road 441 and continues as Juanita Creek which flows 20 miles to the south and empties into the Matagorda Bay northeast of the city of Palacios. This area is located in the Central Matagorda Bay watershed (EPA 2012).

According to the Texas Parks and Wildlife Department (TPWD), there are no ecologically significant river or stream segments in the Project area (TPWD 2013). The closest ecologically significant river or stream segment is the Colorado River which is located approximately 10 miles east of the Project area (TPWD 2002).

USFWS National Wetlands Inventory map indicates there are no wetlands or streams within the Project area or the gas pipeline corridor. The closest wetlands are palustrine scrub/shrub wetlands along Juanita Creek approximately ½ mile west of the Project area and 100 feet west of the pipeline connection at the Kinder Morgan gas pipeline. This area is also identified as a 100-year floodplain (FEMA). The wetlands and floodplains adjacent to the Project area are shown in Figure 3. No direct or indirect impacts are expected from the construction and operation of the Facility and pipeline as soil erosion and sediment control BMPs will be incorporated. Therefore, no delineation was conducted during the field inspection.

5.10 Vegetation

Historically, the native plant community was dominated by tall grasses and some woodlands. Most of the area has been converted to cropland or residential and commercial development. The NLCD classifies the area as cultivated cropland. During the field inspection most of the land use surrounding the Project area was either cotton (*Gossypium hirsutum*) or corn (*Zea mays*). The Project area is an existing cotton field. At the time of the inspection the cotton had been harvested and placed in large bales wrapped in yellow plastic along the northern edge of the property. Other likely vegetation might include Johnson grass (*Sorghum halepense*) and other grasses (*Gramminea* sp.p.).

Juanita Creek located to the west of the Project area and pipeline had riparian vegetation. Characteristic vegetation included common cattail (*Typha latifolia*), sedges (*Carex* sp.p.), goldenrod (*Solidago* sp.), and poison oak (*Toxicodendron diversilobum*) in the herbaceous layer and black willow (*Salix nigra*), locust (*Gleditsia triacanthos*), hackberry (*Celtis occidentalis*), palo verde (*Cercidium microphyllum*), Texas prickly pear (*Opuntia lindheimeiri*), Chinaberry (*Melia azedarach*) and white prairie rose (*Rosa fuliolosa*) in the shrub layer. There were no mature tree species in a canopy layer.

[2] Juanita Creek is identified as Little Tres Palacios Creek on the Wharton County Assessors map.

The USFWS lists the Texas Prairie dawn-flower (*Hymenoxys texana*) as an endangered plant species. However, this species is located in Fort Bend, Harris and LaSalle Counties in specific habitats such as sparsely vegetated areas at the base of mima mounds or on soils in coastal prairie grasslands (TPWD 2013).

5.11 Wildlife

During the site inspection, no mammals, reptiles or amphibians were observed. Avian species in the Project area and within two miles of the Project area included the following:

American kestrel (*Falco sparverius*), killdeer (*Charadrius vociferus*), turkey vulture (*Cathartes aura*), white ibis (*Eudocimus albus*), wren, red-tailed hawk (*Buteo jamaicensis*), eastern meadowlark (*Sturnella magna)*, crested caracara (*Caracara cheriway*), and loggerhead shrike (*Lanius ludovicianus*).

5.11.1 Federally Listed Species

Literature review of current and historical data as well as field surveys were used to evaluate the Action Area for the suitability of habitats to support federally listed threatened, endangered, candidate species including sensitive and critical habitats. Federally listed species with the potential to occur in Wharton County, Texas are listed in Table 5-1.

Table 5-1 Federally Listed Species of Potential Occurrence in Wharton County

Species Common Name ***(Scientific Name)***	**USFWS Southwest Region County-by-County List[1]**	**TPWD Annotated County List of Rare Species Federal Status[2]**
Attwater's great prairie chicken *Tympanuchus cupido attwateri*	E	E
Interior least tern *Sterna antillarum anthalassos*	E	E
Louisiana black bear *Ursus americanus luteolus*	T	T
Red wolf *Canis rufus*	E	E
Sharpnose shiner *Notropis oxyrhynchus*	PE	NL
Smooth pimpleback *Quadrula houstonensis*	C	T
Sprague's pipit *Anthus spragueii*	C	NL
Texas fawnsfoot *Truncilla macrodon*	C	T
Texas pimpleback *Quadrula petrina*	C	T
Whooping crane *Grus americana*	E	E

[1]C=Candidate, E=Endangered, P=Proposed Endangered, T=Threatened
[2] E=Endangered, NL=Not Listed, T=Threatened
Sources: TPWD 2011, USFWS 2013b

5.11.1.1 Attwater's Greater Prairie-Chicken

The Attwater's greater prairie-chicken (*Tympanuchus cupido attwateri*) is a sub-species of greater prairie chicken. This small, brown bird is approximately 17 inches long with a short, rounded, dark tail. Males have large orange air sacs on their necks which are used during mating season to make a loud calling sound (TPWD 2013).

Attwater's greater prairie-chickens mate in areas with bare ground or short grass which allows the female to more easily spot the males. Mating grounds are referred to as booming grounds, or leks, in reference to the booming noise males make. The booming grounds are usually in close proximity to grass suitable for nesting and night roosting (USFWS 1993). Eggs typically hatch in April or May.

Attwater's greater prairie-chickens prefer tall grass coastal prairies with little bluestem, Indian grass, and switchgrass, which is where hens build their nests. Prevalent food sources include vegetation such as Ruellia, ragweed, blackberry, doveweed, and insects such as grasshoppers and beetles (USFWS 1993). The species is endangered due to the conversion of its preferred tall grass prairie habitat. In 1996, it was estimated that only 42 of these birds were left in the wild (TPWD 2013).

5.11.1.2 Interior Least Tern

The interior least tern (*Sterna antillarum anthalassos*) is a small bird that measures approximately 8-9.5 inches long with a wingspan of 20 inches. The species is characterized by a black-capped crown, white forehead, grayish back and dorsal wing surfaces, snowy white undersurfaces, legs of various orange and yellow colors, and a black-tipped bill. Both sexes are alike with small differentiation in the leg and bill coloring and size (DoD and USFWS 1990).

The interior least tern historically bred along the Mississippi, Red, and Rio Grande river systems, and rivers of central Texas, extending from Texas to Montana and from eastern Colorado and New Mexico to southern Indiana. Today the species continues to breed in most of these river systems, although species distribution is generally restricted to more pristine natural segments. The exact wintering area of interior least terns is unknown; however, it is believed that the wintering area includes the Central American coast and northern coast of South America from Venezuela to northeastern Brazil (DoD and USFWS 1990).

