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FINAL
Biological Assessment of the FGE Texas Project near Westbrook, Mitchell County, Texas

Prepared for
FGE Power, LLC and
FGE Texas, LLC

Prepared by
SWCA Environmental Consultants

February 2014

FINAL
BIOLOGICAL ASSESSMENT OF THE FGE TEXAS PROJECT NEAR WESTBROOK, MITCHELL COUNTY, TEXAS

Prepared for

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EXECUTIVE SUMMARY

FGE Power, LLC and its wholly-owned subsidiary, FGE Texas, LLC (FGE), is proposing to construct and operate an electric generating station and ancillary equipment (Proposed Project or FGE Texas Project) near the town of Westbrook, Mitchell County, Texas. The Project Area encompasses an approximately 200-acre Plant Site located approximately 3 miles south-southwest of the intersection of Interstate 20 and Main Street in Westbrook. In addition, the Project Area includes a total of 17.8 miles of interrelated utilities and infrastructure. The surrounding area contains a mix of cultivated and native lands. FGE proposes to provide the most efficient natural gas combined-cycle facility in the marketplace and to serve the growing electrical capacity, energy, and ancillary services market in the historical Electric Reliability Council of Texas (ERCOT) North Nodal Zone. The Proposed Project is critical to the continued reliability and load servicing capability of the ERCOT grid due to a continuing erosion in reserve margins, which are currently projected to fall below the ERCOT grid's stated planning reserve of 13.75 percent in 2014 (Brattle 2012).

This biological assessment (BA) has been prepared in support of a U.S. Environmental Protection Agency Region VI Prevention of Significant Deterioration Permit required for the Proposed Project. The BA evaluation includes an analysis of the potential impacts of the Proposed Project on species listed as threatened or endangered or recently delisted with monitoring requirements under the Endangered Species Act of 1973 (ESA). The area evaluated consists of the approximately 200-acre Plant Site, a 0.2-mile process water disposal line, which will connect to a permitted commercial injection well, a 17.6-mile natural gas line, plus a 31-mile boundary surrounding the Plant Site (Action Area). The Action Area spans all or portions of Borden, Coke, Fisher, Glasscock, Howard, Mitchell, Nolan, Scurry, and Sterling Counties. The Action Area accounts for all potential direct and indirect impacts of the Proposed Project. Potential impacts include those from air and water pollution and noise associated with the construction and operation of the Proposed Project.

Six species are addressed in this BA. They are all listed by the USFWS as endangered, and are, therefore, protected under the authority of the ESA. Table ES-1 provides the list of the federally-listed species that have the potential to occur in Borden, Coke, Fisher, Glasscock, Howard, Mitchell, Nolan, Scurry, and Sterling Counties as identified by the U.S. Fish and Wildlife Service (USFWS) and/or Texas Parks and Wildlife Department (TPWD). The table also provides a summary of their potential for occurrence in the Action Area and the effects determination for each species.

Two of the six species addressed in this BA are expected to occur in the Action Area. The black-capped vireo is expected to occur in the southeast portion of the 31-mile Action Area, approximately 26 miles southeast of the 200-acre Plant Site in Sterling, Coke, and Nolan Counties. The Texas poppy-mallow is expected to occur between 12 and 27 miles southeast of the Plant Site in Mitchell and Coke Counties. No effects to these species are expected to occur from the Proposed Project because project concentrations are far below National Air Quality Standard levels protective of the environment and wildlife. In addition, the localized areas where air quality impacts are expected to occur within the Action Area would not occur within 6 miles of potential habitat for either species. The remaining four species are not expected to occur in the Action Area because this area is clearly outside of the known geographic range of the species, the Action Area does not contain the appropriate vegetation characteristics or landscape features known to support these species, or the species is extirpated from the Action Area.

Therefore, the construction and operation of the Proposed Project (Federal Action) would have no effect on all six listed species addressed in this BA.

Table ES-1. Summary of the Federally Listed Species within the 9-County Action Area as Identified by USFWS and TPWD, their Potential for Occurrence in the Action Area, and Effects Determination

Common Name	Scientific Name	Federal Status*	Borden County	Coke County	Fisher County	Glasscock County	Howard County	Mitchell County	Nolan County	Scurry County	Sterling County	Potential for Occurrence in Action Area	Effects Determination
Birds													
Black-capped vireo	*Vireo atricapilla*	E		✓					✓		✓	Could occur outside the Project Area in Action Area. Nearest known habitat is located 26 miles to the south of the Project Area in Sterling County. Modeled air quality impacts are outside of potential habitat.	No effect.
Interior least tern	*Sterna antillarum athalassos*	E	✓	✓			✓	✓		✓		Not expected to occur because Action Area lacks preferred habitat (salt flats and river shores); nearest habitat is 80 miles southeast of Action Area in near San Angelo in Tom Green County.	No effect.
Whooping crane	*Grus americana*	E	✓	✓	✓	✓	✓	✓	✓	✓	✓	Not expected to occur because Action Area lacks preferred habitat (salt flats or open expanses of herbaceous wetland) and is 32 miles west of migration corridor.	No effect.
Mammals													
Black-footed ferret	*Mustela nigripes*	E	✓		✓	✓	✓	✓	✓	✓	✓	Not expected to occur because extirpated from Texas.	No effect.
Gray wolf	*Canus lupus*	E	✓	✓	✓	✓	✓	✓	✓	✓	✓	Not expected to occur because extirpated from Texas.	No effect.
Flowering Plants													
Texas poppy-mallow	*Callirhoe scabriuscula*	E		✓			✓	✓		✓		Could occur outside the Project Area in Action Area. Nearest known habitat is located 12 miles southeast of Project Area in Mitchell County. Modeled air quality impacts are outside of potential habitat.	No effect.

1. INTRODUCTION

SWCA Environmental Consultants (SWCA) was contracted by FGE Power, LLC and its wholly-owned subsidiary, FGE Texas, LLC (FGE), to complete a biological assessment (BA) in support of the U.S. Environmental Protection Agency's (EPA) decision to issue a Prevention of Significant Deterioration (PSD) permit for greenhouse gas (GHG) regulated pollutants in connection with the proposed construction and operation of a greenfield electric generating station, ancillary facilities, and interdependent actions (FGE Texas Project or Proposed Project) near the town of Westbrook in Mitchell County, Texas. Specifically, the Proposed Project would include the power plant located on approximately 200 acres approximately 3 miles south-southwest of the intersection of Interstate (I-) 20 and Main Street in the town of Westbrook, Mitchell County, Texas (Plant Site). The Proposed Project also includes two interdependent actions: a proposed 17.6-mile high-pressure natural gas lateral (Natural Gas Pipeline) extending south into Sterling County and a proposed 0.2-mile process water disposal line (Process Water Disposal Pipeline) extending immediately west of the Plant Site (collectively, Interdependent Actions). The locations of all components of the Proposed Project are identified in Figure 1.

FGE proposes to complete the FGE Texas Project in two phases. Phase 1 (FGE Texas I Project) would consist of one combined-cycle power block and the only emission points would be two combustion turbine stacks, a single five-cell wet cooling tower, a 20-cell air-cool condenser, a single diesel firewater pump engine, and a single diesel emergency electrical generator. Construction of the Interdependent Actions would also occur during Phase 1. Phase 2 (FGE Texas II Project) would consist of a second combined-cycle power block and an additional cooling tower. The need for the FGE Texas Project is to provide the most efficient natural gas combined-cycle facility in the marketplace and to serve the growing electrical capacity, energy, and ancillary services market in the historical Electric Reliability Council of Texas (ERCOT) North Nodal Zone. The FGE Texas Project is critical to the continued reliability and load servicing capability of the ERCOT grid due to a continuing erosion in reserve margins, which are currently projected to fall below the ERCOT grid's stated planning reserve of 13.75 percent in 2014 (Brattle 2012).

This BA is prepared pursuant to Section 7 under the Endangered Species Act of 1973 (ESA), as amended, to determine whether the EPA's issuance of a PSD permit for the Proposed Project may affect listed species or designated critical habitat. The outcome of this BA determines whether formal consultation or a conference with the U.S. Fish and Wildlife Service (USFWS) is necessary (50 Code of Federal Regulations [CFR] 402.02, 50 CFR 402.12).

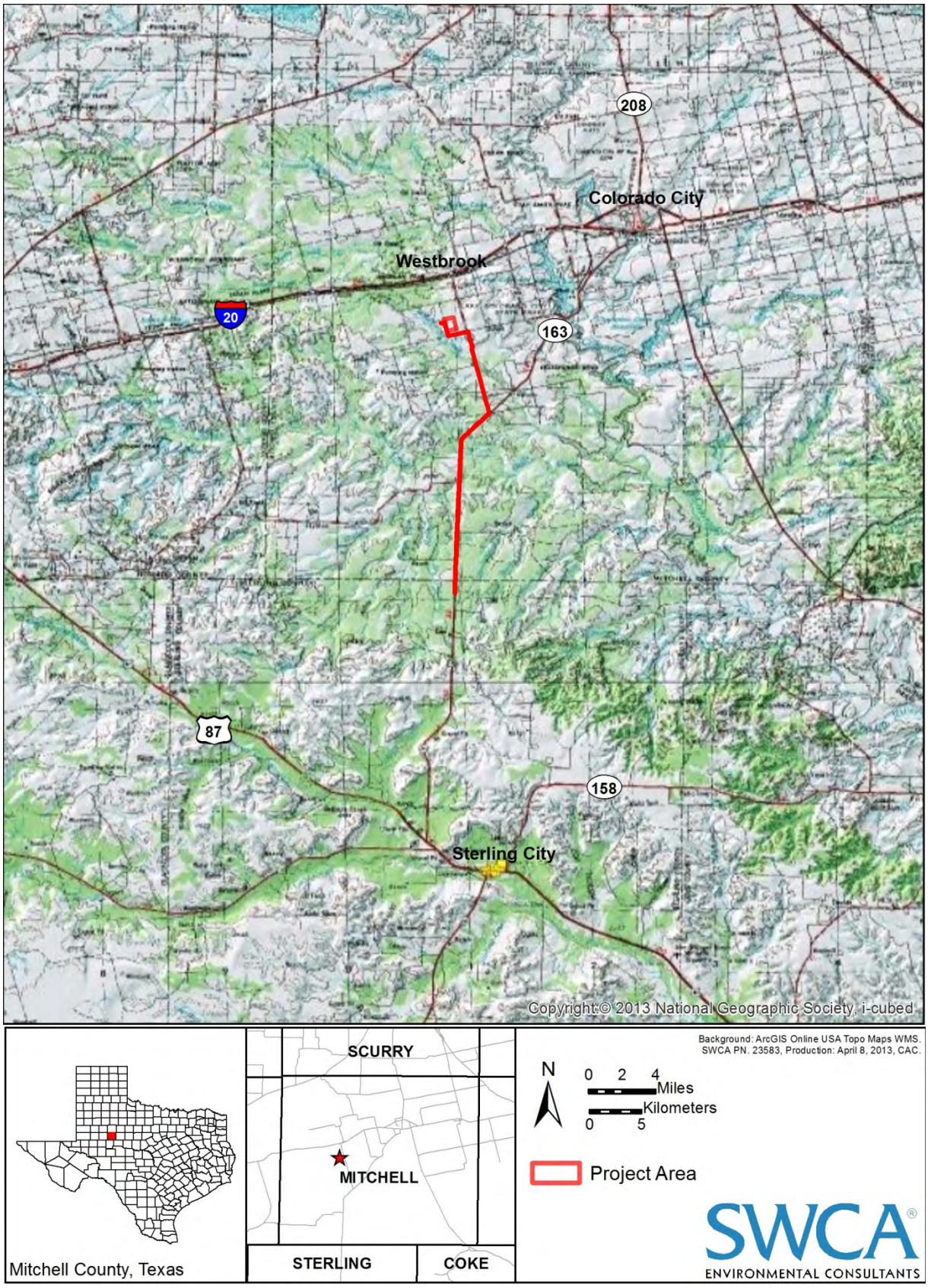

Figure 1. Project Area Location.

2. AGENCY REGULATIONS

2.1. Environmental Protection Agency Regulations and Standards

FGE is seeking a permit under the EPA's PSD program for GHG regulated pollutants, pursuant to 40 CFR 52.21. This federal air quality permit would authorize GHG emissions associated with the construction and operation of the Proposed Project. The involvement of federal permitting through the issuance of a PSD permit establishes a federal nexus that could require consultation with the USFWS. SWCA has drafted this BA, which addresses EPA's decision to issue a PSD permit in support of the Proposed Project, in compliance with Section 7 of the ESA. Section 7 of the ESA requires that, through consultation with the USFWS, federal actions not jeopardize the continued existence of any threatened, endangered, or proposed species or result in the destruction or adverse modification of critical habitat. The BA has been prepared in accordance with EPA rules and regulations implementing the ESA and other federal and state regulations (EPA 2012c).

The Proposed Project would require submission of the New Source Review (NSR) Initial Permit Application for GHG pollutants and is subject to PSD NSR requirements based on the expectation that GHG emissions will be greater than the major source PSD threshold of 100,000 tons per year (tpy) equivalent carbon dioxide (CO_2e) and 100 tpy on a mass basis. The Texas Commission on Environmental Quality (TCEQ) has been delegated authority to issue consolidated NSR/PSD air permits for non-GHG pollutants by the EPA; thus, the Proposed Project would require a PSD permit from TCEQ. The project would also require a PSD permit for GHGs from the EPA because the TCEQ has declined to implement the GHG PSD permitting program. Therefore, a separate GHG PSD permit must be approved and issued by the EPA.

2.2. Endangered Species Act

The ESA prohibits unauthorized taking, possession, sale, and transport of endangered or threatened species and provides protection for species and their habitats that are listed as threatened/endangered in the United States. The ESA seeks to conserve listed species by including provisions for listing species, developing recovery plans, and designating critical habitat. Section 7 of the ESA contains the procedures for authorizing, funding, or carrying out federal actions that may affect listed species. Furthermore, the ESA provides a mechanism by which non-federal persons and entities may receive authorization to take actions that could result in incidental take of a listed species.

Section 9 of the ESA prohibits the take of any federally listed endangered species (16 United States Code [USC] 1538(a)), and USFWS has extended that prohibition to threatened species by regulation. The ESA defines "take" as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC 1532(19)). Section 10(a)(1)(B) of the ESA (16 USC 1539(a)(1)(B)) authorizes USFWS to issue a permit allowing take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity."

2.3. State of Texas Endangered Species Regulations

Under Texas Threatened and Endangered Species Regulations (31 Texas Administrative Code [TAC] 65.171–65.176 [2010]), the State of Texas prohibits the taking, possession, transportation, or sale of state-listed species without the issuance of a permit from the Texas Parks and Wildlife Department (TPWD). Although the USFWS authorizes the take of migratory bird species under a USFWS Migratory Bird Depredation Permit, TPWD authorizes take of protected game birds and mammals under a depredation permit if these species cause economic hardship or pose a threat to public safety (Texas Parks and Wildlife Code, Chapter 43, Subchapter H, Sections 43.151 – 43.158). A permit is not required to kill nuisance fur-bearing animals, such as common raccoons (*Procyon lotor*). Under the TPWD Depredation Permit, any game animal or game bird killed must be immediately field dressed, maintained in edible condition, and donated to a charitable institution, a hospital, a needy person, or any other appropriate recipient.

3. METHODOLOGY

For the purposes of this BA, the *Project Area* is defined as the 200-acre Plant Site, the 17.6-mile-long, 100-foot-wide Natural Gas Pipeline corridor, and 0.2-mile-long, Process Water Disposal Pipeline corridor where the Proposed Project would be constructed and operated. The *Action Area* for this BA comprises the Project Area plus an area extending 31 miles in all directions beyond the 200-acre Plant Site perimeter, as detailed below. As required by regulations at 50 CFR 402.02, the Action Area includes all areas in which listed species could be affected directly or indirectly by the federal action. To delineate the Action Area boundary, SWCA identified the areas where project-related impacts to air quality, water quality, vegetation, and noise levels could have a direct or indirect effect on the species addressed in this BA. Potential impacts to air quality, specifically the modeled 1-hour significant impact level (SIL) for nitrogen dioxide (NO_2), were found to extend the farthest distance from the Proposed Project. Based on finalized modeling data, SWCA used a 31-mile radius from the Project Area fence line to define the Action Area boundary (see Table 1).

Table 1. Distances Required to Achieve Significant Impact Level Based on Criteria Pollutant Modeling Results for the Proposed FGE Texas Project

Pollutant	Regulation	Maximum Concentration Source	Averaging Period	SIL (µg/m^3)	Maximum Ground Level Concentration (µg/m^3)	Below SIL? (Yes or No)	Distance Required to Achieve SIL (miles)
NO_2	NAAQS	MSS	1-hour (ARM)	7.5	16.3	No	35
		MSS	Annual (ARM)	1.0	0.72	Yes	–
CO	NAAQS	Case 9A	1-hour	2,000	65.54	Yes	–
		MSS	8-hour	500	21.59	Yes	–
PM_{10}	State of Texas NAAQS	Case 2A	24-hour	5.0	4.32	Yes	–
		Case 2A	Annual	1.0	0.74	Yes	–
$PM_{2.5}$	NAAQS	Case 2A	24-hour	1.2	4.32	No	3
		Case 2A	Annual	0.3	0.74	No	2

Table 1. Distances Required to Achieve Significant Impact Level Based on Criteria Pollutant Modeling Results for the Proposed FGE Texas Project

Pollutant	Regulation	Maximum Concentration Source	Averaging Period	SIL (µg/m^3)	Maximum Ground Level Concentration (µg/m^3)	Below SIL? (Yes or No)	Distance Required to Achieve SIL (miles)
SO_2	State NAAQS	N/A	1-hour	7.8	6.65	Yes	–
		N/A	3-hour	25.0	5.55	Yes	–
		N/A	24-hour	5.0	3.59	Yes	–
		N/A	Annual	1.0	0.18	Yes	–

Source: SWCA and Oris (2013).

NAAQS = National Ambient Air Quality Standards; ARM = Ambient Ratio Method; MSS = Maintenance, Startup, and Shutdown Activities.

The distance required to achieve SIL for the 1-hour NO_2 during maintenance, startup, and shutdown (MSS) activities extends beyond 31 miles (to 35 miles); however, based on discussions with TCEQ and FGE, TCEQ concluded that the 31-mile area was sufficient to analyze potential impacts to sensitive receptors and approved the Action Area at that distance. The Action Area encompasses approximately 3,105 square miles and spans nine counties comprising Borden, Coke, Fisher, Glasscock, Howard, Mitchell, Nolan, Scurry, and Sterling Counties (Figure 2); therefore, all federally listed species occurring, having the potential to occur, or known to formerly occur in these nine counties are considered in this assessment.

SWCA also reviewed the Clean Air Act (CAA) National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) for pollutants considered harmful to public health and the environment. The CAA identifies two types of national ambient air quality standards: primary standards provide public health protection, whereas secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. Primary and secondary NAAQS for criteria pollutants are identified in Table 2.

Table 2. NAAQS for Criteria Pollutants

Pollutant	Primary/Secondary	Averaging Time	Level
Carbon Monoxide	Primary	8-hour	9 ppm
		1-hour	35 ppm
Lead	Primary and Secondary	Rolling 3-month average	0.15 µg/m^3
NO_2	Primary	1-hour	100 ppb
	Primary and Secondary	Annual	53 ppb
Ozone	Primary and Secondary	8-hour	0.075 ppm
$PM_{2.5}$	Primary and Secondary	24-hour	35 µg/m^3
	Primary	Annual	12 µg/m^3
	Secondary	Annual	15 µg/m^3
	Secondary	24-hour	150 µg/m^3

Table 2. NAAQS for Criteria Pollutants

Pollutant	Primary/Secondary	Averaging Time	Level
SO_2	Primary	1-hour	75 ppb
	Secondary	3-hour	0.5 ppm

SWCA biologists conducted two site visits of the Action Area to assess the potential for federally listed species to occur within the Action Area. An SWCA biologist conducted a field reconnaissance of the Plant Site and Process Water Disposal Pipeline corridor on March 25, 2013 and of the Natural Gas Pipeline corridor on November 7, 2013. A U.S. Geological Survey 7.5-minute topographic map (Big Spring, Texas), recent aerial imagery, and maps provided by FGE were used for general orientation. The field reconnaissance consisted of a pedestrian survey of the 200-acre Plant Site and a windshield survey of the pipeline corridors. A detailed desktop review of the Action Area was also conducted to evaluate vegetation and landscape features considered important to the potential occurrence of species addressed in this BA. This detailed desktop review used the following available data: 2010 National Agriculture Imagery Program (NAIP) aerial imagery; U.S. Geological Survey 7.5-minute topographic maps; National Wetlands Inventory (NWI) digital data; National Hydrography Dataset (NHD) digital data; Natural Resources Conservation Service (NRCS) Soil Data Mart; Bureau of Economic Geology (BEG) Geologic Atlas of Texas (GAT) digital data; TPWD Natural Diversity Database (NDD) searches; peer reviewed literature; and publicly available data from TPWD, USFWS, and other regulatory agencies.

Data were collected to describe the vegetation communities in the Action Area and to assess the potential for occurrence of federally listed species. Photographs of the components of the Project Area are included in Appendix A. Results of both the field survey data and details obtained through desktop review were used to prepare this BA.