Interior least terns arrive at breeding sites from late April to early June and typically spend 4-5 month at these sites. Interior least terns nest in colonies which can be found along the coast or rivers. Riverine nesting areas are typically sparsely vegetated sand and gravel bars within a wide, unobstructed river channel, or along lake shorelines near salt flats. Nests are found at higher elevations and away from the water's edge. The species feeds in shallow waters of rivers, streams and lakes. They feed on small fish, crustaceans, insects, mollusks and worms (DoD and USFWS 1990).

5.11.1.3 Louisiana Black Bear

The Louisiana black bear (*Ursus americanus luteolus*) is a large mammal characterized by long black hair, a short, haired tail, a blunt facial profile, small eyes, and a yellowish-brown muzzle. Sometimes, the Louisiana black bear has a white patch present on the front and hind feet. Adults are typically 4-7 feet tall with adult males weighing up to 600 pounds (USFWS 1995).

Historically, the species was found in eastern Texas, Louisiana, and Mississippi. Typical habitat includes bottomland hardwood forests and brackish and freshwater marshes with long corridors, with the species occasionally drawn to salt domes and agricultural fields. The Louisiana black bear requires large, remote tracts of land with minimal human disturbance. Today the species is primarily found within the Atchafalaya River and Tensas River Basins in Louisiana. Louisiana black bears are opportunistic omnivores and may eat a wide range of items including acorns, berries, carrion, and invertebrates, based on availability (USFWS 1995).

Louisiana black bears breed in the summer with cubs born every other year in January or February (USFWS 1995).

5.11.1.4 Red Wolf

The red wolf (*Canis rufus*) is a mammal characterized by reddish-colored fur behind the ears and along the legs and back, tall, pointed ears, long legs, and large feet. An adult red wolf weighs approximately 50-80 pounds and is about 4 feet long (eParks No Date).

The historical species range extended from the Atlantic and Gulf coasts, north to the Ohio River valley and central Pennsylvania, and west to central Texas and southeastern Missouri. The red wolf population was essentially wiped out due to a predatory control program in the early 20th century. By the late 1930s, only two populations of red wolfs were known to exist; one in the Ozarks/Quachita Mountain region of Missouri, Arkansas, and Oklahoma, and one in southeastern Texas and southern Louisiana (USFWS 2013c).

Red wolves live in packs of 5-8 individuals. Pups are born in April and May. The typical diet of red wolves includes raccoons, rabbit, white-tailed deer, nutria, and other rodents. Red wolves generally avoid humans and human activity and are active at dusk and dawn (USFWS 2013c).

5.11.1.5 Sharpnose Shiner

The sharpnose shiner (*Notropis oxyrhynchus*) is a minnow approximately 3.75 inches in length, and is characterized by straw coloring, silvery sides, a laterally compressed shape, and a broad snout. The dorsal scales are outlined with pigments and the ventral scales are white and without pigments (Texas State University – San Marcos 2013).

Sharpnose shiners are found exclusively within Texas and historically have been found in the Brazos and Red River drainages. Additionally, the species was introduced into the Colorado River drainage. The preferred habitat includes rivers with moderate velocities, shallow depth, and sandy bottoms although the species has been found in smaller tributaries. Sharpnose shiners spawn in open water. The species consumes aquatic and terrestrial invertebrates and detritus. Threats to the species are a result of altered water flow, conversion of riverine habitat, fragmentation and use as bait fish (Texas State University – San Marcos 2013).

5.11.1.6 Smooth Pimpleback

The smooth pimpleback (*Quadrula houstonensis*) is a nearly round, thick-shelled freshwater mussel approximately 2.6 inches in length. Typical coloration is tan to light brown, dark brown, and black, with no rays. Specific information on the age, size of maturity, or host fish for smooth pimpleback is not currently available due to a lack of data on the species (U.S. Department of the Interior – Fish and Wildlife Service 2011).

Preferred habitat for the smooth pimpleback includes mud, sand, and fine gravel in medium-to-large rivers and some reservoirs. The smooth pimpleback is native to the central and lower Brazos and

Colorado rivers and their tributaries in central Texas. Unconfirmed reports of the species have also been made in the Trinity River and other drainages in Texas, Arkansas, and Kansas, although these are likely misidentifications. Today, a few small populations persist in the Brazos River basin, although the species has been nearly extirpated from the Colorado River basin (U.S. Department of the Interior – Fish and Wildlife Service 2011).

5.11.1.7 Sprague's Pipit

The Sprague's pipit (*Anthus spragueii*) is a small bird approximately 6 inches in length, and is characterized by a slender shape, narrow bill, brown underparts with black streaks, pale yellow-brown legs, and a heavily streak crown that contrasts with the pale facial area (BirdLife International 2006).

Sprague's pipit breeds in the grasslands of Canada and north and central Montana, North Dakota, South Dakota, and Minnesota. The bird winters throughout the southern United States, including Arizona, New Mexico, Texas, Oklahoma, Arkansas, Mississippi, Louisiana, and northern Mexico. Sprague's pipit's preferred habitat includes well-drained, native grasslands with sparse to intermediate grass densities. Sprague's pipit arrives at breeding grounds in late April to mid-May and migrates south to winter in late September to early November (BirdLife International 2006). Adults eat primarily insects such as grasshoppers, crickets, ants, weevils, stink bugs, and caterpillars and seeds during the fall. Threats to the species include cover type conversion, over grazing, exotic plant invasions, altered fire regimes, and cultivation activities (Montana Field Guide No Date).

5.11.1.8 Texas Fawnsfoot

The Texas fawnsfoot (*Truncilla macrodon*) is a small, relatively thin-shelled freshwater mussel that is approximately 2.4 inches in length. The species is characterized by a long and oval-shaped shell which is generally free of external sculpturing. External coloration ranges from yellowish- or orangish-tan, brown, reddish-brown, to smoky-green with a pattern of broken rays or irregular blotches. Specific information on the age, size of maturity, or host fish for Texas fawnsfoot is not currently available due to a lack of data on the species (U.S. Department of the Interior – Fish and Wildlife Service 2011).

The Texas fawnsfoot is endemic to the Brazos and Colorado Rivers of central Texas. Relatively few Texas fawnsfoot have been documented since this species was first described in 1859, and few live individuals have been documented in recent decades, making it difficult to determine the preferred habitat and current population size of the species. Historically the species occurred in rivers with soft, sandy sediment with moderate water flow. A live population was identified in the Brazos River in 2008 and a second live population was found in 2009 in the Colorado River. These are the only confirmed populations of the species (U.S. Department of the Interior – Fish and Wildlife Service 2011).

5.11.1.9 Texas Pimpleback

The Texas pimpleback (*Quadrula petrina*) is a large freshwater mussel with a moderately inflated shell that is approximately 2.4-3.6 inches in length. The shell of the Texas pimpleback is generally smooth and the coloration ranges from yellowish-tan to dark brown. Specific information on the age, size of maturity, or host fish for Texas pimpleback is not currently available due to a lack of data on the species (U.S. Department of the Interior – Fish and Wildlife Service 2011).

Preferred habitat for the Texas pimpleback includes moderately sized rivers, usually in mud, sand, gravel, and cobble, and occasionally in gravel-filled cracks in bedrock slab bottoms. The species has not been found in water depths over 6.6 feet or in reservoirs. The Texas pimpleback is endemic to the Colorado and Guadalupe-San Antonio River basins of central Texas. Today, the species is currently found in only four waterbodies, including the San Saba, Concho, Guadalupe, and San Marco rivers (U.S. Department of the Interior – Fish and Wildlife Service 2011).

5.11.1.10 Whooping Crane

The whooping crane (*Grus americana*) is the tallest North American bird with males measuring up to 5 feet tall when standing erect, with a wingspan of 7 feet. The adult whooping crane is characterized by snowy white plumage except for black primary feathers, black or grayish feathers attached to the upper leading end of the wing, sparse black bristly feathers on the side of the head, and a dark gray-black wedge-shaped patch on the nape. The bill is dark olive-gray in color and the legs and feet are gray-black. Juvenile plumage is reddish in color and begins to turn white at 120 days old with typical adult plumage reached in the second year (USFWS 2007).

The whooping crane is found only in Canada and the United States. Within the United States, the primary population of whooping cranes migrates through eastern Montana, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas in October and November. Winters are spent along the Gulf of Mexico, especially at the Aransas National Wildlife Refuge near Rockport, Texas approximately 70 miles southwest of the Project area. During migration, the whooping crane is found primarily on large wetlands, feeding and roosting in wetlands, rivers, and upland grain fields where it can find crustaceans, mollusks, amphibians, fish, rodents, small birds, and berries. Whooping cranes are omnivorous and probe the soil subsurface with their bills to find food. Foraging occurs in brackish bays, marshes, and salt flats on the edge of the mainland and on barrier islands (USFWS 2007).

This migratory species travels north between March 25 and April 15. Nest construction at breeding grounds in northern Canada begins in late April. The whooping crane shows considerable fidelity to breeding territories and typically nests in the same general vicinity each year. Eggs are laid in late April to mid-May, and hatching occurs in late May to mid-June (USFWS 2007).

5.11.2 Other Species and Protected Habitats

5.11.2.1 Bald and Golden Eagles

Bald and golden eagles are protected under the BGEPA of 1940, which is regulated by the USFWS. As discussed in Section 2.2, the BGEPA prohibits the following: "take, possess, sell, purchase, barter, offer to sell, purchase, or barter, transport, export or import, at any time or any manner, any Bald Eagle (or Golden Eagle), alive or dead, or any part, nest, or egg thereof".

The bald eagle is a large raptor, growing up to 34-43 inches tall with a wingspan of 6-8 feet. Adult bald eagles weigh approximately 6.5-14 pounds. Adults are characterized by a dark brown body and wings, white head and tail, and a yellow beak. Juveniles are primarily brown with white coloring on the body, tail, and undersides of their wings. Juveniles maintain this plumage until they reach 6 years of age. Bald eagles are opportunistic predators, feeding primarily on fish but also eating a variety of waterfowl and other birds, small mammals, turtles when available, and carrion (TPWD No Date).

Preferred habitat for the bald eagle includes areas near lakes, reservoirs, rivers, marshes and coasts. The bald eagle is found throughout much of the United States, Canada, and northern Mexico. In Texas, bald eagles nest from October to July, but can be found year-round throughout the state as spring and fall migrants, breeders, or winter residents. Within Texas, breeding populations occur primarily in the eastern half of the state and along coastal counties from Rockport to Houston. Nonbreeding/wintering populations occur primarily in the Panhandle, central, and east Texas. Bald eagle nests are constructed out of large sticks, with leaves, grass, and Spanish moss as lining. Bald eagles will return to nests in subsequent years, and nests can reach up to 6 feet in width. Egg-laying occurs primarily in December with hatching in January (TPWD No Date).

The golden eagle is a large raptor, growing up to 33-38 inches tall with a wingspan of 6-7.5 feet. Adult golden eagles weigh approximately 6-15 pounds (National Geographic No Date). Adults are characterized by dark brown coloring, with lighter golden-brown plumage on their heads and necks, and a horn-colored bill. Juveniles have white coloring at the base of primary feathers and a white tail with a dark terminal band. Golden eagles are opportunistic predators, feeding on small mammals such as rabbits, marmots, and ground squirrels, as well as carrion, reptiles, bird, fish and large insects (NatureServe 2013).

Preferred habitat for the golden eagle includes open and semi-open country such as prairies, sagebrush, arctic and alpine tundra, savannah or sparse woodland, and barren areas. Golden eagles are found in North America, Europe, and parts of Africa and Asia (NatureServe 2013). Within the United States, golden eagles are primarily found within the western half of the country and are not likely to found in Texas. Golden eagles nest in high places, including cliffs, trees, or human structures such as telephone poles. Similar to the bald eagle, golden eagles build huge nests and often return to the same nest for several breeding years (Cornell Lab of Ornithology No Date).

5.11.3 Critical Habitat

Review of USFWS critical habitat data indicates that there is no designated critical habitat for the species identified in Sections 5.10.1 and 5.10.2 or other listed species within the Project area (USFWS 2013d).

6.0 POTENTIAL OCCURRENCE AND DESIGNATION OF EFFECTS DETERMINATION

The potential for federally-listed species to occur on or within the Project area was evaluated based on the presence or absence of suitable habitat. The USFWS and the TPWD lists of species by county based on population distribution and occurrence data were used during this evaluation. Potential effects were determined and designated based on impacts within the Action Area as described in Section 3 of this report. Designated determination of effects are presented in Table 6.1 for federally listed threatened and endangered species that are known to occur or have the potential to occur in Wharton County, Texas.