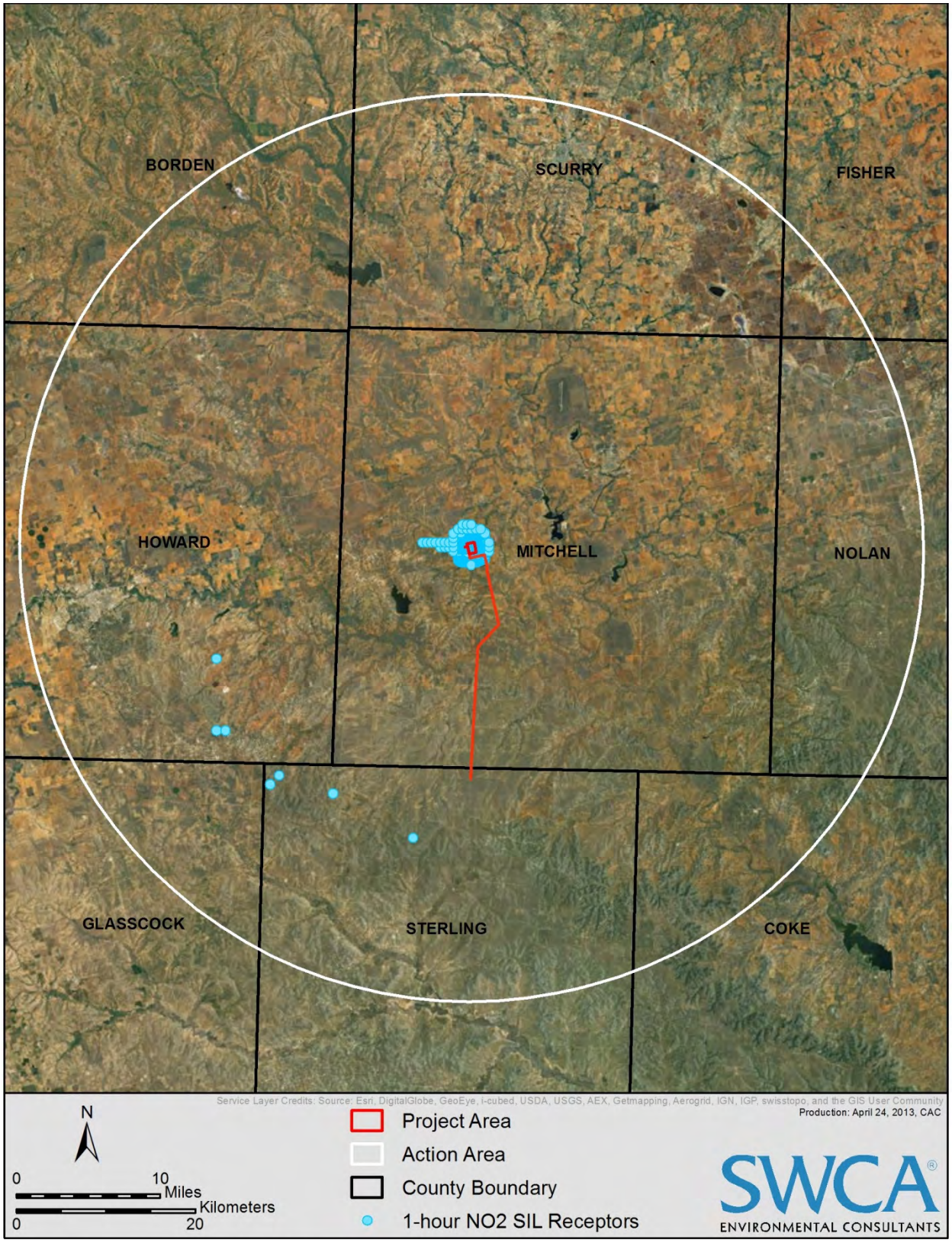

Figure 2. Project Area and the 31-mile Action Area as Defined by the 1-hour MSS NO_2 SIL.

Evaluation of species with the potential to occur in the Action Area was based on 1) documented records, 2) existing information on distribution, and 3) qualitative comparisons of the habitat requirements of each species with vegetation communities or landscape features in the Action Area.[1] Possible impacts to these species were evaluated based on reasonably foreseeable project-related activities. The potential for occurrence of each species is summarized according to the categories listed below. Because not all species are accommodated precisely by a given category (i.e., category definitions may be too restrictive), an expanded rationale for each category assignment is provided. Potential for occurrence categories are as follows:

- Known to occur: The species has been documented in the Action Area by a reliable observer.
- May occur: The Action Area is in the species' currently known range, and vegetation communities, soils, etc., resemble those known to be used by the species.
- Unlikely to occur: The Action Area is in the species' currently known range, but vegetation communities, soils, etc., do not resemble those known to be used by the species, or the Action Area is clearly outside the species' currently known range.

The primary purpose of this BA is to determine the potential effects, if any, on any species present in the Action Area. As noted in the USFWS Consultation Handbook, "no effect" determinations are appropriate where the proposed action would not affect a listed species or designated critical habitat (USFWS and NMFS 1998). Where species are not present in the Action Area and no effects to the species are reasonably certain to occur, "no effect" is the appropriate determination. The Consultation Handbook clarifies that a "may affect, not likely to adversely affect" determination is appropriate where effects on listed species are "expected to be discountable, insignificant, or completely beneficial." The Consultation Handbook further explains that "insignificant effects relate to the size of the impact and should never reach the scale where take occurs." Conversely, where an effect is not discountable, insignificant, or completely beneficial, or anticipated take is likely to occur as a result of the proposed action, the appropriate determination is "may affect, likely to adversely affect" (USFWS and NMFS 1998).

The effects analysis must address the direct, indirect, interrelated, interdependent, and cumulative effects of an action. A direct effect is the direct or immediate effect of the project on a species or its habitat, whether beneficial or adverse (50 CFR 402.02). Direct effects result from the action and include the direct effects of interrelated actions and interdependent actions. Direct effects occur at or very close to the time of the action itself. Interrelated projects include other projects or activities that are part of a larger project and depend on the larger project for their justification (i.e., the proposed action would not occur without the larger project). Interdependent projects have no independent utility apart from the proposed action (i.e., other projects would not occur without the proposed action). Indirect effects are caused by the action and occur later in time after the action is completed (50 CFR 402.02). Cumulative effects include the effects of future tribal, state, local, or private actions that are reasonably certain to occur in the area of the federal action subject to consultation (50 CFR 402.02). Cumulative effects are considered together with the effect of the federal action under consultation by USFWS to determine whether the effects of the federal action are likely to jeopardize the continued existence of a listed species. Other future federal actions that may affect a listed species would be subject to consultation requirements established in Section 7 of the ESA and, therefore, are not considered cumulative effects of the proposed action.

[1] We agree with Hall et al. (1997) that *habitat* is organism-specific and thus not synonymous with *vegetation community*. However, we have refined their definition to read as follows: *habitat* is an area in which some members of a species regularly occur continuously or seasonally. In the field, *habitat* is operationally defined by the presence or absence of a species. Areas that appear suitable for a species but that have not been surveyed are considered possible habitat. We avoid using the term 'potential' with respect to habitat because potential is defined as 'capable of becoming but not yet in existence'; 'possible,' on the other hand, is defined as 'of uncertain likelihood'. We also avoid using the terms 'unoccupied habitat' or 'suitable, but unoccupied habitat,' which represent a contradiction in terms.

Those species listed by the USFWS were assigned to one of three categories of possible effect, following USFWS recommendations. The effects determinations are generally categorized as follows:

- May affect, is likely to adversely affect**:** The Proposed Project would likely adversely affect a species if 1) the species occurs or may occur in the Action Area, and 2) if any adverse effect on listed species may occur as a direct or indirect result of the Proposed Action or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or beneficial. In the event that the overall effect of the Proposed Action is beneficial to the listed species but also is likely to cause some adverse effects, then the Proposed Action "is likely to adversely affect" the listed species.
- May affect, is not likely to adversely affect**:** The Proposed Project would likely adversely affect a species if 1) the species may occur but its presence has not been documented and/or surveys following approved protocol have been conducted with negative results, and/or 2) project activity effects on a listed species are expected to be discountable, insignificant, or completely beneficial.
    - Beneficial effects are contemporaneous positive effects without any adverse effects on the species.
    - Insignificant effects relate to the size of the impact and should never reach the scale where take occurs.
    - Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not 1) be able to meaningfully measure, detect, or evaluate insignificant effects; or 2) expect discountable effects to occur.
- No effect**:** The Proposed Project would have no effect on a species if 1) it has no likelihood of effect on a listed species or its designated critical habitat (including effects that may be beneficial, insignificant, or discountable), or 2) the species' habitat does not occur in the Action Area.

4. PROJECT DESCRIPTION

4.1. Project Purpose and Process

The FGE Texas Project would include two combined-cycle power blocks, each in a 2-on-1 configuration (two combustion turbines, two supplementally-fired [duct burners] heat recovery steam generators [HRSGs], and one steam turbine). The objective of the Proposed Project is to provide the most efficient natural gas combined-cycle facility in the marketplace and to serve the growing electrical capacity, energy, and ancillary services market with the historical Electric Reliability Council of Texas (ERCOT) North Nodal Zone. The Proposed Project's point of interconnection with the ERCOT transmission grid would also facilitate provision of comparable services to the ERCOT West Marketplace. However, the vast majority of the customers are forecasted to be located with the ERCOT North Nodal Zone.

Selective catalytic reduction would be employed as Best Available Control Technology (BACT) for emissions of oxides of nitrogen (NO_X). In addition, FGE is proposing an oxidation catalyst to reduce emissions of carbon monoxide (CO) and volatile organic compounds (VOCs) from the Alstom GT24s. All of the proposed cooling towers and duct burners would be fired exclusively with pipeline-quality natural gas.

At completion, the proposed FGE Texas Project would include the following emission sources:

- Four natural gas–fired combustion turbines with natural gas–fired duct burners including planned MSS activities
- Two induced draft mechanical wet cooling towers

- Two emergency diesel firewater pump engines
- Two emergency diesel electrical generator engines
- Two 1,250-gallon diesel storage tanks (one per firewater pump engine)
- Two 2,000-gallon diesel storage tanks (one per electrical generator engine)
- Two 19% aqueous ammonia tanks
- Fugitive ammonia and natural gas emissions from piping components
- Fugitive emission from electrical equipment insulated with sulfur hexafluoride (SF_6)

4.2. Construction Information

4.2.1. Construction Activities and Schedule

The proposed facility would be constructed in two phases, with Phase I (FGE Texas I Project) consisting of a single power block operating in combined-cycle mode. Phase I is anticipated to begin construction in May 2014 with operations beginning in June 2015. A second power block consisting of an additional 2-on-1 combined-cycle power block is anticipated to begin construction as soon as March 2014, with operations commencing as early as December 2015, with operations commencing in June 2017, as Phase II (FGE Texas II Project). The base load generation capacity of the proposed electric generating facility, at the completion of Phase II, would be a nominal rating of 1,516 megawatt (MW) (gross). Figures 3 through 5 provide plot plans that show the proposed layout of the FGE Texas Project from Phase I through Phase II.

The overall project schedule is dependent on a number of key milestones such as issuance of the PSD and NSR permits described in Section 2.1, as well as financial closure, on-time start of construction, and on-time start of commercial operation. The permits required to start construction include the PSD permit for GHG pollutants issued by EPA Region 6 and the NSR permit issued by TCEQ. However, to complete the financial closure of the Proposed Project, the permits must be issued by April 2014. The planned commencement of construction is May 2014, with a projected start of commercial operation of June 2015.

Based on this schedule outlined above, the construction phase of the Proposed Project, from site preparation and grading to commercial operation for each phase, is anticipated to last up to 36 months (30 months per power block). During that time, many activities would take place, including construction of foundations, installation of piping and equipment, and erection of major structures. During these activities, varying types and numbers of construction equipment and personnel would be in the area of the Proposed Project. In addition, construction-phase best management practices (BMPs) such as those required for dust abatement and stormwater protection would be implemented. Once construction is initiated, following any required clearing and grubbing operations, the site would be contoured to achieve the site draining plan and stormwater management. The project site plot plan depicted in Figures 3 through 5 would be fully engineered for proper management and containment of stormwater, including land contouring, drainage swales/open ditches, road and parking lot surface drains, catch basins with subterranean underground storm collection system, and detention ponds prior to being discharged to the Mitchell County storm collection system, all in accordance with local codes and standards.

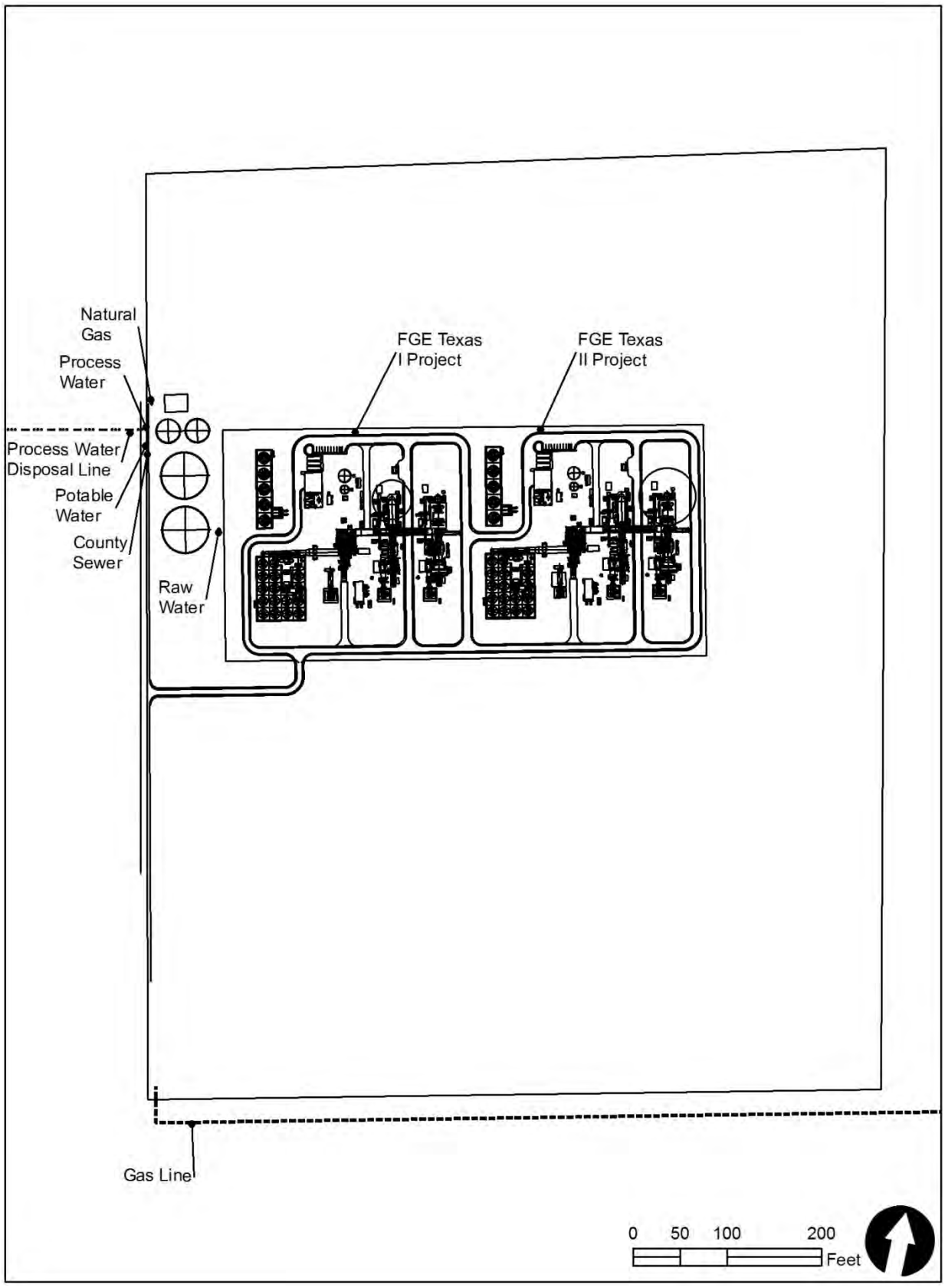

Figure 3. FGE Texas I/II Project Site Layout.

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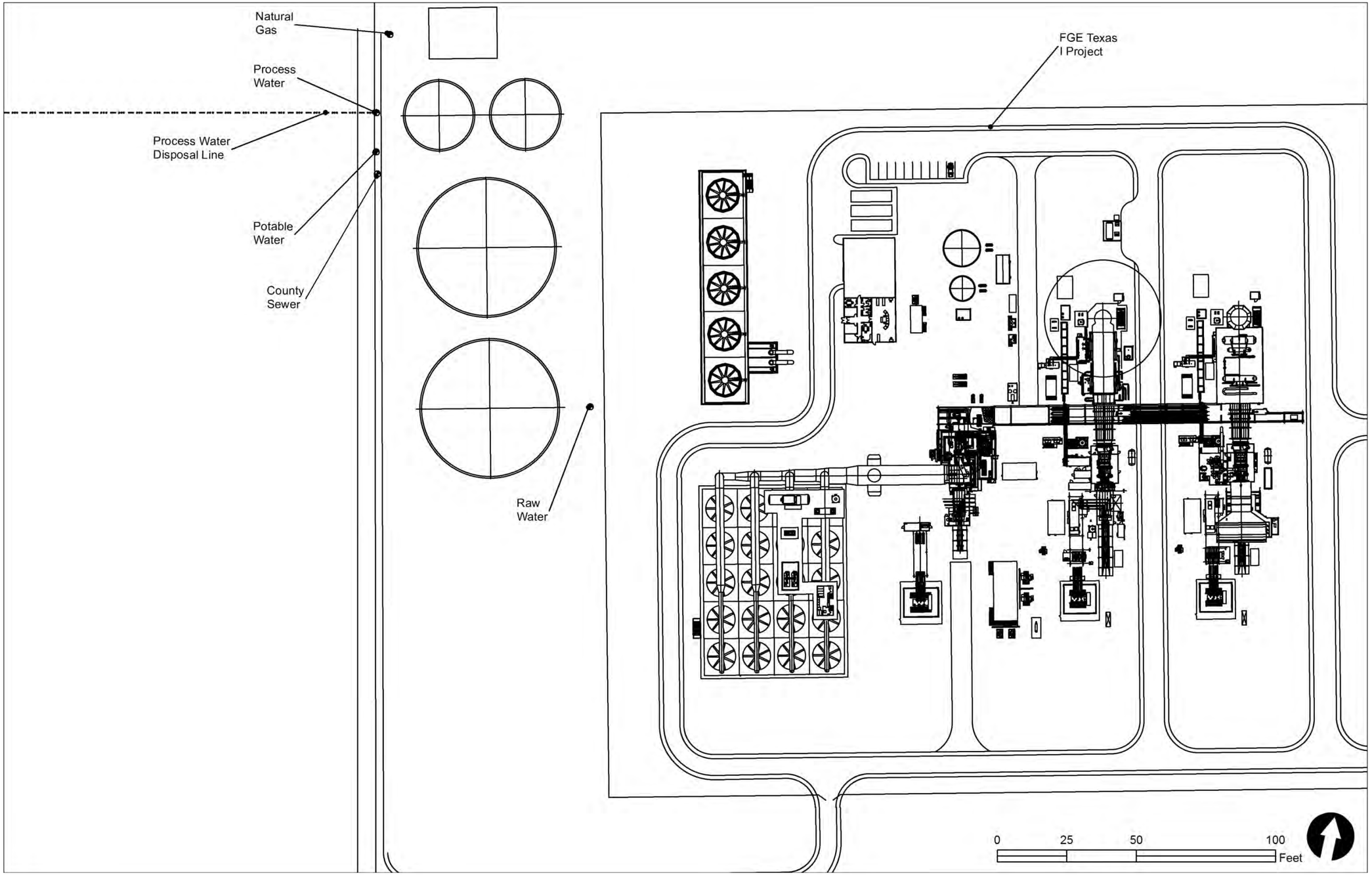

Figure 4. FGE Texas I Project Plant Layout.

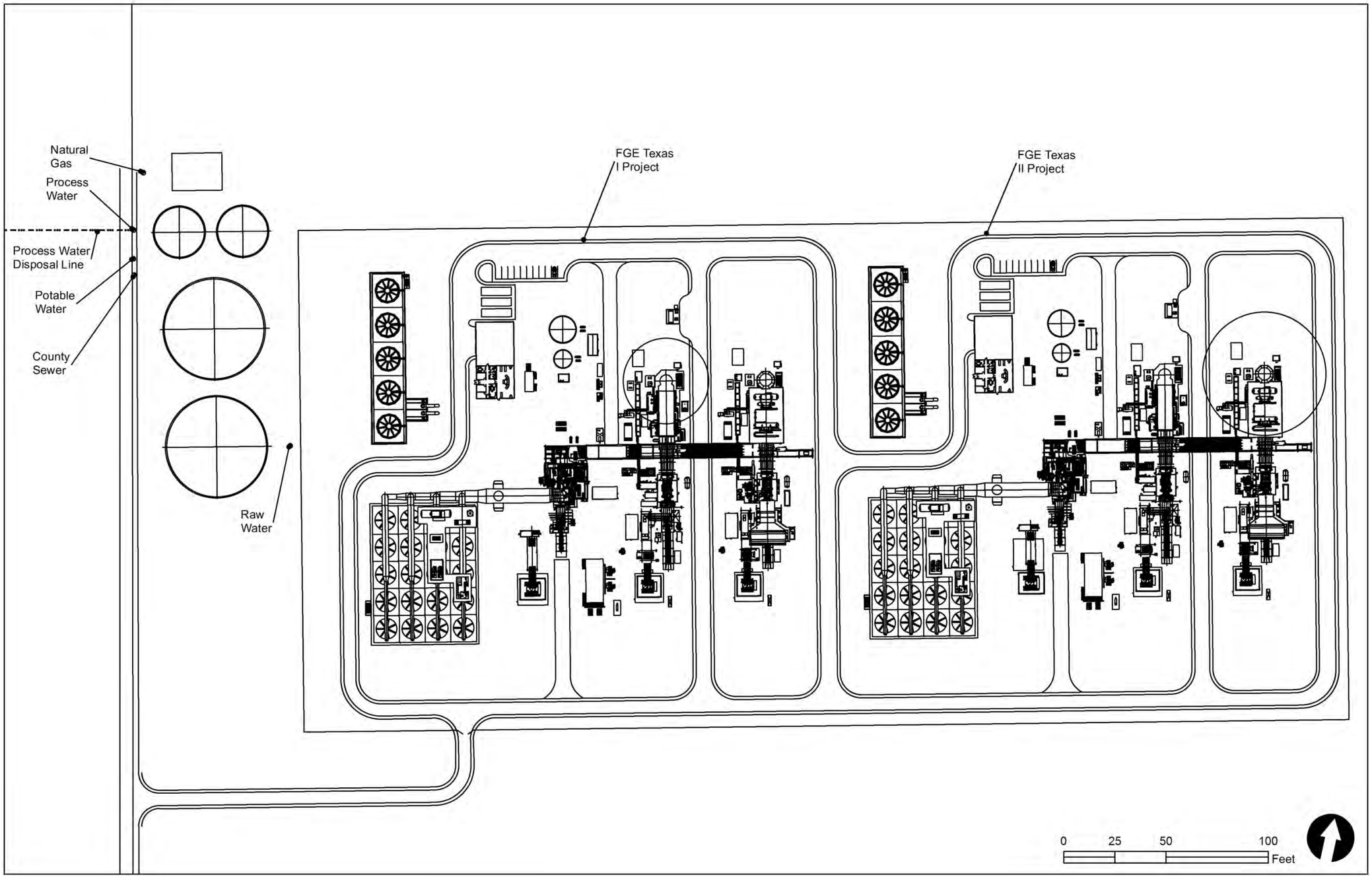

Figure 5. FGE Texas II Project Site Layout.