Table 6.1 Summary of Designated Determination of Effects

Species Common Name *(Scientific Name)*	Listed Species of Potential Occurrence by Agency[1]	Designated Determination of Effects
Attwater's great prairie chicken *Tympanuchus cupido attwateri*	TPWD	No effect
Interior least tern *Sterna antillarum anthalassos*	TPWD	No effect
Louisiana black bear *Ursus americanus luteolus*	TPWD	No effect
Red wolf *Canis rufus*	TPWD	No effect
Sharpnose shiner *Notropis oxyrhynchus*	TPWD	No effect
Smooth pimpleback *Quadrula houstonensis*	TPWD	No effect
Sprague's pipit *Anthus spragueii*	TPWD	No effect
Texas fawnsfoot *Truncilla macrodon*	TPWD	No effect
Texas pimpleback *Quadrula petrina*	TPWD	No effect
Whooping crane *Grus americana*	TPWD/USFWS	No effect

[1]TPWD=Texas Parks and Wildlife Department, USFWS = U.S. Fish and Wildlife Service
Sources: TPWD 2011, USFWS 2013b

6.1 Attwater's Greater Prairie-Chicken

6.1.1 Potential Occurrence in the Action Area

Attwater's greater prairie-chickens prefer tall grass coastal prairies (USFWS 1993). Habitats in the immediate Project area are a cultivated cotton field. Surrounding habitats are additional corn and cotton fields with no tall grass coastal prairies. Habitat conditions associated with the Attwater's greater prairie-chicken do not exist in the Project area. Furthermore, as of 1996, it was estimated that only 42 of these birds were left in the wild (TPWD 2013).

6.1.2 Potential Effects to Attwater's Greater Prairie-Chicken

As described above, there is no preferred habitat for the Attwater's greater prairie-chicken in the Project area. Furthermore, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on the Attwater's greater prairie-chicken.

6.1.3 Determination of Effect

The proposed Project will have no effect on the Attwater's greater prairie-chicken.

6.2 Interior Least Tern

6.2.1 Potential Occurrence in the Action Area

No observations of the interior least tern were documented during the field survey. Interior least terns nest along the coast or along rivers. Riverine nesting areas are typically sparsely vegetated sand and gravel bars within a wide, unobstructed river channel, or along lake shorelines near salt flats (DoD and USFWS 1990). The closest water body was the Juanita Creek which is a very narrow riparian corridor that does not provide enough optimal habitat for the interior least tern. Therefore, habitat conditions associated with the interior least tern do not exist in the Project area.

6.2.2 Potential Effects to Interior Least Tern

As described above, there is no preferred habitat for the interior least tern in the Project area. Furthermore, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on the interior least tern.

6.2.3 Determination of Effects

The proposed Project will have no effect on the interior least tern.

6.3 Louisiana Black Bear

6.3.1 Potential Occurrence in the Action Area

The Louisiana black bear prefers bottomland hardwood forests and brackish and freshwater marshes with long corridors and significant undeveloped tracts of land. The species is primarily found within the Atchafalaya River and Tensas River Basins in Louisiana, which are located several hundred miles east of the Project area (USFWS 1995). Therefore, prime habitats and conditions do not exist in the Project area for the Louisiana black bear.

6.3.2 Potential Effects to Louisiana Black Bear

As described above, there is no preferred habitat for the Louisiana black bear in the Project area. Furthermore, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on the Louisiana black bear.

6.3.3 Determination of Effect

The proposed Project will have no effect on the Louisiana black bear.

6.4 Red Wolf

6.4.1 Potential Occurrence in the Action Area

The red wolf is extirpated in most of Texas and only two populations of red wolfs are currently known to exist; one in the Ozarks/Quachita Mountain region of Missouri, Arkansas, and Oklahoma, and one in southeastern Texas and southern Louisiana. Habitat conditions associated with the red wolf were not documented from the existing literate nor were they observed during the field surveys. Red wolves live in coastal prairies and marshes (USFWS 2013c). These habitats and conditions do not exist in the Project area.

6.4.2 Potential Effects to Red Wolf

As described above, there is no preferred habitat for the red wolf in the Project area. Furthermore, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on the red wolf.

6.4.3 Determination of Effect

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

6.5 Sharpnose Shiner

6.5.1 Potential Occurrence in the Action Area

Sharpnose shiners prefer rivers with moderate velocities, shallow depth, and open waters for spawning, and have historically been found in the Brazos and Red River drainages, which are located further than 35 miles away from the Project area (Texas State University – San Marcos 2013). These habitats and conditions do not exist in the Project area.

6.5.2 Potential Effects to Sharpnose Shiner

As described above, there is no preferred habitat for the sharpnose shiner in the Project area. The proposed Project will have zero discharge of additional wastewater; therefore, no effects to habitat associated with the sharpnose shiner will occur. Furthermore, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on the sharpnose shiner.

6.5.3 Determination of Effect

The proposed Project will have no effect on the sharpnose shiner.

6.6 Smooth Pimpleback

6.6.1 Potential Occurrence in the Action Area

No observations of the smooth pimpleback or habitat that would support the species were documented during the field survey. Smooth pimplebacks prefer mud, sand, and fine gravel in medium-to-large rivers and some reservoirs (U.S. Department of the Interior – Fish and Wildlife Service 2011). Furthermore, this species has been nearly extirpated from the Colorado River basin. Prime habitat and conditions for the smooth pimpleback do not exist within the Project area.

6.6.2 Potential Effects to Smooth Pimpleback

As described above, there is no preferred habitat for the smooth pimpleback in the Project area. The proposed Project will have zero discharge of additional wastewater; therefore, no effects to habitat associated with the smooth pimpleback will occur. Furthermore, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on the smooth pimpleback.

6.6.3 Determination of Effect

The proposed Project will have no effect on the smooth pimpleback.

6.7 Sprague's Pipit

6.7.1 Potential Occurrence in the Action Area

No observations of the Sprague's pipit or habitat that would support the species were documented during the field survey. Sprague's pipits prefer well-drained, native grasslands with sparse to intermediate grass densities (BirdLife International 2006). The predominant habitat in the Project area and surrounding areas are cultivated fields with no significant native grassland present. Therefore, Sprague pipit habitat conditions do not exist within the Project area.

6.7.2 Potential Effects to Sprague's Pipit

As described above, there is no preferred habitat for the Sprague's pipit in the Project area. Furthermore, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on the Sprague's pipit.

6.7.3 Determination of Effect

The proposed Project will have no effect on the Sprague's pipit.

6.8 Texas Fawnsfoot

6.8.1 Potential Occurrence in the Action Area

No observations of the Texas fawnsfoot or habitat that would support the species were documented during the field survey. Texas fawnsfoots prefer rivers with soft, sandy sediment with moderate water flow. Furthermore, only two live populations of the species have been documented, within the Colorado and Brazos rivers, which are approximately 11 and 35 miles to the east of the Project area (U.S. Department of the Interior – Fish and Wildlife Service 2011).

6.8.2 Potential Effects to Texas Fawnsfoot

As described above, there is no preferred habitat for the Texas fawnsfoot in the Project area. The proposed Project will have zero discharge of additional wastewater; therefore, no effects to habitat associated with the Texas fawnsfoot will occur. Furthermore, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on the Texas fawnsfoot.