4.2.2. Construction Equipment Required

The Proposed Project would use conventional construction techniques and equipment. Equipment used during construction, the peak number of units, and the estimated duration of use, are provided in Table 3.

Table 3. Equipment used during Construction, the Peak Number of Units, and the Estimated Duration of Use

Equipment Type	Peak Number of Units	Estimate Duration of Use (months)
Lifting Equipment		
Mobile and stationary cranes	10	18
Fork lifts	6	28
Earth Moving Equipment		
Dozers, excavators, loaders	5	8
On-site dump trucks	3	6
Compactors	16	8
Water trucks	2	7
Backhoes	1	28
General Construction Equipment		
Manlifts (hydraulic, articulating/scissors)	20	28
Air compressors	6	28
Concrete pump trucks/mixers	2	6
Diesel drive weld rigs	8	28
diesel drive generators/light Towers	4	10
Hauling/Mobile Equipment		
Tractor trailer	2	20
Street sweeper	1	10
Service trucks	1	20
Passenger bus	4	28
Pick-up trucks	4	28

At the peak of the construction phase it is anticipated there would be approximately 900 personnel (both staff and craft) working in and around the Plant Site.

4.2.3. Emissions Controls

Air quality analyses for the Proposed Project were performed by SWCA and Oris Solutions, LLC (Oris) as part of the EPA and TCEQ permitting requirements (SWCA and Oris 2013). This analysis also included a BACT analysis for each component. The Proposed Project would include the following potential sources of GHG emissions, depending on the phase of the project:

- Four natural gas combustion turbines, which may operate in the following modes:

  - Phase 1: combined-cycle operation for two combustion turbines (Emission Point Numbers [EPNs]: GT-1, GT-2)
  - Phase 2: combined-cycle operation for four combustion turbines (EPNs: GT-1, GT-2, GT-3, GT-4)
- Two emergency firewater pump diesel-fired engine (all phases; EPN: FWP-1 and FWP-2)
- Two emergency electrical generator diesel-fired engine (all phases; EPN: EG-1 and EG-2)
- Fugitive emissions from natural gas piping components (all phases; EPN: FUG-CH4)
- Fugitive emissions from circuit breakers containing SF_6 (all phases; EPN: FUG-SF_6)

The following emission controls would be implemented for the Proposed Project:

- The proposed emission limits for each emission source is based on a 365-day or 12-month rolling average and includes carbon dioxide (CO_2), methane (CH_4), and nitrous oxide, with CO_2 emissions accounting for more than 99% of the total projected emissions. The BACT limits include the following:
  - Each of the combustion turbines would have a proposed CO_2e BACT limit of 1,470,461 tpy.
  - The emergency firewater pump engine would have a proposed CO_2e BACT limit of 12 tpy.
  - The emergency electrical generator engine would have a proposed CO_2e BACT limit of 27 tpy.
  - The fugitive emissions from natural gas piping would have a proposed CO_2e BACT limit of 209 tpy.
  - The fugitive emissions from SF_6-containing electrical equipment would have a proposed CO_2e BACT limit of 28 tpy.
- GHG emissions generated by the combustion turbines would be minimized by implementing the following BACT: use of combined-cycle technology, use of natural gas fuel, efficient turbine design, turbine inlet air cooling, periodic turbine combustion tuning, reduction in thermal heat loss, and instrumentation and controls.
- GHG emissions generated by the emergency firewater pump engine and the generator would be minimized by implementing the following BACT: operate within proper fuel-to-air ratios, perform maintenance based on recommended readiness testing, and keep low annual hours of operation.
- Fugitive emissions from the piping components in natural gas service would be minimized by implementing audio/visual/olfactory leak detection methods to identify and repair system and equipment leaks.
- Fugitive emissions from SF_6-containing electrical equipment would be minimized by the following BACT: use of state-of-the-art circuit breakers, implement a leak detection and repair program, perform systematic operations tracking, and educate and train employees.

4.3. Operation and Maintenance Information

4.3.1. Operational Requirements

The annual hours of operation would be 8,760 hours per year, including start-up and shutdown events. Normal operations would include service and repair, as needed, to the equipment. The following equipment would be required for the operation of the Proposed Project: four gas combustion turbines, one emergency firewater pump engine, one emergency electrical generator engine, piping components in natural gas service, and circuit SF_6 breakers.

4.3.2. Water

A description of the process water requirements, disposal of waste water (cooling tower blowdown), and discharge of storm water is below.

4.3.2.1. PROCESS WATER

The Proposed Project would use a hybrid design combining air-cooling and water cooling. A condenser/cooling tower arrangement to condense and cool steam exhausted from the steam turbine. Each power block would have a separate condenser/cooling tower. The condenser would be a surface contact heat exchanger, and each cooling tower would be a multi-cell motor driven, mechanical draft, counterflow tower with film fill. Each cooling tower would be equipped with five cells and a circulation rate of 106,000 gallons per minute (gpm). The remaining heat balance would be handled with the use of a 20-cell air cooled condenser (ACC) unit per power block. The maximum total dissolved solids (TDS) content of the cooling water will be 21,000 parts per million (ppm). Source water for the cooling towers would be provided at a rate of 8,000 gpm (1.15 million gallons per day).

FGE is drilling deep water wells on-site and constructing a water treatment facility by which there will be two process water streams bound for the two phases of the Proposed Project. The first stream will be untreated, raw well water for use in charging and maintaining the firewater storage tank for FGE Units 1 and 2 and the cooling tower basin for make-up purposes. The second water supply stream will be reverse osmosis (RO) treated water supplying the boiler feed water treatment system with necessary feed stock. Boiler feed water, once brought to a certain quality level, will be stored in an on-site, demineralized water storage tank. Boiler blowoffs and blowdowns would be discharged into the cooling tower basin. Cooling tower blow down would be discharged to a nearby commercial injection well located approximately 0.2 mile west of the Plant Site.

4.3.2.2. WASTEWATER

Each phase of the Proposed Project would use a separate on-site storage tank to hold discharged water; each tank would have a capacity of 1 million gallons. Discharged water would be stored in these holding tanks and disposed of via a 0.2-mile-long Process Water Disposal Pipeline connecting to an existing commercial injection well located west of the Plant Site. This pipeline corridor would encompass a 100-foot temporary or construction footprint and a 50-foot permanent easement.

4.3.2.3. NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM INFORMATION

The State of Texas, through the TCEQ Texas Pollutant Discharge Elimination System (TPDES), has the federal authority to regulate the National Pollutant Discharge Elimination System program regarding discharge of pollutants to Texas surface water.

A stormwater pollution prevention plan (SWP3) has been prepared for the FGE Texas project in accordance with Texas Pollutant Discharge Elimination System (TPDES) General Permit (GP) TXR150000. This SWP3 has been developed and will be amended, when necessary, to do the following:

- Identify sources of pollutants associated with construction activity that may affect the quality of stormwater runoff from construction sites.
- Identify stormwater management practices to abate pollutants in stormwater discharges from the construction site both during and after construction.

This SWP3 will be appropriately implemented before any ground-disturbing construction activity takes place and the operator will comply with all conditions of the GP. Furthermore, the SWP3 may be modified to cover operations (Multi Sector General Permit).

4.3.3. Natural Gas

FGE has been in coordination with Enterprise Operating Company, LLC (Enterprise) to construct a lateral pipeline to interconnect the FGE Texas Project to the existing Line X, a 36-inch natural gas pipeline currently jointly owned by Enterprise and Energy Transfer partners, L. P. (ETP) on a capacity basis and operated by Enterprise. The existing natural gas pipeline is located approximately 12 miles south of the Plant Site in Sterling County, Texas.

Enterprise plans to construct a new 20-inch in diameter, 17.6-mile-long pipeline from their existing Texas Intrastate System to the Plant Site. This lateral would allow for the transport of 9,760 mmBtu per hour to the Plant Site, which is sufficient to service both phases of the Proposed Project. For the construction of the new lateral, Enterprise has mapped out the proposed 17.6-mile route that would follow along existing public roadways to the Plant Site from their existing infrastructure. This pipeline corridor would encompass a 100-foot temporary or construction footprint and a 50-foot permanent easement. Enterprise would not initiate the process of obtaining ROW access until after the Proposed Project has completed multiple milestones.

4.3.4. Electricity

FGE would require a direct crossing of the 345kV ONCOR transmission facilities for interconnection purposes to minimize the cost of interconnection to ONCOR, provide the construction period credit support required by ERCOT, and eliminate a long permitting process if a transmission line would have been required to interconnect the Proposed Project to a distant substation. Therefore, the sole interconnection requirements for the Project will be deeding approximately five acres of the Plant Site to ONCOR. ONCOR would then construct direct interconnection facilities on site to access the 345kV line which traverses over the southern end of the Plant Site.

4.3.5. Noise

SWCA conducted a noise assessment was specifically for the Proposed Project (SWCA 2013a). The results reveal that the maximum sound levels from the construction and operation of the Proposed Project would comply with all regulatory noise limits and guidelines established for the EPA. Those results are summarized below.

4.3.5.1. EXISTING CONDITIONS/AMBIENT NOISE LEVELS

Simply defined, noise is "unwanted sound" that interferes with normal activities or in some way reduces the quality of the environment. Airborne sound is the rapid fluctuation of air pressure caused by mechanical vibrations. Response to noise varies according to its type, perceived importance, appropriateness in the setting, time of day, and the sensitivity of the individual receptor.

Local conditions, such as traffic, topography, and winds characteristic of the region, can alter background noise conditions. In general, the noise environment (day-night sound levels, or Ldn) can vary widely across the landscape. According to the EPA (1974), the outdoor Ldn in different areas of the United States vary over a range of 50 decibels (dB). Outdoor noise levels can range from as low as 30 to 40 dB (Ldn) in wilderness areas and as high as 85 to 90 dB (Ldn) in urban areas (EPA 1974).

The Action Area contains a mixture of residential, commercial, and industrial zoned properties; however the Plant Site, and the area immediately surrounding the Plant Site, is almost entirely sparsely populated agricultural land (see Figure 2). Therefore, the existing average ambient noise levels within the Plant Site are estimated to be near the low end of the range described above. Potential sensitive noise receptors such as residences or schools are not located within the Plant Site; the closest residence is located approximately 1,800 feet west of the proposed turbine power blocks.

The major sound sources from the Proposed Project are anticipated to be the various construction activities involving the operation of late model diesel-driven construction equipment, hauling and lifting equipment, as well as by handheld tools for such operations as grinding, drilling, saw cutting, and welding operations. Following completion of construction, operational noise associated with normal plant activities, including operation of the cooling towers, combustion air inlets, exhaust stacks, steam piping, transformers, and emergency diesel-fired engines, is expected.

4.3.5.2. CONSTRUCTION NOISE AND VIBRATION IMPACTS

The construction of the Proposed Project, from site preparation and grading to commercial operation, is scheduled for approximately 30 months per power block (approximately 36 months for entire facility). During that time many activities would be taking place, including construction of foundations, installation of piping and equipment, and erection of major structures. During these activities, the type and number of construction equipment and personnel would vary, resulting in fluctuating levels of construction noise. Construction activities within the Plant Site would result in a short-term, temporary increase in the ambient noise level resulting from the operation of construction equipment. The Proposed Project would use conventional construction techniques and equipment, including excavators, bulldozers, heavy trucks (water trucks dump trucks, cranes, drilling equipment, etc.), and similar heavy construction equipment that may be audible from off-site locations. Some of these activities will overlap.

The increase in noise level would be primarily experienced close to the noise source. The magnitude of the noise effects would depend on the type of construction activity, noise level generated by the various construction equipment/vehicles, duration of the construction phase, and distance between the noise sources and the receivers. It is anticipated that only a few pieces of equipment required for the construction have the potential to exceed 85 A-weighted decibels (dBA) at 50 feet (15 meters [m]) from the source. The noise levels resulting from construction activities vary greatly depending on the type of equipment used (make and model), the operations being performed, and the power level and quantity of equipment.

The EPA has published data on the average sound levels for typical construction phases of industrial facilities. These sound levels were projected from the acoustic center of the Plant Site to the nearest residential neighborhood receptors using a standard spreading hemispherical wave propagation

calculation. This calculation conservatively assumes that all construction equipment would be operating concurrently for the specified construction phase. Sound levels of typical construction equipment range from approximately 65 to 95 dBA at 50 feet (15 m) from the source, with an average level of 89 dBA at 15 m during the noisiest activities (USEPA 1971).

For this assessment, a logarithmic relationship describing the acoustical spreading of pure, undisturbed spherical waves in air was used. The rule applies to the propagation of sound waves with no ground interaction. The calculations are based on the formula below (Harris 1991):

$SPL_2 = SPL_1 - 20\log(d_2/d_1)$

where:

SPL_1 = known sound level

SPL_2 = desired sound level

d_1 = known distance

d_2 = desired distance

Noise from construction would largely be considered point sources. Ground conditions may further attenuate noise from a point source by an additional reduction of 1.5 dB per doubling of distance (under soft site conditions, including irregular ground and vegetated surfaces) from the source. Conservatively, 1 dB per 1,000 feet (305 m) of distance from the source was also deducted for air absorption and anomalous excess attenuation.

Acoustical calculations were performed to estimate noise from conventional construction activities at the closest residence. The closest off-site residential uses to the Plant Site consist of a single-family residence located approximately 1,800 feet (550 m) west of the proposed facility. Based on the direct line-of-sight distance from the Proposed Project components to be constructed, sound levels at the residence were estimated to average between 45 to 56 dBA (Table 4).

Table 4. Calculated Sound Levels from Construction Activities

Construction Phase	50 feet from Source (Leq)	Residential Receptor 1,800 feet to the West (Leq)
Excavation	89	56
Foundations	78	45
Pile driving	105	72
Erection	85	52
Finishing	89	56

Equivalent noise level (L_{eq}) is the energy average A-weighted noise level during the measurement period.

The noise from pile driving activities would be approximately 72 dBA at the residential area located 1,800 feet (550 m) from the Plant Site and may cause modest temporary disturbances to this residential area. In addition, the projected sound levels presented in Table 4 are estimated outdoor noise levels. A building (house) would provide significant attenuation for those who are indoors. Sound levels can be expected to be up to 27 dBA lower indoors with the windows closed.[2]

[2] U.S. EPA, 1974. Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety. Available at: http://www.nonoise.org/library/levels/levels.htm#levelsof. Accessed May 1, 2013.

The equipment used during each phase of construction would not generally operate continuously, nor would the equipment always operate simultaneously. There would, therefore, be times when no equipment is operating and noise would be at ambient levels. The U.S. Department of Transportation Federal Transit Administration (FTA) has published a guideline that specifically addresses issues of community noise. This guideline recommends that hourly sound levels of 90 dBA at residences from construction noise would be considered a significant impact.

Calculations were also performed to estimate vibration from pile driving activities at the closest residences. Vibration from construction and pile driving was assumed to have point source propagation characteristics. Vibration levels for impact pile drivers are typically 0.644 inch per second (1.636 centimeters per second) peak particle velocity (PPV) at 25 feet (8 m) and for construction equipment typically range from 0.076 to 0.089 PPV. The calculations for estimating vibration impact from construction activities are based on the formula below[3].

$PPV_{equip} = PPV_{ref} *(25/D)1.5$

where:

PPV_{equip} = the peak particle velocity in inches per second of the equipment adjusted for distance

PPV_{ref} = the reference vibration level in inches per second at 25 feet from equipment

D = the distance from the equipment to the receiver

Calculations were performed to estimate vibration from pile driving activities at the closest residence. Under normal propagation conditions, vibration levels at the closest residence 1,800 feet (550 m) from the activities would be 0.005 inch per second (0.013 cm per second), which is well below the FTA threshold of 0.20 inch per second (0.50 cm per second), resulting in a less than significant impact.

Proposed mitigation strategies to limit noise levels during construction activities include the following:

- Keeping all construction equipment maintained and requiring the contractor to use equipment that is maintained and fitted with sound attenuation equipment when needed. It is anticipated that all construction equipment will be rented/leased using late model heavy-duty diesel engines meeting current federal and state regulations for noise emissions.
- Generators will have whisper exhaust sound-attenuated muffler systems.
- Noisy activities could be combined to occur during the same time period, because the total noise level produced will not be significantly greater than the level produced if the activities were performed separately.
- Construction activities will be positioned at reasonable distances from the property boundaries, as much as practicable.
- Nighttime activities will be minimized. According to the EPC Contractor, with the exception of infrequent and periodic construction operations that may need to extend beyond the normal work day and selected time periods during commissioning of the power blocks, the Proposed Project construction would have work rules implemented controlling site work hours normally occurring during the daylight hours.

3 Federal Transit Administration (FTA). 1995. Transit Noise and Vibration Impact Assessment. April.

4.3.5.3. OPERATIONAL NOISE AND VIBRATION IMPACTS

Noise from normal plant operations would include the cooling towers, combustion air inlets, exhaust stacks, steam piping, transformers, and emergency diesel-fired engines. In general, the sound levels produced by the HRSG stack are typically the largest sources of noise. Combustion turbines generally have total sound power levels ranging from approximately 120 to 155 dB, but are typically 30–50 dB quieter due to most silencer installations. For the purposes of this noise assessment, it was anticipated that the sound pressure level from the HRSG stack would be 115 dB at 3 feet (1 m) from the source.

To determine the noise impact at the Plant Site boundary, the attenuation of the original noise needs to be determined. To complete this assessment, the sound pressure levels at varying distances were predicted using procedures from International Organization of Standardization (ISO) ISO9613-2 (ISO 1996), which is a widely used standard for evaluating noise impact in environmental assessments. The total attenuation of the noise is the sum of the attenuation due to geometrical divergence, absorption by air, the environmental attenuation at long range, barriers, and any other miscellaneous attenuation. The noise sources from normal operation are proposed to be located greater than 800 feet (244 m) from the edge of the nearest property boundaries. All noise is conservatively assumed to be broadcast at the 250-hertz (Hz) frequency, because lower frequencies attenuate less in the atmosphere. Assuming 115 dB are originating from the turbine unit at a distance of 3 feet (1 m) and based on the site arrangement, the predicted A-weighted sound level would be approximately 62 dBA at the nearest facility boundary. The nearest residence is located approximately 1,800 feet (550 m) from the proposed turbine power block. Sound levels at this residence would be approximately 55 dBA. At a distance approximately 4 miles from the turbine power blocks, sound levels would attenuate to approximately 35 dBA.

For comparison, noise levels in a quiet rural area at night are typically between 32 and 35 dBA, and quiet urban night-time noise levels range from 40 to 50 dBA. Noise levels during the day in a noisy urban area are frequently as high as 70–80 dBA. Noise levels higher than 80 dBA over continuous periods can result in hearing loss, whereas noise levels above 110 dBA become intolerable and then painful. Based on a 1974 EPA press release titled, *EPA Identifies Noise Levels Affecting Health and Welfare*, a 24-hour exposure level of 70 dB (or less) will prevent any measureable hearing loss over a lifetime (Giampaolo 1974).

Ground- and airborne-induced vibration from operation of the Proposed Project would not affect the local area. The Proposed Project would be driven primarily by turbines exhausted into a selective catalytic reduction duct. These very large ducts greatly reduce low-frequency noise, which is mainly the source of airborne-induced vibration of structures. The equipment that would be used in the Proposed Project is well balanced and is designed to produce very low vibration levels throughout the life of the Proposed Project. An imbalance could contribute to ground vibration levels near the equipment. However, vibration-monitoring systems installed in the equipment are designed to ensure that the equipment remains balanced. Should an imbalance occur, the event would be detected and the machines would automatically shut down.

Although noise from the construction and operational activities associated with the facility would be perceptible to humans and wildlife to some extent immediately adjacent to the facility, for areas closer to the site (i.e., the boundary of the Plant Site), the expected sound pressure level would be 60–70 dBA, which can be compared to the sound pressure levels of normal conversational speech. The expected sound pressure level at the nearest NSA can be compared to the sound pressure in a quiet office building. Therefore, no effect to wildlife is expected to result from construction or operation of the proposed facility.

5. BACKGROUND INFORMATION

This section provides applicable environmental characteristics for the general region, including the Action Area, in which the Proposed Project is located.

5.1. General Region Information

The Action Area is located at the junction of several ecoregions including four Level III ecoregions: Central Great Plains, Edwards Plateau, High Plains, and the Southwestern Tablelands. Specifically, the Action Area is located within the Llano Estacado; Arid Llano Estacado; Caprock Canyons, Badlands, and Breaks; Flat Tablelands and Valleys; Red Prairie and Semiarid Edwards Plateau Level IV ecoregions (Griffith et al. 2004). The Llano Estacado is an elevated plain surrounded by escarpments on three sides, whereas the Arid Llano Estacado is a drier transitional ecoregion from the Trans-Pecos to the southwest. The Trans-Pecos topography is more broken with fewer playas than the ecoregions to the north. The Caprock Canyons, Badlands, and Breaks ecoregion covers the broken country that extends east of the High Plains. The topography and climate within this ecoregion creates frequent thunderstorms and tornados, and the vegetation is diverse depending on what topographic features are present. These topographic features include escarpments, slopes, flat valley floors, and riparian corridors. The Flat Tablelands and Valleys Ecoregion include pockets of flat areas between prominent buttes, badlands, and escarpments of the tablelands. This ecoregion occurs in the transition zone between a subhumid to semiarid climate. The Red Prairie ecoregion is described as a topographic transition that creates a shallow trough between the High Plains to the west and the rugged topography of the Cross Timbers to the east and Edwards Plateau to the south. There is slightly more precipitation in this ecoregion than the High Plains but the primary vegetation remains prairie grasslands. The Semiarid Edwards Plateau ecoregion, which supports primarily intermittent streams and arid-land trees, shrubs, and short grasses, is slightly drier than the rest of the Edwards Plateau.

5.2. Land Use

The land use in the Action Area primarily supports shrub/scrub land (1,737 square miles [57%]), followed by grasslands (696 square miles [23%]), cultivated crops (457 square miles [15%]), and open space development (120 square miles [4%]). The remaining land use in the Action Area comprises low intensity development, deciduous forest, open water, barren land, medium intensity development, mixed forest, woody wetlands, high intensity development, emergent herbaceous wetlands, and pastureland (Griffith et al. 2004). I-20 and the closest town of Westbrook are located approximately 3 miles north of the Plant Site. Several other small towns and cities are in the Action Area, including Colorado City and Roscoe east of the Plant Site, Coahoma and Big Spring to the west, and Snyder to the north. Cultivated fields and pastureland exist directly adjacent to the Plant Site and oil and gas wells exist west of the Plant Site. Cultivation in Mitchell County may include cotton (*Gossypium hirsutum*), sorghum (*Sorghum bicolor*), and various species of hay, grains, and wheat, whereas rangeland activities may include production of cattle, horses, hogs, sheep, and poultry (Handbook of Texas Online 2013).

Two state parks are located in the Action Area: Lake Colorado City State Park approximately 2.5 miles east and Big Spring State Park approximately 27.5 miles west of the Plant Site. Several other recreational venues exist in the Action Area, including municipal parks, stadiums, sports complexes, and playgrounds associated with schools. Several reservoirs and lakes are in the Action Area, including Lake Colorado City, Champion Creek Reservoir, Mitchell County Reservoir, Red Draw Lake, E.V. Spence Reservoir, and Lake J.B. Thomas.

5.3. Climate

Temperatures identified at the closest meteorological station, Colorado City in Mitchell County, are typical of semiarid, hot climates, ranging from the high 30s degrees Fahrenheit (°F) during the winter to the high 80s°F during the summer (Natural Oceanic and Atmospheric Association [NOAA] 2012a). The average temperature during the winter months is 44.8°F, and the average daily minimum temperature is 31.4°F. During the summer months, the average temperature is 81.3°F, and the average daily maximum temperature is 93.2°F. Although historical wind data are not available for Colorado City, the prevailing winds in the surrounding areas are primarily from the south/southwest with some exceptions from the north in January and February. The average wind speed is highest in March, April, and May with an average of 13–15 miles per hour (NOAA 1998). The average relative humidity is approximately 44%, with high discomfort from heat during the summer months (June through August) (NOAA 2012b). The maximum UV index identifies high levels during the summer months (May through September) with an index of 7–9 and lower levels ranging from 2 to 6 in the remaining months (EPA 2012). Precipitation in the region is low to medium, with rainfall totaling approximately 20 inches per year on average (NOAA 2012a).

5.4. Topography

The landscape in the Action Area varies greatly due to the numerous unique geologic formations. Topography is relatively flat to gently rolling in the Central Great Plains and High Plains with increasingly steep hillsides and slopes in the Edwards Plateau to the south and southwest. The rough terrain of the Southwestern Tablelands in the northern portion of the Action Area includes broad, rolling plains broken up by elevated tablelands with red-hued canyons, mesas, badlands, gorges, and dissected river breaks. Topography in the Action Area ranges from approximately 1,890 to 3,170 feet above mean sea level (amsl) and drains generally to the southeast toward the Colorado River.

5.5. Geology

Most of the surface geology in the Action Area consists of the Dockum Group, undivided (TRd) (34%); Ogallala Formation (PoMo) (14%); Edwards Limestone (Ked) (13%); and Quaternary deposit, undivided (Qu) (11%). The parent material in the Dockum Group, undivided rock unit is fine-grained mixed clastic, and the secondary material is limestone. The parent material in both the Ogallala Formation and the Quaternary deposit, undivided rock unit is sand with a secondary material of silt. The Edwards Limestone rock unit is primarily limestone with a secondary material of dolostone (dolomite) (Bureau of Economic Geology 1974, 1976).

Other rock units in the Action Area include smaller sections of the Lingos Formation (Qli); Blackwater Draw Fromation (Qbd); Sand sheet deposits (Qs); Alluvium (Qal); Quartermaster Formation (Pq); Antlers Sand (Ka); Whitehorse Group, undivided (Pwh); Terrace deposits (Qt); Sand deposits, undivided (Qsu); and Playa deposits (Qp).

5.6. Soils

Twenty-five soil series or complexes are identified as occurring in the Action Area (NRCS 2013a–h) (Table 4). The Vernon-Stamford-Sagerton complex comprises the largest percentage of soil types in the Action Area. The Vernon series comprises moderately deep, well-drained but slowly permeable soils that occur on gently sloping to steep plains (NRCS 2013j). The Stamford series has the same soil characteristics as the Vernon series but was formed in reddish calcareous clay and occurs on uplands with

slopes ranging from 0% to 5% (NRCS 2013k). The Sagerton series, the third portion of the largest complex, consists of very deep, well drained, moderately slowly permeable soils that formed in calcareous loamy alluvium and are found on the gently slopes of alluvial plains (NRCS 2013l).

The Miles-Cobb complex comprises the next largest percentage of the Action Area with 12.5% of the acreage. The Miles series shares the Sagerton series characteristics of depth, drainage, and permeability but occurs on uplands with a wider slope range between 0% and 8% (NRCS 2013m). The Cobb series consists of moderately deep well-drained, moderately permeable soils, which are derived from sandstone and are found on ridges with slopes from 0% to 8% (NRCS 2013n).

The soil series that comprises the third largest percentage in the Action Area is the Rowena series. It also shares the depth, drainage, and permeability traits of the Sagerton series but occurs on upland plains with very gentle slopes between 0% and 3% (NRCS 2013o). The Rowena soil series was formed in calcareous loamy and clayey sediments. Table 5 provides the soil series within the Action Area.

Table 5. Soil series within the Action Area

Series Name	Area (acre)	Percentage of Total Action Area
Vernon-Stamford-Sagerton	359,854	18.1
Miles-Cobb	248,075	12.5
Rowena	205,235	10.3
Ector-Angelo	184,223	9.3
Potter-Mansker	123,594	6.2
Sagerton-Potter	112,708	5.7
Spur-Mereta-Angelo	99,034	5.0
Cho-Angelo	86,231	4.3
Amarillo	73,515	3.7
Sagerton-Rowena-Bukreek	73,443	3.7
Oplin	68,000	3.4
Sagerton-Nuvalde-Cho	66,384	3.3
Rowena-Olton-Estacado-Acuff	65,493	3.3
Veal-Rowena-Potter	50,410	2.5
Spade-Rock outcrop-Miles-Knoco	42,312	2.1
Tivoli-Miles-Heatly	39,470	2.0
Reagan-Mereta-Conger-Angelo	33,239	1.7
Sagerton-Miles-Colorado-Bukreek	19,828	1.0
Circleback-Brownfield-Amarillo	13,802	0.7
Woodward-Quinlan-Paducah	7,490	0.4
Rioconcho-Dev-Broome-Angelo	5,134	0.3
Miles	3,941	0.2
Water	2,73	0.1
Valera-Tobosa-Mereta-Kavett	2,614	0.1

Table 5. Soil series within the Action Area

Series Name	Area (acre)	Percentage of Total Action Area
Patricia-Jalmar-Amarillo	623	0.0
Total	**1,987,358**	**100**

5.7. Water Resources

The ecoregions in the Action Area are diverse and have various sources of hydrology; overall the area is semiarid to arid. The Central Great Plains receive slightly more precipitation than the arid High Plains to the west. The Edwards Plateau receives slightly more precipitation than the Central Great Plains, and surface water includes a sparse network of perennial streams with plentiful underground drainage due to karst topography. The Southwestern Tablelands ecoregion receives minimal rainfall, which results in sub-humid grassland and semiarid rangeland with mainly ephemeral and intermittent streams.

The Action Area is located within the following watersheds of the Colorado and Brazos River Basins: Colorado Headwaters, Beals, Upper Colorado, Upper Clear Fork-Brazos, North Concho, Double Mountain Fork-Brazos, Mustang Draw, and Sulpher Springs Draw. Named reservoirs exist along the Colorado River, Morgan Creek, and Champion Creek. The following perennial streams and/or rivers are identified in the NHD: Colorado River, North Concho River, Beals Creek, Bull Creek, Canyon Creek, Champion Creek, Deep Creek, Hackberry Creek, Hullem Creek, Little Sulpher Creek, Lone Wolf Creek, Morgan Creek, North Fork Champion Creek, Powell Creek, South Fork Champion Creek, and Sulpher Creek. Additionally, small unnamed ephemeral and intermittent streams, artificial canals, intermittent and perennial ponds exist throughout the Action Area. Based on NWI data, several wetland features also occur throughout the Action Area; however, because of access restrictions, a detailed assessment of the waterbody features could only be conducted in the Project Area.

Based on the field reconnaissance and review of the National Hydrography Dataset (NHD), only one waterbody exists within the Plant Site. It is considered to be an upland constructed waterbody that receives agricultural runoff. There is no off-site connection to jurisdictional waters from this waterbody and in SWCA's professional opinion, no waters of the U.S. are present within the Plant Site. Figure 6 provides the location of this non-jurisdictional waterbody.

No water features were identified along the Process Water Disposal Pipeline alignment. There are 11 NHD-identified waterways that cross the proposed Natural Gas Pipeline alignment. All of these drainages along the Natural Gas Pipeline alignment appeared to be ephemeral and dry at the time of the November 2013 inspection, with the exception of Beals Creek, which appeared to retain water. A detailed jurisdictional determination would need to be conducted once full land access has been granted to FGE and its vendor, Enterprise. FGE has made assurances that open-cut trenching and/or boring of these water features will occur to ensure compliance with the general conditions under Clean Water Act (CWA) Nationwide Permit 12 for Utility Lines. Figure 6 provides the locations of these NHD-identified waterways along the Natural Gas Pipeline alignment..

The TCEQ 2010 *Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d)* (TCEQ 2010 Report) is a status update of state surface waters that is prepared and submitted to the EPA every 2 years. The report addresses water impairments, such as bacteria, dissolved oxygen, metals, pH, nutrients, biological uses, etc. TCEQ assigns each waterbody to one of five assessment categories based on water body characteristics, uses, pollutants, and criteria consistent with the Texas Water Quality Standards. The

Figure 6. Waterbody Features in the Action Area.

TCEQ classifies a water as impaired when included in Category 4 or 5. The TCEQ 2010 report includes data on the North Concho River, Lake Colorado City, Depp Creek, E.V. Spence Reservoir, Colorado River below J.B. Thomas, Beals Creek, and Lake J.B. Thomas (TCEQ Segment IDs 1425A, 1412A, 1412C, 1411, 1412, 1412B, and 1413, respectively), which are all in the Action Area[4]. The E.V. Spence Reservoir, Colorado River below Lake J.B. Thomas, Beals Creek, and Lake J.B. Thomas have impairment categories of either 4 or 5.

According to the Federal Emergency Management Agency (FEMA) flood insurance rate map, the Project Area lies in areas of minimal flooding or Zone C (FEMA 2012). Land around creeks and reservoirs within the Action Area occurs within the 100-year floodplain in which base flood elevations and flood hazard factors are not determined (Zone A) (FEMA 2012).

Digital, analyzable USFWS National Wetland Inventory (NWI) data were unavailable, but overall, the regional geomorphology and climate are not conducive for the development of large palustrine wetland systems. A review of digitally scanned NWI maps in the Action Area suggests wetlands are limited primarily to palustrine (i.e., freshwater) riverine classes, narrow fringe systems along the perimeter of waterways and impoundments, and open water stock tanks.

5.8. Vegetation

Most of this region in Texas has been altered from its native grassland and shrubland habitat into urban oil and gas production, cropland, or rangeland uses. Most of the Action Area falls within the crops vegetation community (32%), which consists of cultivated crops or row crops that provide food and/or fiber for humans and domestic animals. This vegetation community also includes grasslands associated with crop rotations.

Other vegetation communities covering much of the Action Area include Mesquite-Lotebush Brush (17%), Mesquite-Juniper Brush (16%), Mesquite Shrub (14%), and Mesquite-Lotebush Shrub (5%). The Mesquite-Lotebush Brush and Mesquite-Lotebush Shrub vegetation communities are associated with yucca (*Yucca*), skunkbush sumac (*Rhus trilobata*), agarito (*Mahonia trifoliolata*), elbowbush (*Forestiera pubescens*), Ashe juniper (*Juniperus asheii*), Christmas cactus (*Opuntia leptocaulis*), cane bluestem (*Bothriochloa barbinodis*), silver bluestem (*Bothriochloa saccharoides*), little bluestem (*Schizachyrium*), sand dropseed (*Sporobolus cryptandrus*), Texas grama (*Bouteloua regidiseta*), sideoats grama (*Bouteloua curtipendula*), hairy grama (*Bouteloua hirsuta*), red grama (*Bouteloua trifida*), tobosagrass (*Pleuraphis mutica*), buffalograss (*Bouteloua dactyloides*), Texas wintergrass (*Nassella leucotricha*), purple threeawn (*Aristida purpurea*), Engelmann daisy (*Engelmannia peristenia*), broom snakeweed (*Gutierrezia sarothrae*), and bitterweed (*Picris sprengeriana*). The Mesquite-Juniper Brush vegetation community that occurs in the western Edwards Plateau is associated with Lotebush (*Ziziphus obtusifolia*), shin oak (*Quercus havardii*), sumac (*Rhus* sp.), Texas pricklypear (*Opuntia engelmanni*), Christmas cactus, kidneywood (*Eysenhardtia texana*), agarito, redbud (*Cercis canadensis*), yucca, Lindheimer silktassel (*Garrya ovata* spp. *lindheimeri*), sotol (*Dasylirion texanum*), catclaw acacia (*Acacia greggii*), Texas persimmon (*Diospyros texana*), sideoats grama, threeawn (*Aristida* sp.), Texas grama, hairy grama, curly mesquite (*Hilaria belangeri*), buffalograss, and hairy tridens (*Tridens pilosum*). The Mesquite Shrub vegetation community is associated with narrowleaf yucca (*Yucca angustissima*), Christmas cactus, ashe juniper, grassland pricklypear (*Opuntia cymochila*), cholla (*Cylindropuntia* sp.), blue grama, hairy grama, purple threeawn, buffalograss, little bluestem, western wheatgrass (*Pascopyrum smithii*), Indiangrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), James rush-pea (*Pomaria jamesii*), scurfpea (*Cullen*), lemon scurfpea (*Psoralidium lanceolatum*), plains beebalm (*Monarda pectinata*), scarlet gaura

[4] For more information, The Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d) is compiled and published on the TCEQ Web site page at: http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/10twqi

(*Gaura coccinea*), yellow evening primrose (*Calylophus serrulatus*), sand sage (*Artemisia filifolia*), and wild buckwheat (*Polygonum convolvulus*).

Other vegetation communities occurring in the remaining 16% of the Action Area include small sections of Mesquite Brush, Mesquite-Juniper-Live Oak Brush, Havard shin Oak-Mesquite Brush, Juniper, Mesquite-Hackberry Brush/Woods, Havard Shin Oak Brush, Water, Urban, and Mesquite-Saltcedar Brush/Woods (McMahan et al. 1984).

5.9. Wildlife

Several species of wildlife exist in the Southwestern Tablelands ecoregion. Common terrestrial species in this area include, but are not limited to white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), ringtail cat (*Bassariscus astutus*), nine-banded armadillo (*Dasypus novemcinctus*), javelina (*Pecari tajacu)*, feral hog (*Sus scrofa*), gray fox (*Urocyon cirereoargenteus*), red fox (*Vulpes vulpes*), Virginia opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), nutria (*Myocastor coypus)*, eastern cottontail rabbits (*Sylvilagus floridanus*), desert cottontail rabbit (*Sylvilagus audubonii*), and striped skunk (*Mephitis mephitis*) (Griffith et al. 2007).

SWCA is not aware of any bird surveys that have been conducted specifically in the Action Area. Bird species expected to occur commonly either on a permanent or seasonal basis were identified through review of the Texas breeding bird survey results (Sauer et al. 2011), the locations of which are approximately 20 miles south and 36 miles northeast, respectively, of the proposed Action Area. In addition, SWCA reviewed the Big Spring Christmas Bird Count (National Audubon Society 2011), and the *TOS Handbook of Texas Birds* (Lockwood and Freeman 2004). Based on this review, birds expected to occur commonly year-round in the Action Area include northern bobwhite (*Colinus virginianus*), red-tailed hawk (*Buteo regalis*), mourning dove (*Zenaida macroura*), great-horned owl (*Bubo virginianus*), ladder-backed woodpecker (*Picoides scalaris*), western kingbird (*Tyrannus verticalis*), scissor-tailed flycatcher (*Tyrannus forficatus*), loggerhead shrike (*Lanius ludovicianus*), chihuahuan raven (*Corvus cryptoleucus*), cliff swallow (*Petrochelidon pyrrhonota*), American robin (*Turdus migratorius*), northern mockingbird (*Mimus polyglottos*), curve-billed thrasher (*Toxostoma curvirostre*), eurpoean starling (*Sturnus vulgaris*), lark sparrow (*Chondestes grammacus*), northern cardinal (*Cardinalis cardinalis*), red-winged blackbird (*Agelaius phoeniceus*), meadowlark (*Sturnella* sp.), great-tailed grackle (*Quiscalus mexicanus*), brown-headed cowbird (*Molothrus ater*), house finch (*Carpodacus mexicanus*), and house sparrow (*Passer domesticus*).

Migratory species expected to be common winter residents in the Action Area include Canada goose (*Branta canadensis*), gadwall (*Anas strepera*), American wigeon (*Anas americana*), mallard (*Anas platyrhynchos*), northern shoveler (*Anas clypeata*), northern pintail (*Anas acuta*), green-winged teal (*Anas carolinensis*), canvasback (*Aythya valisineria*), lesser scaup (*Aythya affinis*), bufflehead (*Bucephala albeola*), ruddy duck (*Oxyura jamaicensis*), northern harrier (*Circus cyaneus*), ferruginous hawk (*Buteo regalis*), American kestral (*Falco sparverius*), American coot (*Fulica americana*), killdeer (*Charadrius vociferus*), least sandpiper (*Calidris minutilla*), ring-billed gull (*Larus delawarensis*), rock pigeon (*Columba livia*), greater roadrunner (*Geococcyx californianus*), northern flicker (*Colaptes auratus*), ruby-crowned kinglet (*Regulus calendula*), yellow-rumped warbler (*Setophaga coronata*), spotted towhee (*Pipilo maculatus*), vesper sparrow (*Pooecetes gramineus*), lark bunting (*Calamospiza melanocorys*), savannah sparrow (*Passerculus sandwichensis*), white-crowned sparrow (*Zonotrichia leucophrys*), dark-eyed junco (*Junco hyemalis*), pyrrhuloxia (*Cardinalis sinuatus*), brewer's blackbird (*Euphagus cyanocephalus*), pine siskin (*Spinus pinus*), and American goldfinch (*Spinus tristis*).

The Action Area is located in the Central Flyway (USFWS undated). This position creates potential for a great number of migratory bird species that neither breed nor winter in the Action Area to occur in the area on a regular or irregular basis during the spring and fall migration periods. Regular migrants through the Action Area likely include spotted sandpiper (*Actitis macularia*), lesser yellowlegs (*Tringa flavipes*), upland sandpiper (*Bartramia longicauda*), olive-sided flycatcher (*Contopus cooperi*), and tree swallow (*Tachycineta bicolor*), among others.

6. LISTED SPECIES HABITAT EVALUATION

6.1. Summary of Listed Species

The USFWS and TPWD maintain the lists of listed species and the critical habitat that is designated in each Texas county. These species are currently listed as endangered under the ESA (16 USC 1531 et seq.). TPWD frequently designates federally listed species in a county that are not necessarily on the USFWS list. Although preference is made to USFWS-identified species for each county, it is not to be used as the sole and final source for identifying species that may be impacted by a Proposed Project. Therefore, those federally listed species that TPWD designated as occurring in the 9-county Action Area are also addressed. The six endangered species evaluated in this BA were based on the USFWS and TPWD lists for all counties listed (USFWS 2013b; TPWD 2013a–i). The USFWS and TPWD ESA species lists are provided in Appendix B and a summary of the listed species evaluated in this BA is presented in Table 6.