6.8.3 Determination of Effect

The proposed Project will have no effect on the Texas fawnsfoot.

6.9 Texas Pimpleback

6.9.1 Potential Occurrence in the Action Area

No observations of the Texas pimpleback or habitat that would support the species were documented during the field survey. Texas pimplebacks lives in moderately sized rivers, usually in mud, sand, gravel, and cobble. Today, the species is found in the four waterbodies, including the San Saba, Concho, Guadalupe, and San Marco rivers, all of which are located more than 50 miles from the Project area (U.S. Department of the Interior – Fish and Wildlife Service 2011). These habitats conditions do not exist in the Project area.

6.9.2 Potential Effects to Texas Pimpleback

As described above, there is no preferred habitat for the Texas pimpleback in the Project area. The proposed Project will have zero discharge of additional wastewater; therefore, no effects to habitat associated with the Texas pimpleback will occur. Furthermore, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on Texas pimpleback.

6.9.3 Determination of Effects

The proposed Project will have no effect on Texas pimpleback.

6.10 Whooping Crane

6.10.1 Potential Occurrence in the Action Area

No observations of the whooping crane or habitat that would support the species were documented during the field survey. During migration, the whooping crane prefers large wetlands, rivers, and upland grain fields where it can find crustaceans, mollusks, amphibians, fish, rodents, small birds, and berries (USFWS 2007). The only habitat condition that would exist near the Project area would be corn fields. However, it is unlikely that the whooping cranes would prefer this area as opposed to areas with larger waterbodies during migration.

6.10.2 Potential Effects to Whooping Crane

As described above, there is no preferred habitat for the Whooping Crane in the Project area. Furthermore, emissions, noise, and dust resulting from the planned construction and operation would not be expected to have any impact on Whooping Crane habitat due to the range of construction activities and the range of occurrence for this species.

6.10.3 Determination of Effect

The proposed Projct will have no effect on the whooping crane.

7.0 AIR QUALITY DISPERSION MODELING ANALYSIS

The dispersion modeling analyses for the Project have been conducted in accordance with the Air Quality Modeling Protocol submitted to the TCEQ on 5/8/2013, along with subsequent response to TCEQ comments.

As described in Section 5.2, the Project will be a major air emissions source subject to PSD, due to the significant increases in CO_{2e}, CO, NO_X, PM, PM_{10} and $PM_{2.5}$. As a result, dispersion modeling has been conducted for CO, NO_2, PM, PM_{10} and $PM_{2.5}$ to demonstrate compliance with the NAAQS and PSD Increments, as well as the additional Texas regulatory standards. In addition, SO_2 and sulfuric acid (H_2SO_4) have been modeled for compliance with TCEQ standards, and modeling was also conducted for air toxic pollutants as part of the State Effects Evaluation analysis (see Section 7.8). The EPA recommended AERMOD modeling system was used to conduct the dispersion modeling.

The dispersion modeling for this Project has been conducted in a manner that evaluates worst case operating conditions in an effort to predict the highest impact for each pollutant and averaging period. Maximum predicted impacts from the worst case scenarios are compared to the SILs. If maximum predicted impacts are below the corresponding SILs, then compliance is demonstrated and no additional analysis is necessary. However, if predicted impacts are greater than the SILs, a cumulative impact assessment which accounts for potential contribution from other major emission sources in the area, has been conducted. The results of the modeling analysis are compared to the NAAQS and PSD Increments, along with vegetative impact thresholds and toxic pollutant impact thresholds.

7.1 Source Data and Operating Scenarios

The modeling analysis for the Project includes the GTGs, the emergency diesel generator, the fire pump diesel engine, and the natural gas pipeline heater. The air dispersion modeling has been conducted for a range of operating scenarios to capture worst case potential impact concentrations from the GTGs. The GTGs were first modeled alone to determine worst case load conditions for each pollutant and averaging period. The GTGs under worst case load conditions were then modeled in combination with the ancillary units to determine total project impacts.

7.2 Meteorological Data for AERMOD

The modeling was conducted using five years (2006-10) of meteorological data recommended and processed by the TCEQ for sources located in Wharton County. The surface data is from the Sugar Land Municipal Airport in Sugar Land, Texas and the corresponding upper air data is from Corpus Christi, Texas. The surface station is located approximately 82.5 km (51.3 mi) north northeast from the Project site. The TCEQ prepared the data with the AERMET processor for 3 different surface roughness conditions (high, medium, and low). Since the area surrounding the Project site is a mixture of low intensity residential, open pasture/crop land, with small forest breaks, the medium surface roughness data was used.

7.3 Land-Use

A land-use determination has been made following the classification technique suggested by Auer in accordance with EPA/TCEQ modeling guidance. The classification determination was conducted by assessing land-use categories within a 3-km radius of the proposed site. Inspection of this section of

USGS map, aerial photos, and on-site inspection, indicates that virtually the entire area is characterized as rural. Therefore, rural dispersion coefficients have been used for the air quality modeling.

7.4 GEP/BPIP Analysis

A Good Engineering Practice (GEP) stack height analysis was performed based on the Facility structures to determine the potential for building-induced aerodynamic downwash for the proposed stacks. The analysis procedures described in EPA's Guidelines for Determination of Good Engineering Practice Stack Height (EPA, 1985) TCEQ guidance have been used.

The GEP formula height is based on the observed phenomena of disturbed atmospheric flow in the immediate vicinity of a structure resulting in higher ground level concentrations at a closer proximity to the building than what would otherwise occur. It identifies the minimum stack height at which significant aerodynamic downwash is avoided. The GEP formula stack height, as defined in the 1985 final regulation, is calculated as follows:

$H_{GEP} = H_{BLDG} + 1.5L$

Where:

- H_{GEP} is calculated GEP formula height,
- H_{BLDG} is the height of the nearby structure, and
- L is the lesser dimension (height or projected width) of the nearby structure.

Both the height and width of the structure are determined from the frontal area of the structure projected onto the plane perpendicular to the direction of the wind. The GEP stack height is based on the plane projected from any structure which results in the greatest calculated height. For the purpose of the GEP analysis, nearby refers to the "sphere of influence" defined as 5 times L (the lesser dimension [height or projected width] of the nearby structure), downwind from the trailing edge of the structure.

The EPA's Building Profile Input Program (BPIP, Dated: 04274) version that is appropriate for use with the PRIME algorithms in AERMOD was used to evaluate downwash effects in the model. The building dimensions and coordinates for each potentially influencing structure were input in BPIPPRM program to determine direction specific building data. The PRIME algorithms calculate the entire structure of the structure's wake, from the cavity immediately downwind of the building, to the far wake.

7.5 Receptor Grid and AERMAP Processing

Discrete receptors were placed at 25 meter intervals along the Facility fence line. In addition, a nested Cartesian grid was extended out from the fence line at the following receptor intervals and distances:

- At 25 meter intervals from the fence line to 300 meters;
- At 100 meter intervals from the 300 meters to 1,000 meters;
- At 500 meter intervals from 1,000 to 5,000 meters;
- At 1,000 meter intervals from 5,000 to 10,000 meters; and
- At 2,000 meter intervals from 10,000 to 50,000 meters.

Terrain elevations at receptors were determined using BEE-Line Software's BEEST program and USGS digital terrain data. BEEST implements the AERMAP model which includes processing routines that extract National Elevation Data (NED) at 10-meter spacing based on North American Datum of 1983

(NAD83). The four nearest data points surrounding each receptor will be used to determine receptor terrain elevations (by interpolation) for air quality model input.

If maximum model concentrations are predicted beyond the dense (100 m intervals) portion of the grid, and the predicted concentration exceeds 75% of the applicable standard, supplemental receptors are placed around the initial maximum location (at the next lower grid spacing interval) to ensure higher concentrations are not overlooked.

7.6 Modeling Analysis and Significant Impact Area Determination

The AERMOD results for the project are presented Table 7-1. As shown in Table 7-1, maximum predicted impact concentrations are less than SILs for all pollutants except 1-hour and annual NO_2. Compliance with air quality standards (NAAQS and TCEQ) and PSD Increments is demonstrated for pollutants with predicted insignificant impacts and no additional modeling for these pollutants is necessary. A cumulative impact assessment has been conducted for 1-hour and annual NO_2 to account for potential impact contributions from other air emission sources in the area. For this BA, the measured ambient background concentrations are used to represent the potential impacts of these background sources.. As shown in Table 7-1, the resulting total concentrations for NO_2 are below the corresponding NAAQS concentrations. Consistent with regulatory guidance, model predicted NO_2 concentrations assume 80% conversion of NO_X to NO_2 for 1-hour impacts and 75% conversion for annual impacts. A full interactive modeling analysis based on a background NO_X source inventory provided by TCEQ is currently being completed and will be submitted to TCEQ and EPA as part of the Air Quality Analysis (AQA) report for the project.

7.7 Air Toxics Analysis

Modeling has been conducted for air toxic pollutants as part of the State Effects Evaluation analysis as described in TCEQ RG-324, Modeling and Effects Review Applicability (APDG 5874). Potential Project air toxic emission impacts from the emergency diesel generator and the fire pump diesel engine were modeled with AERMOD according to the procedures described above. Maximum predicted total toxic pollutant impacts are compared to the short-term and long-term effect screening levels (ESLs). The emissions from the GTGs and the natural gas pipeline heater are not subject to this evaluation since they are fired with natural gas only, which is exempt from the effects review.

Table 7-2 presents the projected maximum impacts for each air pollutant that will potentially be emitted by the project, for which an ESL has been established. Since the emergency generator and fire pump engine are limited to 500 and 300 hours of operation per year, respectively, the annual Project impacts account for the annual emission rate potential as shown Table 7-2, the resulting project concentrations are well below the ESL guideline values.

Table 7-1 Maximum AERMOD Predicted Impact Concentration for Indeck Wharton Energy Center Project

Pollutant	Averaging Period	Rank	Maximum Impact Concentration (µg/m³)	SIL (µg/m³)	Greater Than the Modeling SIL?	Maximum Impact Concentration Plus Ambient Background (µg/m³)	NAAQS / TCEQ Standards (µg/m³)	PSD Class II Increment (µg/m³)
NO_2	1-hour	H1H (5-year Average)	19.3	7.5	Yes	57.0	188	NA
	Annual	H1H	1.8	1	Yes	17.0	100	25
CO	1-hour	H1H	362.5	2000	No	NA	40,000	NA
	8-hour	H1H	58.2	500	No	NA	10,000	NA
PM_{10}	24-hour	H1H	1.29	5	No	NA	150	30
$PM_{2.5}$	24-hour	H1H (5-year Average)	0.70	1.2	No	NA	35	9
	Annual	H1H (5-year Average)	0.088	0.3	No	NA	12	4
SO_2	30-minutes	H1H	4.81	NA	No	NA	1021	NA
	1-hour	H1H (5-year Average)	1.37	7.8	No	NA	196	NA
	3-hour	H1H	2.53	25	No	NA	1300	1300
	24-hour	H1H	0.60	5	No	NA	365	365
	Annual	H1H	0.05	1	No	NA	80	80
Sulfuric Acid	24-hour	H1H	0.04	NA	NA	NA	15	NA
	1-hour	H1H	0.36	NA	NA	NA	50	NA

Notes: Consistent with TCEQ guidance, 30-minute standards are evaluated with 1-hour impact predictions. Maximum highest first highest (H1H) concentrations are used for comparison with the SILs. Impact concentrations are based on maximum predicted across the range of year modeled for all pollutants except $PM_{2.5}$ (both annual and 24-hour), NO_2 (1-hour only), and SO_2 (1-hour only), which are based on the maximum 5-year average values. NO_2 concentrations assume 80% NO_X to NO_2 conversion for 1-hour concentrations and 75% for annual concentrations. Impact concentrations for 3-hour SO_2 and 8-hour CO based on weighted average of maximum 1-hour impact for worst case start-up conditions and the worst impact for normal operating conditions the remainder of the averaging period. Ambient background concentrations (15.2 µg/m³ for annual NO_2 and 37.7 µg/m³ for 1-hour NO^2) come from Lake Jackson monitor (#48-039-1016) for the period 2010-2012, As presented in Table 3-10 of the air modeling protocol.

Table 7-2 Indeck Wharton Energy Center Project Maximum Predicted Impacts Compared to TCEQ Air Toxics ESLs (micrograms/cubic meter)