Table 6. Federally Listed Species in the 9-County Action Area as Identified by USFWS and TPWD

Common Name	Scientific Name	Federal Status	State Status	Borden County	Coke County	Fisher County	Glasscock County	Howard County	Mitchell County	Nolan County	Scurry County	Sterling County
Birds												
Black-capped vireo	Vireo atricapilla	E	E	–	S/F	–	–	–	–	S/F	–	S/F
Interior least tern	Sterna antillarum athalassos	E	E	S	S	–	–	S	S	–	S	–
Whooping crane	Grus americana	E	E	S	S	S	S	S	S	S	S	S
Flowering Plants												
Texas poppy-mallow	Callirhoe scabriuscula	E	E	–	S/F	–	–	S	S/F	–	S	–
Mammals												
Black-footed ferret	Mustela nigripes	E	N/A	S	-	S	S	S	S	S	S	S
Gray wolf	Canis lupus	E	E	S	S	S	S	S	S	S	S	S

Notes: E = Endangered; N/A = Not considered a state-listed species; S = TPWD (state) listed this species as occurring or having the potential to occur in this county; F = USFWS (federal) listed this species as occurring or having the potential to occur in this county; – = Species not listed as occurring or having the potential to occur in this county.

Out of the six federally listed species addressed in this BA, only the TPWD lists the interior least tern (*Sterna antillarum athalassos*), whooping crane (*Grus americana*), black-footed ferret (*Mustela nigripes*), and gray wolf (*Canis lupus*) as having the potential to occur in Borden, Coke, Fisher, Glasscock, Howard, Mitchell, Nolan, Scurry, and Sterling Counties. The black-footed ferret and gray wolf are discussed briefly in this BA; however, for reasons provided below, these species will not receive detailed discussion herein.

The distribution of the black-footed ferret formerly extended over the northwestern third of Texas, in prairie dog towns of the Panhandle, Trans-Pecos, and Rolling Plains; however, this species is now extirpated from Texas. The last records of black-footed ferrets occurring in Texas were from Dallam County in 1953 and Bailey County in 1963 (Schmidly 2013). Because this species is extirpated from Borden, Coke, Fisher, Glasscock, Howard, Mitchell, Nolan, Scurry, and Sterling Counties, the black-footed ferret is not discussed in further detail.

The distribution of the gray wolf formerly extended over the western two-thirds of Texas in forests, brushlands, and grasslands, but this species is now extirpated in Texas. The last record of gray wolf occurring in Texas was 1970 (Schmidly 2013). All reintroduced populations are classified as experimental and nonessential, not endangered; however, no reintroduced populations occur in the nine counties of the Action Area. Because this species is extirpated from Borden, Coke, Fisher, Glasscock, Howard, Mitchell, Nolan, Scurry, and Sterling Counties, the gray wolf is not discussed in further detail.

The remaining four species in Table 5 are federally and state-listed as endangered with the potential to occur in the Action Area. As designated by the USFWS and TPWD, the black-capped vireo (*Vireo atricapilla*) has potential to occur in Coke, Nolan, and Sterling Counties. The interior least tern is designated by TPWD as having potential to occur in Borden, Coke, Howard, Mitchell, and Scurry Counties. The whooping crane is the only listed species with potential to occur in each county within the Action Area as designated by TPWD. The only listed flowering plant, the Texas poppy-mallow (*Callirhoe scabriuscula*), is designated by TPWD as having the potential to occur in Coke, Howard, Mitchell, and Scurry Counties and by USFWS as having potential to occur in Coke and Mitchell Counties.

6.2. Critical Habitat Designation

The USFWS designates critical habitat for ESA-listed species to aid in the recovery of those species. The USFWS Critical Habitat Portal was accessed to determine whether any designated critical habitat for ESA-listed species occurs in the Action Area. The results reveal that no designated critical habitat is present in the Action Area. The closest area of designated critical habitat is more than 117 miles southwest of the Action Area and is designated for the Leon Springs pupfish (*Cyprinodon bovinus*), Pecos assiminea snail (*Assiminea pecos*), and Pecos sunflower (*Helianthus paradoxus*) along Leon Creek in Pecos County, Texas (USFWS 2013c).

6.3. Descriptions of Listed Species

A brief description, including listing status, life history, habitat requirements, population status, and current and historical range information, of the remaining four federally listed species are described below. Known occurrences identified from the literature and TPWD NDD review as well as suitable habitat locations are identified in Figure 7.

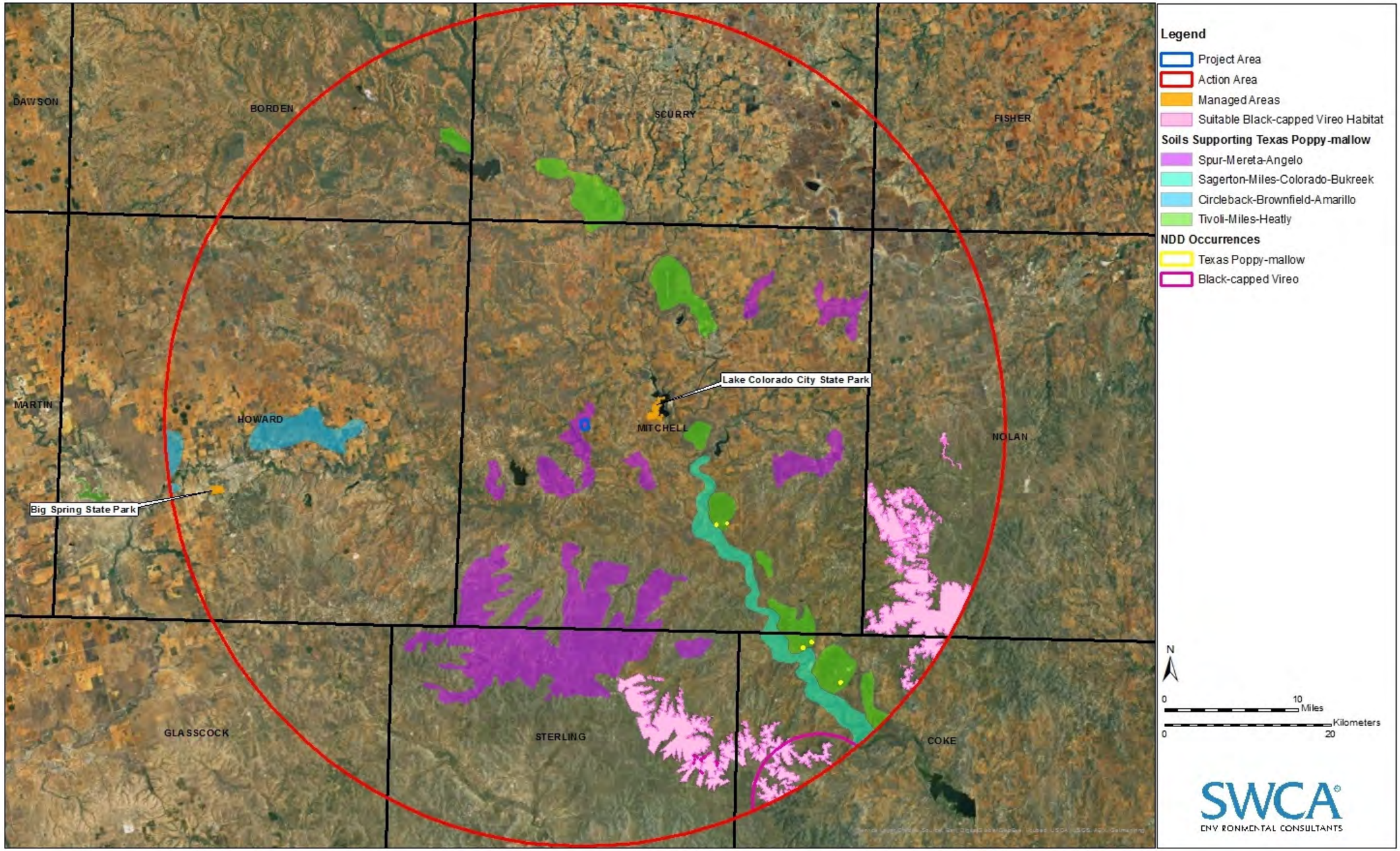

Figure 7. Known or Possible Habitat Locations for Listed Species Evaluated in the Biological Assessment.

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6.3.1. Black-capped Vireo

The black-capped vireo was federally listed as endangered in 1987 (52 *Federal Register* 37420), and no critical habitat has been designated for this species. In Texas, the black-capped vireo breeds primarily in the Cross Timbers, Edwards Plateau, and the Trans Pecos regions of the state (USFWS 1991; Grzybowski 1995; Farquhar and Gonzalez 2005) and arrives on its breeding grounds in late March or early April. This species winters primarily on the pacific slope of Mexico, mostly from southern Sonora south to Guerrero (Grzybowski 1995).

Typical breeding habitat for the black-capped vireo consists of mostly deciduous shrublands with woody vegetation of irregular height and distribution, with clusters of shrubs separated by narrow clearings (Grzybowski 1995). Larger trees may be present in areas occupied by black-capped vireos, although the canopy layer is typically open. Shrublands occupied by vireos usually, but not exclusively, develop on limestone substrates (Campbell 2003). Across most of the range of the species, vegetation used by black-capped vireos is an early successional habitat that develops in response to disturbance, especially fire (Graber 1961; Grzybowski 1995; Campbell 2003).

The total black-capped vireo population is unknown. Much of the range of the species in Texas and Mexico lies on privately held lands that have not been surveyed. black-capped vireo habitat is difficult to identify from satellite imagery or aerial photography because the shrubs that make up their habitat are difficult to discern from that distance. However, USFWS (2004) using Wilkins et al. (2006) and Maresh and Rowell (2000) estimate the total amount of potentially suitable black-capped vireo habitat present in Texas to be 1,450,438 acres. Populations of the black-capped vireo in Oklahoma and Texas appear to be increasing, and the Mexican population may be greater and distributed more widely than was thought at the time of listing.

SWCA reviewed the Action Area during the site reconnaissance. No suitable black-capped vireo habitat was observed in the Project Area and no USFWS or TPWD NDD records of black-capped vireo are reported in Mitchell County. However, three southeastern counties in the Action Area (Coke, Nolan, and Sterling) are within the breeding range of the black-capped vireo. Additionally, the USFWS and the TPWD NDD have records of black-capped vireo occurrences in the Action Area in two of these counties (Coke and Sterling; Figure 7). USFWS and TPWD do not have records in any of the other counties in the Action Area (Borden, Fisher, Glasscock, Howard, and Scurry). Based on the TPWD NDD results, SWCA's knowledge with the vegetation and landscape of this region, and review of aerial photography, suitable black-capped vireo habitat in the Action Area was delineated and displayed on Figure 7. All suitable habitat remains in the three southeastern counties of the Action Area that are within the black-capped vireo breeding range.

6.3.2. Interior Least Tern

Interior least tern was listed as endangered by the USFWS in 1985. Least terns are the smallest of North American terns, averaging 8–10 inches in length, and breeding adults are characterized by gray above and white below, black cap, black nape and eye strip, white forehead, yellow bill with a dark tip, and yellow to orange legs. Least terns feed on small fish and invertebrates in shallow waters near their breeding colony (TPWD 2012a).

There are three subspecies of least terns recognized in the United States, which are differentiated by their separate breeding ranges. The interior least tern breeds along the Missouri, Mississippi, Colorado, Arkansas, Red, and Rio Grande River systems, and at reservoirs around San Angelo in Tom Green County, Lake Amistad in Val Verde County, and Falcon Reservoir in Zapata County, Texas (Lockwood

and Freeman 2004; TPWD 2012a). The interior least tern prefers nesting on sandbars, islands, salt flat, and bare or sparsely vegetated sand, shell, and gravel beaches associated with braided streams, rivers, and reservoirs. As these optimal nesting sites disappear, least terns use human-made sites, such as sand and gravel pits, wastewater treatment plants, and inland beaches (TPWD 2011, 2012a).

The interior least tern is not listed by USFWS as occurring in any of the counties in the Action Area, but the species is listed by TPWD as occurring in Borden, Coke, Howard, Mitchell, and Scurry Counties.

6.3.3. Whooping Crane

The whooping crane, which is the tallest bird in North America, was listed by USFWS as endangered in 1967 (USFWS 1967). The greatest threats to the whooping crane are human made and include power lines, illegal hunting, and habitat loss (TPWD 2012b). Whooping cranes prefer coastal salt marshes in their wintering range in Texas.

The whooping crane overwinters in the Aransas National Wildlife Refuge in Aransas County, Texas, with regular occurrences in Matagorda, Refugio, Calhoun, Aransas, Williamson, San Patricio, Maverick, and Caldwell Counties. The entire whooping crane migratory corridor encapsulates 95% of all sightings and spans approximately 106 counties across Texas (USFWS 2013d). The USFWS does not include the whooping crane on the threatened and endangered species list for Mitchell County because Mitchell County is outside of the whooping crane migration corridor. The migration corridor is approximately 56 miles east of the Action Area, the most western extent of which lies in Callahan and Jones Counties. The likelihood of observing a whooping crane outside of this corridor is extremely rare. The closest sighting of a whooping crane outside the migration corridor is approximately 17 miles northwest of the Action Area in Dawson County in 2001, followed by another sighting in 1993 approximately 32 miles west of the Action Area in Martin County. No whooping cranes have been documented in any of the counties in the Action Area. However, in the event a whooping crane could occur outside this corridor in these nine counties (e.g., significant storm that blows birds off-course), SWCA reviewed the Action Area and determined that the wetland and vegetation characteristics do not support preferred habitat required by the species.

6.3.4. Texas Poppy-mallow

The Texas poppy-mallow is an annual flowering plant that was listed as endangered by the USFWS in 1981 (USFWS 1981). The primary threat to the existence of this species is habitat destruction due to farming, grazing, sand mining, urban development, and collection. The ESA does not prohibit take of a plant, and because the Texas poppy-mallow is threatened by its collection, the Secretary of the USFWS determined it would be more detrimental to the plant if critical habitat was designated for this species (USFWS 1981).

Texas poppy-mallow is found in grasslands and open oak shrublands or mesquite woodlands of the Rolling Plains and its distribution is limited to a small area of deep, loose sands blown from alluvial deposits along the Colorado River. The soils that support the plant's habitat are Tivoli-Brownfield fine sands of the Spur-Colorado-Miles soil association (Weidenfeld et al. 1970 as cited in Amos 1985). Texas poppy-mallow is endemic to the upper Colorado River watershed in Coke, Mitchell, and Runnels Counties. According to the TPWD NDD, the nearest known populations of Texas poppy-mallow were documented in 1987 in southern Mitchell County approximately 12 miles southeast of the Project Area (Figure 7). Additionally, the NDD also has occurrence records in the Action Area in northwestern Coke County, approximately 22 and 27 miles to the southeast of the Project Area. The Texas poppy-mallow could exist in the following soil series with the Action Area: Tivoli-Miles-Heatly, Circleback-Brown-Amarillo, Sagerton-Miles-Colorado-Bukreek, and Spur-Mereta-Angelo. These soil associations exist in all counties in the Action Area aside from Fisher and Glasscock (Figure 7). However, all five known

occurrences in the Action Area appear to be consistently supported by the Tivoll-Miles-Heatly soil map unit (Figure 7).

6.4. Texas Natural Diversity Database Results

The results of the Texas NDD records review for Borden, Coke, Fisher, Glasscock, Howard, Mitchell, Nolan, Scurry, and Sterling Counties were received from the TPWD on November 8, 2012, and again on April 17, 2013. No elements of occurrence (EOs) are located in the Project Area; however, there are several EOs in the Action Area. Two EOs of the Texas poppy-mallow are located 12 miles southeast of the Project Area in Mitchell County. Three additional EOs for the Texas poppy-mallow are located in Coke County, approximately 22 and 27 miles southeast of the Project Area. These EOs were documented from 1987 to 1990.

Twenty EO locations for the black-capped vireo are located approximately 27 miles south-southeast of the Project Area in Sterling County. These occurrences were collectively documented in 2006. A separate EO for the black-capped vireo was documented in 1977 approximately 29 miles southeast of the Project Area.

One rookery EO was listed as occurring approximately 27 miles southeast of the Project Area in Coke County, Texas. This rookery supports numerous bird species that are protected through provisions of the MBTA.

6.5. Listed Species Habitat Evaluation

Results of both the field survey data obtained on March 25, 2013, and information obtained through the detailed desktop review as described in Section 3 (Methodology) were used to prepare this evaluation. The following sections describe the vegetation communities observed in the Action Area and the analysis of the potential for species addressed in this BA to occur in the Action Area.

6.5.1. Vegetation Communities Observed

McMahan et al. (1984) classified the Action Area primarily as various mesquite communities (68%) and the crops vegetation community (32%). In addition, this area is classified as Semi-desert grassland by Brown et al. (2007). The March 25, 2013 field reconnaissance verified these communities in more detail. The vast majority of the Project Area is cultivated and contained either agricultural vegetation or bare ground (see Appendix A, Photo A-2). Areas lacking agricultural vegetation in the crops vegetation community are dominated by Bermuda grass (*Cynodon dactylon)*, common ragweed (*Ambrosia artemisiifolia*), false garlic (*Allium* spp.), common yellow mustard (*Brasicca compestriss*), milk thistle (*Silybum marianum*), wandering vetch (*Vicia peregrina*), and buttercup (*Ranunculus sceleratus*). It was observed that the shrubland areas bordering croplands were dominated by black willow (*Salix nigra*), salt cedar (*Tamarix* spp.), Russian thistle (*Salsola* spp.), honey mesquite, Chinese tallow (*Triadica sebifera*), and false willow (*Baccharis neglecta*).

6.5.2. Evaluation of Occurrence

6.5.2.1. BLACK-CAPPED VIREO

The three southeastern counties in the Action Area (Coke, Nolan, and Sterling) are in the breeding range of the black-capped vireo and have been known to support black-capped vireos and their habitat. Additionally, the USFWS and the TPWD NDD have records of black-capped vireo occurrences in Coke

and Sterling Counties, confirming the quality of habitat is (or once was) suitable for black-capped vireo occupation (Figure 7). The USFWS and TPWD do not have records in any of the other counties in the Action Area (Borden, Fisher, Glasscock, Howard, and Scurry), and based on review of aerial imagery and available literature, habitat in these counties do not appear to support black-capped vireo habitat.

Suitable black-capped vireo habitat in the Action Area was delineated and identified on Figure 7. The habitat delineation was based on the geologic formations in the area, aerial review of the surrounding vegetative characteristics, and known occurrences as documented by TPWD NDD. The delineated habitat patches are located approximately 26 miles to the south of the Plant Site in Sterling and Coke Counties and 26 miles to the southeast of the Plant Site in Nolan County. In addition, this potential habitat is located approximately 4 miles south of the proposed Natural Gas Pipeline alignment. Therefore, the black-capped vireo is known to occur in the Action Area.

6.5.2.2. INTERIOR LEAST TERN

The interior least tern is not listed by USFWS as occurring in any of the counties in the Action Area, but the species is listed by TPWD as occurring in Borden, Coke, Howard, Mitchell, and Scurry Counties. The interior least tern prefers nesting on bare or sparsely vegetated sand beaches and open areas associated with braided streams, rivers, and reservoirs. This type of habitat (i.e., bare grounds along braided streams and reservoirs) is absent from the Action Area. The nearest known habitat is 80 miles southeast of Action Area in near San Angelo in Tom Green County. Therefore, the interior least tern is unlikely to occur in the Action Area.

6.5.2.3. WHOOPING CRANE

None of the nine counties in the Action Area occur within the whooping crane migration corridor, which encompasses 95% of species' sightings, is 56 miles to the east of the Action Area. The likelihood of observing a whooping crane outside this corridor is extremely rare. The nearest sighting outside of the migration corridor is located 17 miles northwest of the Action Area in Dawson County. In the rare event a whooping crane could occur in the Action Area (e.g., significant storm that blows birds off-course), SWCA reviewed the Action Area and determined that the wetland and vegetation characteristics do not support preferred foraging habitat required by the species (i.e., salt flats or open expanses of herbaceous wetland). Therefore, the whooping crane is unlikely to occur in the Action Area.

6.5.2.4. TEXAS POPPY-MALLOW

The TPWD NDD indicates that the nearest known populations of Texas poppy-mallow were documented in 1987 in southern Mitchell County approximately 12 miles southeast of the Project Area (Figure 7), with three additional occurrences in northwestern Coke County, approximately 22 and 27 miles southeast of the Project Area. Therefore, the Texas poppy-mallow is known to occur in the Action Area.

The Texas poppy-mallow could exist in the following soil series in the Action Area: Tivoli-Miles-Heatly (2%), Circleback-Brownfield-Amarillo (0.7%), Sagerton-Miles-Colorado-Bukreek (1%), and Spur-Mereta-Angelo (5%). These soil associations make up 8.7% of the Action Area and exist in all associated counties aside from Fisher and Glasscock (Figure 7). However, all five known occurrences in the Action Area are consistently supported by the Tivoli-Miles-Heatly soil map unit (Figure 7), which makes up 2% of the Action Area and is absent from the Project Area. In addition, the Project Area has been either cultivated or parallels rural infrastructure and no Texas poppy-mallows were identified during the field reconnaissance visits on March 15 and November 7, 2013. In addition, as a designated non-federal representative of EPA, SWCA requested an informal consultation with USFWS for concurrence with our findings on the Texas poppy-mallow. On February 24, 2014, USFWS concurred with the findings that the

Texas poppy-mallow is unlikely to occur within the Project Area, including the Natural Gas Pipeline, because soils within the Project Area consist mainly of various clayey and loamy soil types, which are typically not associated with Texas poppy-mallow habitat. The Natural Gas Pipeline route does cross some areas of Spade fine sandy loams; however, Texas poppy-mallow has not been observed in these soils (USFWS 2014).