Pollutant	CAS #	Diesel Gen 1-hour (µg/m³)	Diesel Gen Annual (µg/m³)	Fire Pump 1-hour (µg/m³)	Fire Pump Annual (µg/m³)	Total Engines 1-hour Impact (µg/m³)	Short Term ESL (µg/m³)	1-Hr Impact % of ESL (%)	Total Engines Annual Impact (µg/m³)	Short Term ESL (µg/m³)	Annual Impact % of ESL %
Acetaldehyde	75-07-0	4.30E-03	2.53E-05	0.4059	1.20E-03	4.10E-01	15	2.7%	1.23E-03	45	0.0%
Acrolein	107-02-8	1.34E-03	7.91E-06	0.0490	1.45E-04	5.03E-02	3.2	1.6%	1.53E-04	0.15	0.1%
Benzene	71-43-2	1.32E-01	7.79E-04	0.4938	1.46E-03	6.26E-01	170	0.4%	2.24E-03	4.5	0.0%
Formaldehyde	50-00-0	1.35E-02	7.92E-05	0.6245	1.85E-03	6.38E-01	15	4.3%	1.93E-03	3.3	0.1%
Hexane	110-54-3	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	5300	0.0%	0.00E+00	200	0.0%
Napthalene	91-20-3	2.22E-02	1.30E-04	0.0449	1.33E-04	6.70E-02	200	0.0%	2.64E-04	50	0.0%
PAH	NA	3.62E-02	2.13E-04	0.0889	2.64E-04	1.25E-01	0.5	25.0%	4.76E-04	0.5	0.1%
Propylene (corrected to oxide)	75-56-9	6.57E-01	3.87E-03	1.8855	5.59E-03	2.54E+00	70	3.6%	9.46E-03	7	0.1%
Toluene	108-88-3	4.79E-02	2.82E-04	0.2164	6.42E-04	2.64E-01	640	0.0%	9.24E-04	1200	0.0%
Xylene	1330-20-7	3.29E-02	1.94E-04	0.1508	4.47E-04	1.84E-01	350	0.1%	6.41E-04	180	0.0%
Arsenic	7440-38-2	7.88E-06	4.64E-08	0.0000	7.25E-08	3.23E-05	3	0.0%	1.19E-07	0.067	0.0%
Beryllium	7441-41-7	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.02	0.0%	0.00E+00	0.002	0.0%
Cadmium	7440-43-9	8.75E-07	5.15E-09	0.0000	8.05E-09	3.59E-06	0.1	0.0%	1.32E-08	0.01	0.0%
Chromium	7440-47-3	2.11E-03	1.24E-05	0.0066	1.95E-05	8.68E-03	3.6	0.2%	3.19E-05	0.041	0.1%
Cobalt	7440-48-4	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	0.2	0.0%	0.00E+00	0.02	0.0%
Manganese	1309-48-4	0.00E+00	0.00E+00	0.0000	0.00E+00	0.00E+00	50	0.0%	0.00E+00	5	0.0%
Mercury	7439-97-6	1.76E-06	1.03E-08	0.0000	1.62E-08	7.21E-06	0.1	0.0%	2.65E-08	0.01	0.0%
Nickel	7440-02-0	2.52E-04	1.49E-06	0.0008	2.32E-06	1.04E-03	0.33	0.3%	3.81E-06	0.059	0.0%
Selenium	8-4-7446	4.37E-05	2.57E-07	0.0001	4.02E-07	1.79E-04	2	0.0%	6.59E-07	0.2	0.0%
Lead	7439-92-1	1.31E-04	7.72E-07	0.0004	1.21E-06	5.38E-04	0.15 [1]	0.4%	1.98E-06	0.15 [1]	0.0%

[1] Must meet the NAAQS for lead which is equal to 0.15 µg/m3 (3-month rolling average). One-hour impact concentration conservatively represents 3-month average concentration.

7.8 Soils and Vegetation

The EPA guidance document for soils and vegetation, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals (EPA 450/2-81-078)* established a screening methodology for comparing air quality modeling impacts to "vegetation sensitivity thresholds".

Vegetation Assessment

As an indication of whether emissions from the Project will significantly impact the surrounding vegetation (i.e., cause acute or chronic exposure to each evaluated pollutant), the modeled emission concentrations are compared against both a range of injury thresholds found in the guidance, as well as those established by the NAAQS secondary standards. Since the NAAQS secondary standards were set to protect public welfare, including protection against damage to crops and vegetation, comparing modeled impact concentrations to these standards provides some indication if potential impacts are likely to be significant. Table 7-3 lists the project impact concentrations and compares them to the vegetation sensitivity thresholds and NAAQS secondary standards. All pollutant impact concentrations are below the vegetation sensitivity thresholds.

Table 7-3 Vegetation Impact Screening Thresholds Assessment

Pollutants	Averaging Period	Maximum Project Impacts ($\mu g/m^3$)	NAAQS Secondary Standards ($\mu g/m^3$	EPA's 1980 Screening Concentrations ($\mu g/m^3$)
SO_2	1-hour	4.81	NA	917
	3-hour	2.53	1300	786
	Annual	0.05	NA	18
NO_2	4-hour	19.3[1]	NA	3760
	1 month	19.3[1]	NA	561
	Annual	1.8	100	94
CO	Week	58.2[1]	NA	1,800,000 (weekly)
PM_{10}	24-hour	1.29	150	None
$PM_{2.5}$	24-hour	0.70	35	None
	Annual	0.09	15	

[1] Conservatively based on shorter term average predicted concentration.

Soil Assessment

The EPA Screening Procedure also provides a method for assessing impacts to soils. This assessment evaluates trace element contamination of soils. Since plant and animal communities can be affected before noticeable accumulation occur in the soils, the approach used here evaluates the way soil acts as an intermediary in the transfer of a deposited trace element to the plants. For trace elements, the concentration deposited in the soil is calculated from the from the maximum predicted annual ground level concentrations conservatively assuming that all deposited material is soluble and available for uptake by plants. The amount of trace element potentially taken up by plants is calculated using average plant to soil concentration ratios. The calculated soil and plant concentrations were then compared to screening concentrations designed to assess potential adverse effects to soils and plants. Table 7-4 presents the results of the potential soil and plant concentrations and compares them to the corresponding screening concentration criteria. Only pollutants which are potentially emitted from the Project and which have a screening concentration are presented. A calculated concentration in excess of either of the screening concentration criteria is an indication that a more detailed evaluation may be required.

However, as show in Table 7-4, calculated concentrations as a result of operation of the Project are all well below the screening criteria.

Table 7-4 Soils Impact Screening Assessment

Pollutant	Deposited Soil Concentration (ppmw)	Soil Screening Criteria (ppmw)	Percent of Soil Screening Criteria	Plant Tissue Concentration (ppmw)	Plant Screening Criteria (ppmw)	Percent of Plant Screening Criteria
Arsenic	6.28E-03	3	0.2	8.80E-04	0.25	0.4
Cadmium	3.44E-02	2.5	1.4	3.68E-01	3	12.3
Chromium	5.29E-02	8.4	0.6	1.06E-03	1	0.1
Lead	5.67E-04	1000	0.0	2.55E-04	126	0.0
Mercury	8.13E-03	455	0.0	4.07E-03	NA	NA
Nickel	6.67E-02	500	0.0	3.00E-03	60	0.0
Selenium	9.39E-04	13	0.0	9.39E-04	100	0.0

Note: Based in screening procedures described in Chapter 5 of the EPA guidance document for soils and vegetation, "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals."