6.5.2.5. SUMMARY

Two of the federally listed species identified by USFWS and TPWD as occurring or having the potential to occur in Borden, Coke, Fisher, Glasscock, Howard, Mitchell, Nolan, Scurry, and Sterling Counties are also likely to occur in the Action Area. The black-capped vireo has the potential to be present in the southeastern portion of the Action Area in Coke, Nolan, and Sterling Counties, approximately 4 miles from a linear component of the Proposed Project and 26 miles from the Plant Site itself. The Texas poppy-mallow has the potential to be present in the central and southeastern portion of the Action Area in Mitchell and Coke Counties, the nearest of which is 12 miles southeast of the Plant Site. For the remaining two species, interior least tern and whooping crane, the Action Area is either outside the known geographic range or it does not contain the appropriate vegetation characteristics or landscape features known to support these species.

7. AIR QUALITY ANALYSIS RESULTS

7.1. Estimated Total Annual Emissions Overview

SWCA completed an analysis of estimated air pollutant emissions by the Proposed Project (SWCA 2013b). The analysis included estimated emissions from the following sources: four natural gas–fired combustion turbines, two induced draft mechanical wet cooling towers, two emergency diesel firewater pump engines, two emergency diesel electrical generator engines, two 1,250-gallon diesel storage tanks (one per firewater pump engine), two 2,000-gallon diesel storage tanks (one per electrical generator engine), two 19% aqueous ammonia tanks, and fugitive ammonia and natural gas emissions from piping components (SWCA 2013b). Table 7 presents the results of this air pollutant emissions analysis.

Table 7. Summary of Estimated Emissions for the Proposed Project

Emission Point	EPN/FIN	Air Contaminant Emission Rate (tpy)									
		NO_X	CO	SO_2	VOC	PM	PM_{10}	$PM_{2.5}$	NH_3	H_2SO_4	H_2CO
Gas combustion turbine (combined-cycle operation)	GT-1	87.54	68.57	9.20	74.36	71.83	71.83	71.83	110.38	8.45	1.30
Gas combustion turbine (combined-cycle operation)	GT-2	87.54	68.57	9.20	74.36	71.83	71.83	71.83	110.38	8.45	1.30
Gas combustion turbine (combined-cycle operation)	GT-3	87.54	68.57	9.20	74.36	71.83	71.83	71.83	110.38	8.45	1.30

Table 7. Summary of Estimated Emissions for the Proposed Project

Emission Point	EPN/FIN	Air Contaminant Emission Rate (tpy)									
		NO_X	CO	SO_2	VOC	PM	PM_{10}	$PM_{2.5}$	NH_3	H_2SO_4	H_2CO
Gas combustion turbine (combined-cycle operation)	GT-4	87.54	68.57	9.20	74.36	71.83	71.83	71.83	110.38	8.45	1.30
Cooling tower 1 (5 cells)	CT-1	–	–	–	–	24.39	1.09	1.09	–	–	–
Cooling tower 2 (5 cells)	CT-2	–	–	–	–	24.39	1.09	1.09	–	–	–
Emergency firewater pump engine	FWP-1	0.06	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	–	–	–
Emergency firewater pump engine	FWP-2	0.06	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	–	–	–
Emergency electrical generator engine	EG-1	0.51	0.07	<0.01	0.01	0.01	0.01	0.01	–	–	–
Emergency electrical generator engine	EG-2	0.51	0.07	<0.01	0.01	0.01	0.01	0.01	–	–	–
Fugitives: ammonia from selective catalytic reduction piping	FUG-NH3	–	–	–	–	–	–	–	3.85	–	–
Fugitives: natural gas	FUG-NGAS	–	–	–	0.58	–	–	–	–	–	–
Diesel storage tank 1	DIESEL-1	–	–	–	<0.01	–	–	–	–	–	–
Diesel storage tank 2	DIESEL-2	–	–	–	<0.01	–	–	–	–	–	–
Diesel storage tank 3	DIESEL-3	–	–	–	<0.01	–	–	–	–	–	–
Diesel storage tank 4	DIESEL-4	–	–	–	<0.01	–	–	–	–	–	–

Source: SWCA and Oris (2013).

7.2. Area of Impact Dispersion Modeling Results

Significance analysis dispersion modeling of air pollutant emissions was conducted by SWCA and Oris the Proposed Project (SWCA and Oris 2013). The following sections provide information related to the methods and results for the Proposed Project.

7.2.1. Dispersion Modeling Methods

The air quality analysis for the Proposed Project followed the *TCEQ Air Quality Modeling Guidelines – RG-25 (*TCEQ 1999a) and *TCEQ Modeling and Effects Review Applicability – APDEG 5874* (TCEQ

1999b). The EPA's American Meteorological Society/EPA Regulatory Model (AERMOD, version 11353) was used for this air quality analysis. Specific details of the modeling methodology will be submitted to TCEQ and copied to EPA under separate cover.

For this project, a PSD air quality analysis was triggered for the emissions of the following pollutants: NO_2, CO, particulate matter (PM), PM_{10}, $PM_{2.5}$, VOCs, and sulfuric acid (H_2SO_4) mist. PSD air quality dispersion modeling analyses are organized into two major subsections based on EPA modeling guidance: the significance analysis and the full impact analysis. In accordance with EPA guidance, the significance analysis considers the criteria pollutant emissions associated only with the Proposed Project to determine whether they would have a significant impact on the surrounding area. In the significance analysis, the modeled ground-level concentrations are compared with the corresponding SILs. A full impact analysis needs to be performed only if the significance analysis indicates that modeled ground-level concentrations for a particular pollutant and averaging period are greater than the applicable SIL. A full impact analysis is limited to those receptors where the significance analysis indicates that modeled ground-level concentrations are greater than the SILs ("significant receptors") due to emissions from the Proposed Project. If a full impact analysis is triggered, emissions from nearby sources are incorporated into the model, and monitored background concentration would be added to the modeling results as part of the ambient air quality impact assessment at the significant receptors. Note that this likely overestimates the ground-level concentrations of pollutants because emissions from nearby sources are included in the background levels, but in the modeling they are added to the background.

7.2.2. Dispersion Modeling Results

SWCA and Oris conducted dispersion modeling of air emissions for the Proposed Project (SWCA and Oris 2013). As presented within this modeling report, this analysis demonstrates the following:

- The Significant Impact Level (SIL) runs for carbon monoxide (CO), particulate matter less than 10 microns in diameter (PM10), and sulfur dioxide (SO2) and all receptors were below the SILs;
- The full impact analysis for 1-hour nitrogen dioxide (NO2) demonstrated that all significant receptors were below the 1-hour NO2 National Ambient Air Quality Standards (NAAQS);
- The full impact analysis for 24-hour and annual particulate matter less than 2.5 microns in diameter (PM2.5) demonstrated that all significant receptors were below the PM2.5 24- hour or annual NAAQS or increments;
- The required State Property Line analysis demonstrated that impacts from SO2 and sulfuric acid mist (H2SO4) were below the standards; and
- The required Air Toxics Effects Screening Level analysis demonstrated that impacts from ammonia (NH3) and formaldehyde were below the short and long-term screening levels.

Therefore, the predicted air quality impacts from the proposed project will not cause or contribute to a violation of any applicable NAAQS, PSD Increment Standard, or State Property Line Standard, or cause or contribute to adverse impacts on human health or the environment.

8. EFFECTS OF THE PROPOSED ACTION

The following sections present the effects analysis for listed species from the construction and operation of the Proposed Project.

8.1. Air Quality

8.1.1. Air Pollution Effects Background Review

A literature review was conducted regarding the effects of air pollution on flora and fauna in order to complete an effects analysis for the Proposed Project. Air pollution types that were researched in this literature review incorporated only those associated with the Proposed Project. Furthermore, this review focused on potential impacts to plants and wildlife species but did not include human-related effects. The review also focused on potential terrestrial and aquatic impacts because both terrestrial-based and aquatic systems are present in the Action Area. Very little specific information regarding the sensitivity of soils, plants, or animals (which are discussed in this report) known to this region of Texas was found during the extensive literature review.

Generalized conclusions regarding the effects of air pollution on biodiversity of ecosystems include the following:

- Lower life forms are usually more affected than higher life forms
- Plants are normally more affected than terrestrial wildlife.
- Typically, populations of species that are affected decline, but this is not always the case (Dudley and Stolton 1996).

Effects to higher life forms, such as mammals and birds, are usually indirect effects to food chain changes or food availability reduction or effects to reproductive success (Dudley and Stolton 1996). Many species of animals have at least some level of tolerance to air pollution, and for those that are affected, the level of effect can vary from one individual to another (Dudley and Stolton 1996).

Impacts to flora and fauna from air pollutants can be categorized as acute or chronic. Where acute effects represent short-term (e.g., 3-hour averaging) exposures to relatively high levels, chronic effects represent longer term (e.g., months and years) exposures to lower levels of pollutants (Smith and Levenson 1980). Pathways in which air pollutants can have direct and indirect effects on plants and animals include 1) direct exposure to animals; 2) direct exposure to plants; 3) indirect exposure by animal ingestion of plants with toxin on their surfaces; and 4) indirect exposure through plant uptake of toxins that have been deposited on soil, and animal ingestion of plants that have undergone uptake of toxins (Smith and Levenson 1980). In addition, these effects to species of plants and wildlife from exposures to air pollutants can have varying degrees of effects to different species and also vary between individuals of one species (Smith and Levenson 1980).

Air pollution components including photochemical oxidants (or smog), such as NO_x and VOCs, which are precursors to ozone (O_3), have been shown to affect animals, primarily as eye irritation and eye or respiratory injury (Peterson 1982). Research has revealed that low-level chronic exposures can be reversible and also that localized tolerance can occur (Peterson 1982). Plants, however, suffer more deleterious effects from oxidant stress. CO contributes to the formation of CO_2 and O_3, which is a part of the photochemical oxidant complex. O_3 uptake through plant stomata of leaves is found to accelerate the aging process in plants, causing injury to foliage, flowers, and fruit (Peterson 1982). Conifers are particularly vulnerable to chronic oxidant stress because they preserve their photosynthetic tissue for longer periods of time than deciduous trees (Peterson 1982).

Air pollutants in acid form or that have acid-forming properties, such as SO_2 and NO_x, can be deposited in wet (i.e., acid rain) or dry forms (EPA 2012a). As SO_2 and NO_x gases are emitted into the atmosphere, they react to form sulfate (SO_2), nitrate (NO_3^-), sulfuric acid (SO_2), and nitric acid (HNO_3), which are then

deposited back to the Earth's surface as pollutants (Lovett and Tear 2008). Effects of NO_x include contribution to soil and water acidification and nutrient enrichment, which can lead to losses in biodiversity (EPA 2012a). Detrimental effects of sulfur oxides (SO_x) pollutants consist of the following: soil and water acidification, direct injury to plants through direct exposure by the gaseous pollutant, contribution to particle formation with associated effects, contribution to mercury methylation in wetland areas, and cooling of the atmosphere (EPA 2012a; Smith and Levenson 1980).

Acidifying air pollutants can have significant effects on the reproduction and physiology of amphibians and aquatic organisms such as fish and macroinvertebrates, but effects to terrestrial wildlife are poorly understood. Short-term effects to animals typically involve mild respiratory irritation; however, long-term direct effects to terrestrial fauna have not been extensively studied. Acid precipitation causes fish kills, species population and biodiversity reduction, and food chain imbalances in aquatic systems (EPA 2008). Deposition of acid particles, wet and dry, can also have direct visible effects to plant surfaces from short-term, high-level exposure and also have adverse metabolic effects from long-term, low-level exposure (Peterson 1982). Effects to terrestrial plants include altered foliar growth or injury, accelerated erosion of protective cuticles and leaching of foliar nutrients, altered relations with symbiotic species and pathogens, and reduced seed germination in conifers (Peterson 1982).

NH_3 effects include the following: eutrophication (i.e., the process by which a waterbody becomes enriched with dissolved nutrients that promote the growth of aquatic plants, and as a result, a depletion of dissolved oxygen in surface water can occur); groundwater nitrogen contamination; and formation of nitrate and sulfate particles that have adverse environmental effects (EPA 2012a). Nitrogen saturation of an ecosystem is the long-term removal of nitrogen limitations on biotic activity, along with a decrease in the ability of nitrogen retention (Fenn et al. 2003). This excess in nitrogen availability can in turn affect groundwater quality, eutrophication of waterbodies, toxic effects to freshwater flora and fauna, biodiversity changes, nutrient cycling disruptions, and increased soil emissions of nitrogen (Fenn et al. 2003).

Adverse effects of PM pollution include the following: impaired visibility in wildlife, alteration of ecosystem processes, soil structure modifications, and the alteration of timing and location of traditional precipitation patterns (EPA 2012a). Mineral dusts and soil-related dusts associated with road and railroad use are usually relatively inert, are not particularly acidic or alkaline, are commonly composed of course particles (i.e., larger than 2.5 micrometer [µm] in diameter), and usually only have effects close to the source; any potential effects are usually associated with high dust loads (Chaston and Doley 2006; Doley and Rossato 2010). The deposition of dust on plants has been shown to impact plants in the following ways: reduced light penetration on the leaf surface, increased leaf temperature, decreased photosynthesis, increased transpiration, and inhibition of growth (Chaston and Doley 2006; Doley and Rossato 2010; Sharifi et al. 1997). Adverse effects of PM pollution on aquatic systems include increased turbidity (which can inhibit the spawning of fish and disrupt aquatic ecosystem balance) and increased sedimentation (leading to physical disruption of hydraulic characteristics of flowing waterbodies and increased flooding potential) (FAO 1996).

8.1.2. Air Quality Effects

8.1.2.1. CRITERIA POLLUTANT EMISSIONS

As identified in Table 7 above, the Proposed Project would have emissions that are above the SERs, triggering PSD applicability for NO_2, CO, VOC, PM, PM_{10}, $PM_{2.5}$, and H_2SO_4. Air dispersion modeling indicates that NO_2 and $PM_{2.5}$ would exceed the SILs, specifically 1-hour NO_2 emissions from MSS activities, 24-hour $PM_{2.5}$, and annual $PM_{2.5}$ (SWCA and Oris 2013). As shown in Table 1, the $PM_{2.5}$ SILs would be achieved within 3 miles from the Project Area. The NO_2 emissions from MSS activities would exceed the SILs extending beyond the 31-mile Action Area to 35 miles (SWCA and Oris 2013).

Impacts of increased NO_2, CO, VOCs, PM, PM_{10}, $PM_{2.5}$, and NH_3 could have direct and indirect effects on listed species present in the Action Area if they were to occur in these elevated areas. These effects could include increased nitrogen levels, which could have direct, short-term effects by damaging plant surfaces and also have long-term effects by changing the vegetation community composition, disrupting nutrient cycling, and increasing GHG soil emissions. However, emissions from the Proposed Project would have no effect to species addressed in this BA because modeled air quality impacts from the Proposed Project lie outside areas identified as known or suitable listed species habitat.

8.1.2.2. FUGITIVE DUST

Construction of the Proposed Project would temporarily increase dust presence in the area, but dust would not likely result during operation of the project because BMPs to control dust during construction and operation would be implemented. Thus, the short-term increase during the initial construction would likely be negligible in terms of impacts to listed species if they were to occur in construction areas. However, construction activities from the Proposed Project would have no effect to species addressed in this BA because the nearest known or suitable listed species habitat is located 4 miles to the south of the proposed Natural Gas Pipeline.

8.1.3. Impacts of Air Pollution Sources on Flora and Fauna

8.1.3.1. GENERAL IMPACTS

A comparison of background concentrations and Proposed Project concentrations to pollutant emission concentration exposures and levels of effects to vegetation are identified in Table 9. Vegetation sensitivity was determined by visible damage or growth effects. EPA does not provide guidance for direct and indirect sensitivity levels to wildlife species for criteria pollutants (Smith and Levenson 1980).

Table 9. Comparison of Background Concentrations, this Project's Proposed Emission Levels, and Emission Concentration Exposures and the Levels of Effects to Vegetation

Emission*	Background/ Ambient Concentrations**	Project Concentrations	Averaging Time	Vegetation Sensitivity (minimum reported level)***		
				Sensitive	Intermediate	Resistant
CO	14,000 µg/m^3 1-hour Concentration†	22.88 µg/m^3	1 week	1,800,000 µg/m^3	n/a	18,000,000 µg/m^3
NO_2	27.8 µg/m^3 1-hour Concentration§	13.86 µg/m^3	4 hours	3,760 µg/m^3	9,400 µg/m^3	16,920 µg/m^3
	n/a	11.41 µg/m^3	8 hours	3,760 µg/m^3	7,520 µg/m^3	15,040 µg/m^3
	n/a	4.89 µg/m^3	1 month	564 µg/m^3	564 µg/m^3	564 µg/m^3
	25 µg/m^3 Annual Average Concentration§	0.72 µg/m^3	1 year	94-188 µg/m^3	94-188 µg/m^3	94-188 µg/m^3
SO_2	577.8 µg/m^3 1-hour Concentration¶	6.65 µg/m^3	1 hour	917 µg/m^3	n/a	n/a
	520 µg/m^3 1-hour Concentration¶	5.55 µg/m^3	3 hours	786 µg/m^3	2,096 µg/m^3	13,100 µg/m^3

Table 9. Comparison of Background Concentrations, this Project's Proposed Emission Levels, and Emission Concentration Exposures and the Levels of Effects to Vegetation

Emission*	Background/ Ambient Concentrations**	Project Concentrations	Averaging Time	Vegetation Sensitivity (minimum reported level)***		
				Sensitive	Intermediate	Resistant
	20 µg/m^3 1-hour Concentration¶	0.18 µg/m^3	1 year	18 µg/m^3	18 µg/m^3	18 µg/m^3

Notes: µg/m^3 = micrograms per cubic meter; ppb = parts per billion; ppmv = parts per million volume.

Sources: Smith and Levenson (1980); SWCA and Oris (2013); TCEQ (1998).

* The criteria pollutants evaluated by EPA for vegetative effects (and that are applicable to the Proposed Project) include CO, NO_2, and SO_2. The PM, PM_{10}, and $PM_{2.5}$ contaminants were not addressed and therefore, could not be included in this evaluation.

**The background concentrations used were determined based on a statewide review of the highest monitoring values during 1992-1997. These values are meant to be conservative as they were developed for use primarily in the screen modeling process (TNRCC 1998).

*** All values refer to effects on vegetation.

† The background concentration for Howard County was used as it was the only county in the Action Area with 1-hour CO concentration data.

§ The background concentration for Lubbock County was used for comparison as no Action-Area counties were listed with annual NO_2 concentration data. It was chosen since it was the closest county to the Action Area with a city large enough to provide conservative values. 1-hour NO_2 concentrations were not provided; therefore, it was calculated using the reverse methodology in USEPA (2003).

¶ The background concentration for Mitchell County was used for comparison as it is the central county in the Action Area. 1-hour SO_2 concentrations were not provided; therefore, it was calculated using the reverse of the methodology in USEPA (2003).

As presented in Table 8, none of the Proposed Project's emissions would be above the level of impact to sensitive, intermediate, and resistant plant species, even when combined with the conservative background screening values. No specific data regarding wildlife and the levels at which effects could occur were obtained during the literature review. Thus, specific impacts from the Proposed Project's emissions to wildlife remain unknown. The literature review indicates that air pollution effects could have direct, short-term visibility effects and also long-term, indirect effects through ecosystem changes if listed species or their known or suitable habitat occurs within the areas where modeled emissions are above the SIL. However, emissions from the Proposed Project would have no effect to species addressed in this BA because modeled air quality impacts from the Proposed Project lie outside areas identified as known or suitable listed species habitat. A more detailed description on the two listed species with potential to occur in the Action Area are below.

8.1.3.2. BLACK-CAPPED VIREO

Known or suitable black-capped vireo habitat is present within the Action Area approximately 26 miles south of the Plant Site in Sterling and Coke counties and 26 miles southeast in Nolan County. In terms of the entire Project Area, this potential habitat is 4 miles south of the Natural Gas Pipeline. Modeling for 1-hour NO_2 during MSS activities suggests SIL receptors for this pollutant are absent in the areas identified as suitable black-capped vireo habitat (see Figure 8 below). Maximum ground level concentrations for all other pollutants modeled are expected to achieve SIL no farther than 3 miles from the Proposed Project boundary (Table 1), which is over 20 miles from the nearest suitable black-capped vireo habitat. Modeling results indicate that the areas where MSS activities could temporarily raise NO_2 concentrations above baseline levels are not anticipated to be within 6 miles of the nearest potential black-capped vireo habitat. Therefore, while the black-capped vireo is expected to occur within the Action Area, individuals or their habitat would not be affected as a result of the Proposed Project.

Regardless of their location outside potential receptor areas, a detailed review of the vireo's potential to be affected by the Proposed Project occurred. MSS activities would occur quite infrequently because the

project would be a base-load facility. Base-load facilities are fully capable of continuous operation under Low Load Operating (LLO) conditions, and the Proposed Project is planned to be operated in this manner. Under the LLO mode, also known as the "parking feature," operation is reduced to 8 to 10 percent of its maximum load, instead of being shut down entirely, to allow for rapid ramping each day in a short time period (10 minutes) to the maximum load without risk of start failure or excessive wear. This technology vastly reduces the number of MSS activities required throughout the year and hence, significantly reduces the number of events where MSS-related NO_2 would be released.

Air quality modeling accounts for a worst case scenario, anticipating the need for MSS activities once per day per year and accounting for specific prevailing wind speed and direction that would extend a plume the farthest distance to achieve SIL. In contrast, because the Proposed Project is planned to be operated using LLO technology, MSS activities are expected to occur on a rare basis. Consequently, elevated NO_2 levels are expected to reach receptor areas much less frequently than the worst case modeling.

The black-capped vireo is a migratory species that utilizes habitat composed primarily of deciduous shrubs. Vireos typically return to their breeding grounds in Texas in late March or early April, and depart for their wintering grounds in September (USFWS 1991). Prevailing winds in the Action Area during the spring and summer are from the south (NOAA 1998). Winds from this direction would serve to carry emissions from the FGE Texas Project away from suitable black-capped vireo habitat, not towards it. The prevailing wind direction coupled with the expected infrequent occurrence of MSS activities indicates that MSS-related releases of NO_2 have extremely rare to no potential to reach areas identified as suitable black-capped vireo habitat in concentrations above SIL while the birds are actually present on their breeding grounds.

8.1.3.3. TEXAS POPPY-MALLOW

The nearest known populations of Texas poppy-mallow have been documented approximately 12 miles southeast of the Project Area in southern Mitchell County and 22 and 27 miles southeast of the Project Area in Coke County (Figure 8). While the Texas poppy-mallow could be supported by any of the Tivoli-Brownfield fine sands of the Spur-Colorado-Miles soil association in the Action Area (Weidenfeld et al. 1970 as cited in Amos 1985), all five known occurrences appear to be consistently supported by only one soil map unit, the Tivoli-Miles-Heatly unit, which is absent from the Project Area (Figure 8).

Modeling for 1-hour NO_2 during MSS activities suggests SIL receptors for this pollutant are present in some areas identified as suitable Texas poppy-mallow habitat within the Action Area (see Figure 8 below). This overlap of receptor locations and suitable habitat includes the Project Area, which is underlain by the Spur-Mereta-Angelo soil map unit. However, surveys during the field reconnaissance revealed that the Project Area is cultivated and no Texas poppy-mallows were identified within the Project Area. In addition, as a designated non-federal representative of EPA, SWCA requested an informal consultation with USFWS for concurrence with our findings on the Texas poppy-mallow. On February 24, 2014, USFWS concurred with the findings that the Texas poppy-mallow is unlikely to occur within the Project Area, including the Natural Gas Pipeline, because soils within the Project Area consist mainly of various clayey and loamy soil types, which are typically not associated with Texas poppy-mallow habitat. The Natural Gas Pipeline route does cross some areas of Spade fine sandy loams; however, Texas poppy-mallow has not been observed in these soils (USFWS 2014). No SIL receptors for 1-hour NO_2 during MSS activities are present in the areas where the Texas poppy-mallow has been documented to occur (see Figure 8).

As stated above in Section 9.1.3.1, none of the project's emissions would be above the level of impact to sensitive, intermediate, and resistant plant species. In addition, the project's maximum ground level concentration of NO_2 during MSS activities is 23.40 $\mu g/m^3$, which is eight times lower than the 188 $\mu g/m^3$

secondary NAAQS for 1-hour NO_2 that are protective of the environment and wildlife. Consequently, no impacts are expected to occur from emissions the Proposed Project.

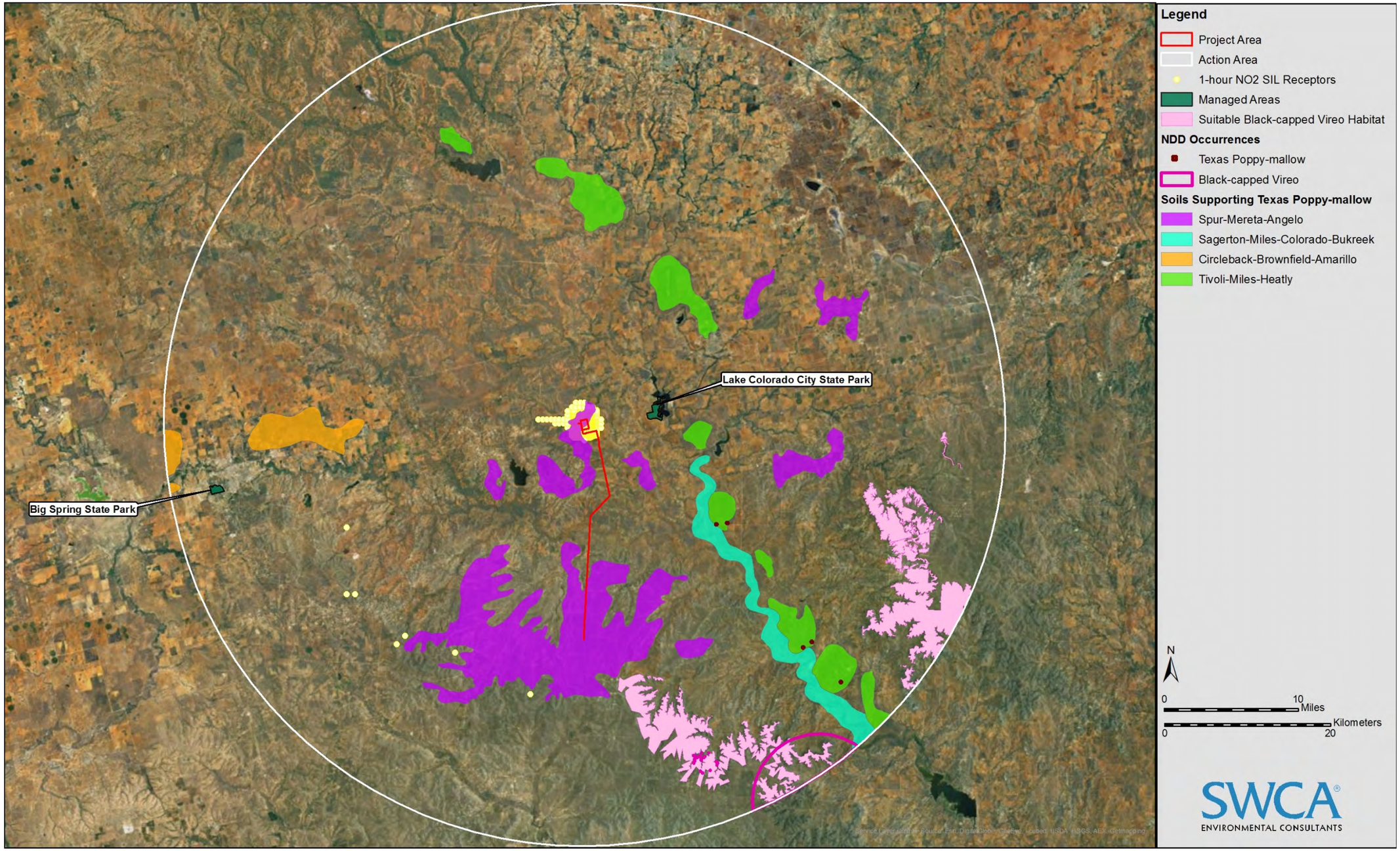

Figure 8. Suitable Federally Listed Species Habitat Compared to MSS 1-hour NO_2 SIL Receptors.

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8.2. Water Quality

8.2.1. Wastewater Effects

The Proposed Project would be fully engineered for proper management and containment of stormwater, including land contouring, drainage swales/open ditches, road and parking lot surface drains, catch basins with subterranean underground storm collection system, and detention ponds prior to being discharged to the Mitchell County storm collection system, all in accordance with local codes and standards.

The disposal of wastewater from the cooling towers is a project component that FGE and SWCA are continuing to analyze in order to determine the most efficient and compliant method. When that determination is made, an addendum will be submitted to EPA including all supporting documentation. Options for disposing of the wastewater stream include discharge into an aboveground storage tank and subsequent sale to Mitchell County for reuse in the oil and gas industry or transport by pipeline to an injection well for groundwater recharge. If any on-site construction is needed, it would occur within the physical footprint of the current Project Area. In either disposal option, no wastewater generated by the Proposed Project would be discharged to any waters of the U.S. and no wastewater would have the potential to affect listed species. No effects to listed species would occur from the storage or disposal of wastewater from the Proposed Project.

8.2.2. Surface Water Effects

One water feature is located within the Plant Site. It is considered to be an upland constructed waterbody that receives agricultural runoff and there is no off-site connection to jurisdictional waters (Figures 6 and Appendix A, Photo A-1). The non-jurisdictional pond is in an area where proposed construction occurs and therefore, will be permanently impacted (i.e., filled) for construction purposes. Eleven NHD-identified water features are located along the proposed Natural Gas Pipeline. Some or all of these features have the potential to be jurisdictional. FGE has made assurances to open-cut trench and/or bore these water features, which would comply with the general conditions under CWA Nationwide Permit 12 for Utility Lines. Direct and indirect impacts would be temporary and localized with the implementation of BMPs along the Natural Gas Pipeline corridor. Direct or indirect impacts to listed species are not expected to occur from permanent or temporary impacts to surface waters because the species are not expected to utilize habitat within the footprint of the Project Area (Plant Site and interrelated actions).

Several other surface water features are present within the Action Area (see Section 5.7). There is potential for NO_2 to directly alter the pH of surface waters in the Action Area. However, this potential is low due to the infrequency of the predicted exposure of a concentration greater than the SIL to surface waters and the low concentration of airborne pollutants over large volumes of surface waters. Therefore, emissions resulting from the Proposed Project would not likely directly affect surface water pH. Any possible impact would be considered an isolated, temporary event. Direct impacts to listed species via air pollution to surface waters are not expected to occur from the Proposed Project. Indirect, long-term effects from NO_2 emissions such as acidification, eutrophication, or nitrogen saturation could also occur; however, these effects are typically the result of direct acid deposition that would be an unlikely, rare event. Indirect impacts to listed species via air pollution to surface waters are not expected to occur from the Proposed Project.

8.3. Noise

8.3.1. Noise Effects Background Review

A literature review was conducted regarding the effects from an acoustical stimulus (i.e., noise) on terrestrial wildlife in order to complete an effects analysis for the Proposed Project. The nature of anthropogenic noise is multifaceted and even more complex in terms of how it affects wildlife species. The effects can range from habitat use changes, activity pattern changes, increased stress responses, decreased immune responses, decrease foraging efficiency and success, reduced reproductive success, increased predation risk, intraspecific diminished communication, and hearing damage (NoiseQuest 2012; Pater et al. 2006; USFWS 2012c). These responses can vary, depending on the nature of the sound, including sound level, rate of onset, duration, number of events, spectral distribution of sound energy, and level of background noise (Pater et al. 2006). Noise is typically presented in terms of decibels (dB), and for most noise assessments it is quantified in terms of dBA, which is an "A-weighted" sound level scale that more closely describes how a person perceives sound. Thus, the sound level when defined as dBA does not always transfer to wildlife, because species groups (e.g., owls, bats, birds, and ungulates) have different hearing sensitivities and ranges (Pater et al. 2006). Other considerations for noise effects on wildlife include the ambient or background noise level and how that compares with the Proposed Project's noise level. Also, the sound from a noise expands outward with roughly a 6-dB decrease in each distance-doubling increment (Pater et al. 2006). Furthermore, the perceived sound level from a noise source can be affected by other factors besides distance from the source, such as source noise strength, direction of the source, atmospheric conditions, and topography (Pater et al. 2006; SWCA 2012).

The following information provides some of the wildlife-specific data obtained in the literature research in order to better understand how noise levels have the potential to affect wildlife species:

- Bat species can hear well at high frequencies; thus, low frequency noises would not likely affect these species (Pater et al. 2006).
- Animals have been shown to habituate to noise sources once they learn that the noise does not pose a threat (Pater et al. 2006).
- Woodland and grassland bird population declines have been shown to occur between 35 and 48 dBA (Kaseloo 2006; USFWS 2012c).
- For the average bird, noise levels 24–30 dBA above background noise are detectable (USFWS 2012c).
- Bird communication can be affected at levels above 20 dBA (USFWS 2012c).

8.3.2. Noise-Related Effects

The Project Area, and probably most of the Action Area, likely has an existing noise level of 35–65 dBA, low to mid-range as discussed previously. Standards for maximum construction and operational noise levels would be no greater than 85 dBA at a distance of 3 feet. However, these noise levels are at the source, and because noise attenuates, the noise levels in the 31-mile Action Area would be much less. At a distance of 6,500 feet (1.23 miles) from the Project Area, the operational noise would attenuate to 0 dBA. Although most the Action Area is supported by scrub/shrub land, grasslands, and cultivated lands (95%), land development including oil and gas wells, small towns and urban areas, and I-20 exist in the Action Area. Much of the wildlife present in the Action Area is habituated to the typical noises associated with common industry practices in the area. No impacts to listed species from construction or operational noise are expected because the levels would be minimal and similar to existing conditions. The interior

least tern and the whooping crane are not expected to be adversely affected by project-related noise because they could easily avoid the area. The black-capped vireo is not expected to be adversely affected by the noise either because the species' habitat occurs near the southeastern edge of the Action Area, several miles from the Project Area (Figure 7).

8.4. Infrastructure-Related Effects

To construct the Proposed Project, portions of the approximate 200-acre Project Area would be cleared of the existing vegetation, consequently removing the existing plants and potentially displacing wildlife. However, it is not expected that the interior least tern or the whooping crane would be adversely affected by infrastructure changes in the Action Area because their limited presence is migratory in nature. Additionally, there is no expectation of adverse impacts to black-capped vireo because all NDD occurrences and delineated suitable habitat occur over 20 miles to the south and southeast of Plant Site and over 4 miles from the proposed Natural Gas Pipeline (Figure 7). Adverse effects to the Texas poppy-mallow are unlikely from infrastructure-related activities because soils conducive to Texas poppy-mallow habitat are absent from the Project Area (USFWS 2014). The only NDD occurrences in the Action Area occur on the Tivoli-Miles-Heatly soil complex, which comprises 2% of the Action Area and the closest is located approximately 12 miles southeast of the Plant Site (Figure 9). These soils are not present along the interrelated actions (Water Disposal Pipeline or Natural Gas Pipeline). Although the Plant Site is located on the Spur-Mereta-Angelo soil complex, which is also capable of supporting the Texas poppy-mallow, no observations have been recorded. In addition, USFWS concurred that no potential habitat is present within the Project Area (USFWS 2014) where infrastructure-related effects would occur.

8.5. Human Activity Effects

Construction of the Proposed Project would temporarily increase human-related presence in the area, and operation would increase human-related presence in the long term, both of which could disturb and affect wildlife species. The interior least tern and whooping crane are expected to remain unaffected by human activity in the area due to lack of presence in Action Area. Human activity is not expected to disturb black-capped vireo because its habitat is over 20 miles away from the Plant Site and 4 miles from the Natural Gas Pipeline. There could be impacts in the form of soil disturbance to the Texas poppy-mallow if it were to occur in the Project Area. No Texas poppy-mallows were identified in the Plant Site during the field reconnaissance and its occurrence in the Project Area is expected to be low. In addition, no protection is afforded a listed plant when on private lands.

9. CONCLUSIONS

9.1. Determination of Effect

Two of the six species addressed in this BA are expected to occur in the Action Area. The black-capped vireo is expected to occur in the southeast portion of the 31-mile Action Area, with the nearest habitat over 20 miles away from the Plant Site and 4 miles from the Natural Gas Pipeline. The Texas poppy-mallow is expected to occur between 12 and 27 miles southeast of the Plant Site in Mitchell and Coke Counties. No effects to these species are expected to occur from the Proposed Project because effects would either be insignificant and would never reach the scale where take occurs or they are discountable and are extremely unlikely to occur. In addition, project concentrations are far below NAAQS levels protective of the environment and wildlife.

The remaining four species are not expected to occur in the Action Area because this area is clearly outside of the known geographic range of the species, the Action Area does not contain the appropriate vegetation characteristics or landscape features known to support these species, or the species is extirpated from the Action Area. Therefore, the construction and operation of the Proposed Project (Federal Action) would have no effect on all listed species associated with the Action Area. Table 10 provides a summary of the listed species as identified as occurring in each of the nine counties in the Action Area by USFWS and TPWD, their potential for occurrence in the Action Area, and the determination of effect made for each species.

Table 10. Summary of the Federally Listed Species within the 9-County Action Area, their Potential for Occurrence in the Action Area, and Effects Determination

Common Name	Scientific Name	Federal Status*	Borden County	Coke County	Fisher County	Glasscock County	Howard County	Mitchell County	Nolan County	Scurry County	Sterling County	Potential for Occurrence in Action Area	Effects Determination
Birds													
Black-capped vireo	*Vireo atricapilla*	E		✓					✓		✓	Could occur outside the Project Area in Action Area. Nearest known habitat is located 26 miles to the south of the Project Area in Sterling County. Modeled air quality impacts are outside of potential habitat.	No effect
Interior least tern	*Sterna antillarum athalassos*	E	✓	✓			✓	✓		✓		Not expected to occur because Action Area lacks preferred habitat (salt flats and river shores); nearest habitat is 80 miles southeast of Action Area in near San Angelo in Tom Green County.	No effect
Whooping crane	*Grus americana*	E	✓	✓	✓	✓	✓	✓	✓	✓	✓	Not expected to occur because Action Area lacks preferred habitat (salt flats or open spanses of herbaceous wetland) and is 32 miles west of migration corridor.	No effect
Mammals													
Black-footed ferret	*Mustela nigripes*	E	✓		✓	✓	✓	✓	✓	✓	✓	Not expected to occur because extirpated from Texas.	No effect
Gray wolf	*Canus lupus*	E	✓	✓	✓	✓	✓	✓	✓	✓	✓	Not expected to occur because extirpated from Texas.	No effect
Flowering Plants													
Texas poppy-mallow	*Callirhoe scabriuscula*	E		✓			✓	✓		✓		Could occur in Action Area, but not in Project Area. Nearest known habitat is located 12 miles southeast of Project Area in Mitchell County. Modeled air quality impacts are outside of potential habitat.	No effect

9.2. Interdependent and Interrelated Actions

Interrelated actions are those that are part of a larger action and depend on the larger action for their justification (i.e., the proposed action would not occur without the larger project). All interrelated actions were incorporated into the project actions and description as part of the associated infrastructure description. Thus, no additional discussion regarding interrelated actions related to the proposed FGE Texas Project is required for the analysis of the Proposed Project.

Interdependent actions are those that have no significant independent utility apart from the action under consideration (i.e., other projects would not occur without the proposed action). The Proposed Project has three such interdependent actions: (1) transmission line and substation upgrades to the existing ONCOR transmission system within the Plant Site; (2) natural gas pipeline upgrades and new pipeline installation on the existing Line X within and in the vicinity of the Proposed Project; and, (3) water disposal line installation within and in the vicinity of the Proposed Project. All three of these interdependent actions were incorporated into the project actions and description as part of the associated infrastructure description. Thus, no additional discussion regarding interdependent actions related to the proposed FGE Texas Project is required for the analysis of the Proposed Project.

9.3. Cumulative Effects

Cumulative effects include the effects of future state or private actions that are reasonably certain to occur in the Action Area considered in this BA. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA. SWCA reviewed agency databases and publicly available sources to determine if reasonably foreseeable projects occur within the Action Area. There are multiple public roadway projects planned within the Action Area, but none would be associated with the project (affecting ingress and egress) (TxDOT 2013). It is unknown what other currently proposed and future developments in the surrounding will occur. However, because the Proposed Project would have no effect on listed species, there would also be no apparent cumulative effect anticipated, even if new developments were to occur in the region in the foreseeable future.

9.4. Conservation Measures

All conservation measures were incorporated into the Proposed Project description. No significant impacts would occur as a result of the construction and operation of the proposed FGE Texas Project. No effects from the six federally listed species addressed in this BA are expected to occur from the Proposed Project; therefore, no additional conservation measures are required for the Proposed Project.

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Appendix A

Photographic Log

Figure A-1. Representative photo of on-site constructed waterbody within Plant Site.

Figure A-2. Representative photo of vegetation at Plant Site.

Figure A-3. Representative photo of vegetation along natural gas pipeline corridor.

Figure A-4. Representative photo of vegetation along water disposal line across road.