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FIGURES

Legend

- Project Site
- Proposed Danevang Power Plant
- Proposed_Pipeline
- Proposed Right of Way
- Existing Transmission Line
- Existing Gas Pipeline

N

1 inch = 1,250 feet

0 500 1,000

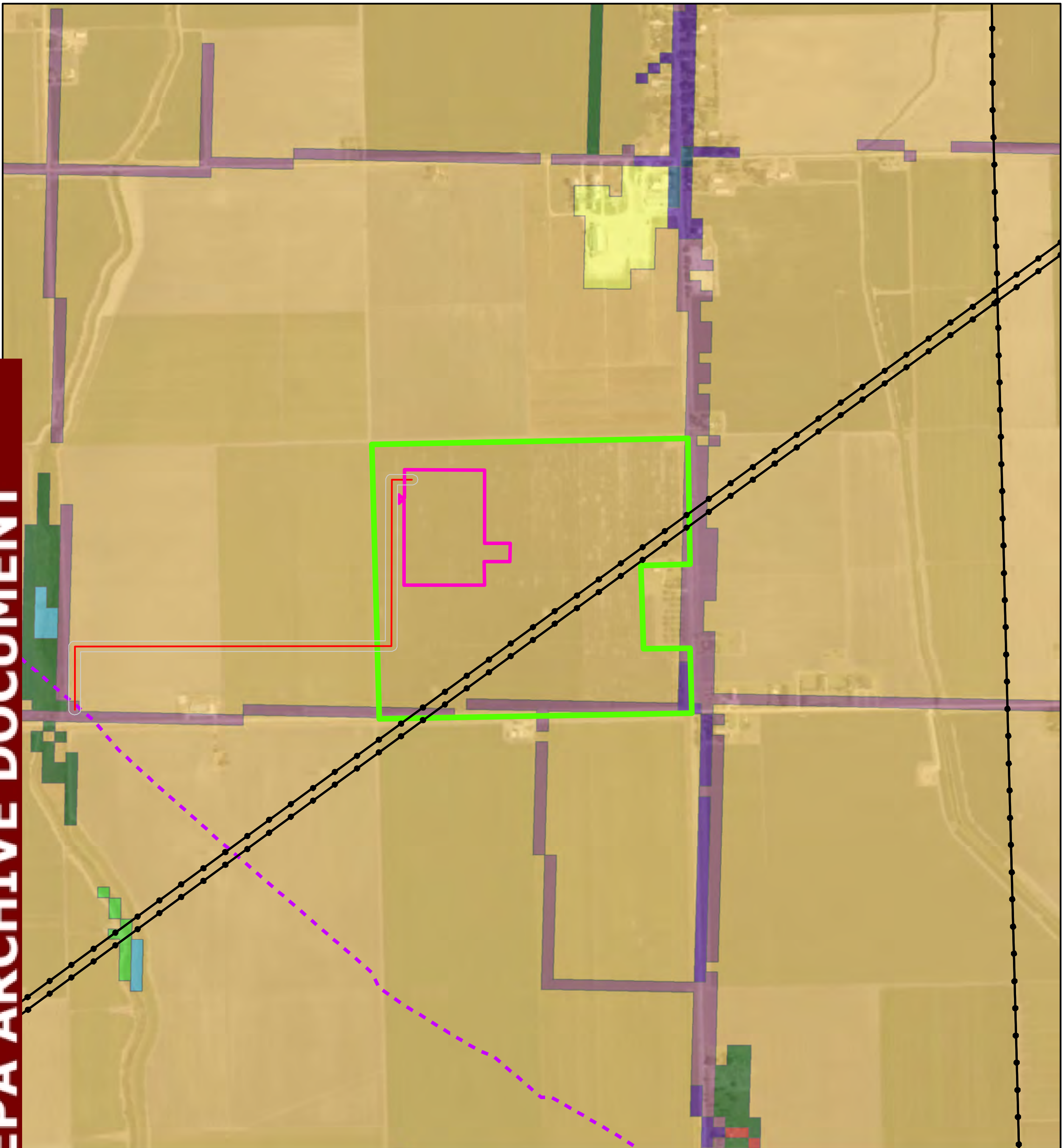
Feet

Source: 2013 ESRI Imagery, Ventyx

Figure 1
Aerial Overview of Project Site

Indeck Wharton Energy Center
Wharton County, Texas

December 2013



Legend

- Project Site
- Proposed Danevang Power Plant
- Proposed_Pipeline
- Proposed Right of Way
- Existing Transmission Line
- Existing Gas Pipeline

Land Use

- Barren Land (Rock/Sand/Clay)
- Cultivated Crops
- Deciduous Forest
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, Open Space
- Grassland/Herbaceous
- Pasture/Hay
- Woody Wetlands

N

1 inch = 1,250 feet

0 500 1,000

Feet

Source: 2013 ESRI Imagery, Ventyx, NLCD 2006

Figure 2
Land Use Surrounding Project Site

Indeck Wharton Energy Center
Wharton County, Texas

TETRA TECH

December 2013

Legend

- Proposed Right of Way
- Proposed Danevang Power Plant
- Proposed_Pipeline
- Existing Transmission Line
- Existing Gas Pipeline
- Project Site
- Freshwater Forested/Shrub Wetland
- 100-year Floodplain
- River/Stream
- Roads

N

1 inch = 1,250 feet

0 500 1,000

Feet

Source: 2013 ESRI Imagery, Ventyx, FEMA

Figure 3
Floodplains and Wetlands

Indeck Wharton Energy Center
Wharton County, Texas

TETRA TECH

December 2013

APPENDIX

APPENDIX A
PHOTO LOG

Photo 1. Juanita Creek one mile southwest of the property looking north.

Photo 2. Dry swale draining west into Juanita Creek. Prairie rose in the upper right corner.

Photo 3. Juanita Creek one mile southwest of the property on south side of Farm to Market Road 441 looking north. Black willow tree to the left of the creek.

Photo 4. Culverts for swales just east of Juanita Creek looking south to Farm to Market Road 441.

Photo 5. Offsite one mile west of the property at the Morgan Kinder pipeline as it crosses under Farm to Market Road 441 looking north.

Photo 6. Offsite along Farm to Market Road 441 looking northeast at the cell tower.

Photo 7. Northeast corner of the property looking north at the grain coop and State Route 71.

Photo 8. Northeast corner of the property looking north. Grain coop in the background and offsite cattle pond in the foreground.

Photo 9. Northern boundary and dirt road looking west. Rows of harvested cotton in the middle of the photo.

Photo 10. Northwest corner of the property looking south.

Photo 11. Southwest corner of the property looking northeast. The 345 kilovolt transmission line in the middle foreground and the distribution line in the right foreground.

Photo 12. Southeast corner of the property looking northeast. State Route 71 to the east (right) of the property.