Appendix B

U.S. Fish and Wildlife Service and
Texas Parks and Wildlife Department Protected Species Lists

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Ecological Services

Southwest Region

4 States
47 Refuges
9 Fish Hatcheries
64 Native American Tribes
95 Law Enforcement Officers

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List of species by county for Texas:

Counties Selected: Borden, Coke, Fisher, Glasscock, Howard, Mitchell, Nolan, Scurry, Sterling

Select one or more counties from the following list to view a county list:

Andersen
Andrews
Angelina
Aransas
Archer

View County List

Coke County

Common Name	Scientific Name	Species Group	Listing Status	Species Image	Species Distribution Map	Critical Habitat	More Info
black-capped Vireo	*Vireo atricapilla*	Birds	E				P
Texas poppy-mallow	*Callirhoe scabriuscula*	Flowering Plants	E				P

Fisher County

Common Name	Scientific Name	Species Group	Listing Status	Species Image	Species Distribution Map	Critical Habitat	More Info
sharpnose Shiner	*Notropis oxyrhynchus*	Fishes	C	No Image			P
smalleye Shiner	*Notropis buccula*	Fishes	C	No Image			P

Mitchell County

Common Name	Scientific Name	Species Group	Listing Status	Species Image	Species Distribution Map	Critical Habitat	More Info
Texas poppy-mallow	*Callirhoe scabriuscula*	Flowering Plants	E				P

Nolan County

Common Name	Scientific Name	Species Group	Listing Status	Species Image	Species Distribution Map	Critical Habitat	More Info
black-capped Vireo	*Vireo atricapilla*	Birds	E				P

Sterling County

Common Name	Scientific Name	Species Group	Listing Status	Species Image	Species Distribution Map	Critical Habitat	More Info
black-capped Vireo	*Vireo atricapilla*	Birds	E				P

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BORDEN COUNTY

BIRDS

		Federal Status	State Status
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T

year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south, occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	

migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Baird's Sparrow	*Ammodramus bairdii*		

shortgrass prairie with scattered low bushes and matted vegetation; mostly migratory in western half of State, though winters in Mexico and just across Rio Grande into Texas from Brewster through Hudspeth counties

Bald Eagle	*Haliaeetus leucocephalus*	DL	T

found primarily near rivers and large lakes, nests in tall trees or on cliffs near water; communally roosts, especially in winter, hunts live prey, scavenges, and pirates food from other birds

Ferruginous Hawk	*Buteo regalis*		

open country, primarily prairies, plains, and badlands; nests in tall trees along streams or on steep slopes, cliff ledges, river-cut banks, hillsides, power line towers, year-round resident in northwestern high plains, wintering elsewhere throughout western 2/3 of Texas

Interior Least Tern	*Sterna antillarum athalassos*	LE	E

subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony

Mountain Plover	*Charadrius montanus*		

breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous

Peregrine Falcon	*Falco peregrinus*	DL	T

both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south; subspecies (F. p. anatum) is also a resident breeder in west Texas, the two subspecies' listing statuses differ, F p. tundrius is no longer listed in Texas, but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level; see subspecies for habitat

Snowy Plover	*Charadrius alexandrinus*		

formerly an uncommon breeder in the Panhandle; potential migrant, winter along coast

BORDEN COUNTY

BIRDS

		Federal Status	State Status
Sprague's Pipit	*Anthus spragueii*	C	

only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant; strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges

Western Burrowing Owl *Athene cunicularia hypugaea*

open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Western Snowy Plover *Charadrius alexandrinus nivosus*

uncommon breeder in the Panhandle; potential migrant; winter along coast

Whooping Crane	*Grus americana*	LE	E

potential migrant via plains throughout most of state to coast, winters in coastal marshes of Aransas, Calhoun, and Refugio counties

MAMMALS

		Federal Status	State Status
Big free-tailed bat	*Nyctinomops macrotis*		

habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore

Black-footed ferret	*Mustela nigripes*	LE	

extirpated; inhabited prairie dog towns in the general area

Black-tailed prairie dog *Cynomys ludovicianus*

dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups

Cave myotis bat *Myotis velifer*

colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore

Gray wolf	*Canis lupus*	LE	E

extirpated; formerly known throughout the western two-thirds of the state in forests, brushlands, or grasslands

Pale Townsend's big-eared bat *Corynorhinus townsendii pallescens*

roosts in caves, abandoned mine tunnels, and occasionally old buildings, hibernates in groups during winter; in summer months, males and females separate into solitary roosts and maternity colonies, respectively; single offspring born May-June; opportunistic insectivore

BORDEN COUNTY

MAMMALS

		Federal Status	State Status
Palo Duro mouse	*Peromyscus truei comanche*		T

rocky, juniper-mesquite-covered slopes of steep-walled canyons of the eastern edge of the Llano Estacado, juniper woodlands in canyon country of the panhandle; primarily nocturnal

Swift fox	*Vulpes velox*		

restricted to current and historic shortgrass prairie; western and northern portions of Panhandle

REPTILES

		Federal Status	State Status
Texas horned lizard	*Phrynosoma cornutum*		T

open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September

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COKE COUNTY

BIRDS

		Federal Status	State Status
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T

year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south, occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	

migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Baird's Sparrow	*Ammodramus bairdii*		

shortgrass prairie with scattered low bushes and matted vegetation; mostly migratory in western half of State, though winters in Mexico and just across Rio Grande into Texas from Brewster through Hudspeth counties

Bald Eagle	*Haliaeetus leucocephalus*	DL	T

found primarily near rivers and large lakes, nests in tall trees or on cliffs near water; communally roosts, especially in winter, hunts live prey, scavenges, and pirates food from other birds

Black-capped Vireo	*Vireo atricapilla*	LE	E

oak-juniper woodlands with distinctive patchy, two-layered aspect; shrub and tree layer with open, grassy spaces; requires foliage reaching to ground level for nesting cover, return to same territory, or one nearby, year after year; deciduous and broad-leaved shrubs and trees provide insects for feeding; species composition less important than presence of adequate broad-leaved shrubs, foliage to ground level, and required structure; nesting season March-late summer

Ferruginous Hawk	*Buteo regalis*		

open country, primarily prairies, plains, and badlands; nests in tall trees along streams or on steep slopes, cliff ledges, river-cut banks, hillsides, power line towers; year-round resident in northwestern high plains, wintering elsewhere throughout western 2/3 of Texas

Interior Least Tern	*Sterna antillarum athalassos*	LE	E

subspecies is listed only when inland (more than 50 miles from a coastline), nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony

Mountain Plover	*Charadrius montanus*		

breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous

COKE COUNTY

BIRDS

		Federal Status	State Status
Peregrine Falcon	*Falco peregrinus*	DL	T

both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south; subspecies (F. p. anatum) is also a resident breeder in west Texas; the two subspecies' listing statuses differ, F p. tundrius is no longer listed in Texas, but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level; see subspecies for habitat.

Snowy Plover *Charadrius alexandrinus*

formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast

Sprague's Pipit	*Anthus spragueii*	C	

only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant, strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges.

Western Burrowing Owl *Athene cunicularia hypugaea*

open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Western Snowy Plover *Charadrius alexandrinus nivosus*

uncommon breeder in the Panhandle; potential migrant; winter along coast

Whooping Crane	*Grus americana*	LE	E

potential migrant via plains throughout most of state to coast, winters in coastal marshes of Aransas, Calhoun, and Refugio counties

FISHES

		Federal Status	State Status
Guadalupe bass	*Micropterus treculii*		

endemic to perennial streams of the Edward's Plateau region; introduced in Nueces River system

MAMMALS

		Federal Status	State Status
Black-tailed prairie dog	*Cynomys ludovicianus*		

dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups

Cave myotis bat *Myotis velifer*

colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals, hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore

Gray wolf	*Canis lupus*	LE	E

COKE COUNTY

MAMMALS

Federal Status State Status

extirpated; formerly known throughout the western two-thirds of the state in forests, brushlands, or grasslands

REPTILES

Federal Status State Status

Concho water snake *Nerodia paucimaculata* DL

Texas endemic, Concho and Colorado river systems, shallow fast-flowing water with a rocky or gravelly substrate preferred; adults can be found in deep water with mud bottoms, breeding March-October

Spot-tailed earless lizard *Holbrookia lacerata*

central and southern Texas and adjacent Mexico; moderately open prairie-brushland; fairly flat areas free of vegetation or other obstructions, including disturbed areas; eats small invertebrates, eggs laid underground

Texas horned lizard *Phrynosoma cornutum* T

open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September

PLANTS

Federal Status State Status

Irion County wild-buckwheat *Eriogonum mealleyi*

Texas endemic, grasslands and shallow stony soils over limestone and indurated caliche, often collected from ungrazed but sparsely vegetated roadsides, particularly where limestone or caliche is exposed on hilltops; flowering June-September

Miller's hedgehog cactus *Echinocereus milleri*

Occurs on sandy-loam soils on rocky hills.

Texas poppy-mallow *Callirhoe scabriuscula* LE E

Texas endemic; grasslands and open oak shrublands or mesquite woodlands on deep, loose sands (Tivoli Series) of ancient and contemporary Colorado River terraces; flowering (April-) May-June; in late July the plants die back to the taproots, in late August-September basal rosettes form, in April the flowering stems bolt

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FISHER COUNTY

BIRDS

		Federal Status	State Status
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T

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Baird's Sparrow	*Ammodramus bairdii*		

shortgrass prairie with scattered low bushes and matted vegetation; mostly migratory in western half of State, though winters in Mexico and just across Rio Grande into Texas from Brewster through Hudspeth counties

Bald Eagle	*Haliaeetus leucocephalus*	DL	T

found primarily near rivers and large lakes, nests in tall trees or on cliffs near water; communally roosts, especially in winter, hunts live prey, scavenges, and pirates food from other birds

Ferruginous Hawk	*Buteo regalis*		

open country, primarily prairies, plains, and badlands; nests in tall trees along streams or on steep slopes, cliff ledges, river-cut banks, hillsides, power line towers, year-round resident in northwestern high plains, wintering elsewhere throughout western 2/3 of Texas

Mountain Plover	*Charadrius montanus*		

breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous

Peregrine Falcon	*Falco peregrinus*	DL	T

both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south, subspecies (F. p. anatum) is also a resident breeder in west Texas, the two subspecies' listing statuses differ, F.p. tundrius is no longer listed in Texas; but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level; see subspecies for habitat

Snowy Plover	*Charadrius alexandrinus*		

formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast

Sprague's Pipit	*Anthus spragueii*	C	

only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant, strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges

FISHER COUNTY

BIRDS		Federal Status	State Status
Western Burrowing Owl	*Athene cunicularia hypugaea*		

open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Western Snowy Plover *Charadrius alexandrinus nivosus*

uncommon breeder in the Panhandle, potential migrant; winter along coast

Whooping Crane *Grus americana* LE E

potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties

FISHES		Federal Status	State Status
Sharpnose shiner	*Notropis oxyrhynchus*	C	

endemic to Brazos River drainage, also, apparently introduced into adjacent Colorado River drainage, large turbid river, with bottom a combination of sand, gravel, and clay-mud

Smalleye shiner *Notropis buccula* C

endemic to upper Brazos River system and its tributaries (Clear Fork and Bosque); apparently introduced into adjacent Colorado River drainage, medium to large prairie streams with sandy substrate and turbid to clear warm water; presumably eats small aquatic invertebrates

MAMMALS		Federal Status	State Status
Black-footed ferret	*Mustela nigripes*	LE	

extirpated; inhabited prairie dog towns in the general area

Black-tailed prairie dog *Cynomys ludovicianus*

dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups

Cave myotis bat *Myotis velifer*

colonial and cave-dwelling, also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore

Gray wolf *Canis lupus* LE E

extirpated; formerly known throughout the western two-thirds of the state in forests, brushlands, or grasslands

Pale Townsend's big-eared bat *Corynorhinus townsendii pallescens*

roosts in caves, abandoned mine tunnels, and occasionally old buildings; hibernates in groups during winter; in summer months, males and females separate into solitary roosts and maternity colonies, respectively; single offspring born May-June; opportunistic insectivore

FISHER COUNTY

MAMMALS

		Federal Status	State Status
Plains spotted skunk	*Spilogale putorius interrupta*		

catholic; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands, prefers wooded, brushy areas and tallgrass prairie

REPTILES

		Federal Status	State Status
Texas horned lizard	*Phrynosoma cornutum*		T

open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky, burrows into soil, enters rodent burrows, or hides under rock when inactive, breeds March-September

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GLASSCOCK COUNTY

BIRDS

		Federal Status	State Status
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T

year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south, occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	

migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Baird's Sparrow	*Ammodramus bairdii*		

shortgrass prairie with scattered low bushes and matted vegetation; mostly migratory in western half of State, though winters in Mexico and just across Rio Grande into Texas from Brewster through Hudspeth counties

Bald Eagle	*Haliaeetus leucocephalus*	DL	T

found primarily near rivers and large lakes, nests in tall trees or on cliffs near water; communally roosts, especially in winter, hunts live prey, scavenges, and pirates food from other birds

Ferruginous Hawk	*Buteo regalis*		

open country, primarily prairies, plains, and badlands; nests in tall trees along streams or on steep slopes, cliff ledges, river-cut banks, hillsides, power line towers, year-round resident in northwestern high plains, wintering elsewhere throughout western 2/3 of Texas

Mountain Plover	*Charadrius montanus*		

breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous

Peregrine Falcon	*Falco peregrinus*	DL	T

both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south, subspecies (F. p. anatum) is also a resident breeder in west Texas, the two subspecies' listing statuses differ, F.p. tundrius is no longer listed in Texas; but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level; see subspecies for habitat

Snowy Plover	*Charadrius alexandrinus*		

formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast

Sprague's Pipit	*Anthus spragueii*	C	

only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant, strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges

GLASSCOCK COUNTY

BIRDS		Federal Status	State Status
Western Burrowing Owl	*Athene cunicularia hypugaea*		

open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Western Snowy Plover *Charadrius alexandrinus nivosus*

uncommon breeder in the Panhandle, potential migrant; winter along coast

Whooping Crane *Grus americana* LE E

potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties

MAMMALS		Federal Status	State Status
Black-footed ferret	*Mustela nigripes*	LE	

extirpated; inhabited prairie dog towns in the general area

Black-tailed prairie dog *Cynomys ludovicianus*

dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups

Cave myotis bat *Myotis velifer*

colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore

Gray wolf *Canis lupus* LE E

extirpated; formerly known throughout the western two-thirds of the state in forests, brushlands, or grasslands

Pale Townsend's big-eared bat *Corynorhinus townsendii pallescens*

roosts in caves, abandoned mine tunnels, and occasionally old buildings, hibernates in groups during winter; in summer months, males and females separate into solitary roosts and maternity colonies, respectively; single offspring born May-June; opportunistic insectivore

Swift fox *Vulpes velox*

restricted to current and historic shortgrass prairie; western and northern portions of Panhandle

REPTILES		Federal Status	State Status
Spot-tailed earless lizard	*Holbrookia lacerata*		

central and southern Texas and adjacent Mexico; moderately open prairie-brushland; fairly flat areas free of vegetation or other obstructions, including disturbed areas; eats small invertebrates; eggs laid underground

GLASSCOCK COUNTY

REPTILES

		Federal Status	State Status
Texas horned lizard	*Phrynosoma cornutum*		T

open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive, breeds March-September

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HOWARD COUNTY

BIRDS

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American Peregrine Falcon	*Falco peregrinus anatum*	DL	T

year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south, occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

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Snowy Plover *Charadrius alexandrinus*

formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast

Sprague's Pipit	*Anthus spragueii*	C

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HOWARD COUNTY

BIRDS

		Federal Status	State Status
Western Burrowing Owl	*Athene cunicularia hypugaea*		

open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Western Snowy Plover	*Charadrius alexandrinus nivosus*		

uncommon breeder in the Panhandle, potential migrant; winter along coast

Whooping Crane	*Grus americana*	LE	E

potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties

MAMMALS

		Federal Status	State Status
Big free-tailed bat	*Nyctinomops macrotis*		

habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore

Black-footed ferret	*Mustela nigripes*	LE	

extirpated; inhabited prairie dog towns in the general area

Black-tailed prairie dog	*Cynomys ludovicianus*		

dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups

Cave myotis bat	*Myotis velifer*		

colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore

Gray wolf	*Canis lupus*	LE	E

extirpated; formerly known throughout the western two-thirds of the state in forests, brushlands, or grasslands

Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*		

roosts in caves, abandoned mine tunnels, and occasionally old buildings; hibernates in groups during winter; in summer months, males and females separate into solitary roosts and maternity colonies, respectively; single offspring born May-June; opportunistic insectivore

Swift fox	*Vulpes velox*		

restricted to current and historic shortgrass prairie, western and northern portions of Panhandle

HOWARD COUNTY

REPTILES

		Federal Status	State Status

Spot-tailed earless lizard *Holbrookia lacerata*

central and southern Texas and adjacent Mexico; moderately open prairie-brushland; fairly flat areas free of vegetation or other obstructions, including disturbed areas; eats small invertebrates; eggs laid underground

Texas horned lizard *Phrynosoma cornutum* T

open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive, breeds March-September

PLANTS

		Federal Status	State Status

Irion County wild-buckwheat *Eriogonum mealleyi*

Texas endemic, grasslands and shallow stony soils over limestone and indurated caliche, often collected from ungrazed but sparsely vegetated roadsides, particularly where limestone or caliche is exposed on hilltops, flowering June-September

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MITCHELL COUNTY

BIRDS

		Federal Status	State Status
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T

year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south, occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	

migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Baird's Sparrow	*Ammodramus bairdii*		

shortgrass prairie with scattered low bushes and matted vegetation; mostly migratory in western half of State, though winters in Mexico and just across Rio Grande into Texas from Brewster through Hudspeth counties

Bald Eagle	*Haliaeetus leucocephalus*	DL	T

found primarily near rivers and large lakes, nests in tall trees or on cliffs near water; communally roosts, especially in winter, hunts live prey, scavenges, and pirates food from other birds

Ferruginous Hawk	*Buteo regalis*		

open country, primarily prairies, plains, and badlands; nests in tall trees along streams or on steep slopes, cliff ledges, river-cut banks, hillsides, power line towers, year-round resident in northwestern high plains, wintering elsewhere throughout western 2/3 of Texas

Interior Least Tern	*Sterna antillarum athalassos*	LE	E

subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony

Mountain Plover	*Charadrius montanus*		

breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous

Peregrine Falcon	*Falco peregrinus*	DL	T

both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south, subspecies (F. p. anatum) is also a resident breeder in west Texas, the two subspecies' listing statuses differ, F p. tundrius is no longer listed in Texas, but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level; see subspecies for habitat

Snowy Plover	*Charadrius alexandrinus*		

formerly an uncommon breeder in the Panhandle; potential migrant, winter along coast

MITCHELL COUNTY

BIRDS

		Federal Status	State Status
Sprague's Pipit	*Anthus spragueii*	C	

only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant; strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges

Western Burrowing Owl *Athene cunicularia hypugaea*

open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Western Snowy Plover *Charadrius alexandrinus nivosus*

uncommon breeder in the Panhandle; potential migrant; winter along coast

		Federal Status	State Status
Whooping Crane	*Grus americana*	LE	E

potential migrant via plains throughout most of state to coast, winters in coastal marshes of Aransas, Calhoun, and Refugio counties

MAMMALS

		Federal Status	State Status
Black-footed ferret	*Mustela nigripes*	LE	

extirpated; inhabited prairie dog towns in the general area

Black-tailed prairie dog *Cynomys ludovicianus*

dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups

Cave myotis bat *Myotis velifer*

colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore

		Federal Status	State Status
Gray wolf	*Canis lupus*	LE	E

extirpated; formerly known throughout the western two-thirds of the state in forests, brushlands, or grasslands

Pale Townsend's big-eared bat *Corynorhinus townsendii pallescens*

roosts in caves, abandoned mine tunnels, and occasionally old buildings; hibernates in groups during winter; in summer months, males and females separate into solitary roosts and maternity colonies, respectively; single offspring born May-June; opportunistic insectivore

REPTILES

		Federal Status	State Status
Concho water snake	*Nerodia paucimaculata*	DL	

Texas endemic, Concho and Colorado river systems, shallow fast-flowing water with a rocky or gravelly substrate preferred; adults can be found in deep water with mud bottoms; breeding March-October

MITCHELL COUNTY

REPTILES

		Federal Status	State Status
Spot-tailed earless lizard	*Holbrookia lacerata*		

central and southern Texas and adjacent Mexico; moderately open prairie-brushland; fairly flat areas free of vegetation or other obstructions, including disturbed areas; eats small invertebrates; eggs laid underground

Texas horned lizard	*Phrynosoma cornutum*		T

open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive, breeds March-September

PLANTS

		Federal Status	State Status
Dwarf broomspurge	*Chamaesyce jejuna*		

according to specimen collections, found on grama-grass prairie on caliche uplands, also dry caliche slopes, and limestone hills; flowering late March through July

Texas poppy-mallow	*Callirhoe scabriuscula*	LE	E

Texas endemic; grasslands and open oak shrublands or mesquite woodlands on deep, loose sands (Tivoli Series) of ancient and contemporary Colorado River terraces; flowering (April-) May-June; in late July the plants die back to the taproots, in late August-September basal rosettes form, in April the flowering stems bolt

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NOLAN COUNTY

BIRDS		Federal Status	State Status
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T

year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south, occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	

migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Baird's Sparrow	*Ammodramus bairdii*		

shortgrass prairie with scattered low bushes and matted vegetation; mostly migratory in western half of State, though winters in Mexico and just across Rio Grande into Texas from Brewster through Hudspeth counties

Bald Eagle	*Haliaeetus leucocephalus*	DL	T

found primarily near rivers and large lakes, nests in tall trees or on cliffs near water; communally roosts, especially in winter, hunts live prey, scavenges, and pirates food from other birds

Black-capped Vireo	*Vireo atricapilla*	LE	E

oak-juniper woodlands with distinctive patchy, two-layered aspect; shrub and tree layer with open, grassy spaces; requires foliage reaching to ground level for nesting cover, return to same territory, or one nearby, year after year; deciduous and broad-leaved shrubs and trees provide insects for feeding; species composition less important than presence of adequate broad-leaved shrubs, foliage to ground level, and required structure; nesting season March-late summer

Ferruginous Hawk	*Buteo regalis*		

open country, primarily prairies, plains, and badlands; nests in tall trees along streams or on steep slopes, cliff ledges, river-cut banks, hillsides, power line towers; year-round resident in northwestern high plains, wintering elsewhere throughout western 2/3 of Texas

Mountain Plover	*Charadrius montanus*		

breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields, primarily insectivorous

Peregrine Falcon	*Falco peregrinus*	DL	T

both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south, subspecies (F. p. anatum) is also a resident breeder in west Texas, the two subspecies' listing statuses differ, F.p. tundrius is no longer listed in Texas; but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level, see subspecies for habitat

NOLAN COUNTY

BIRDS		Federal Status	State Status
Snowy Plover	*Charadrius alexandrinus*		

formerly an uncommon breeder in the Panhandle, potential migrant; winter along coast

Sprague's Pipit	*Anthus spragueii*	C	

only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant, strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges

Western Burrowing Owl	*Athene cunicularia hypugaea*		

open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports, nests and roosts in abandoned burrows

Western Snowy Plover	*Charadrius alexandrinus nivosus*		

uncommon breeder in the Panhandle, potential migrant; winter along coast

Whooping Crane	*Grus americana*	LE	E

potential migrant via plains throughout most of state to coast, winters in coastal marshes of Aransas, Calhoun, and Refugio counties

MAMMALS		Federal Status	State Status
Black-footed ferret	*Mustela nigripes*	LE	

extirpated; inhabited prairie dog towns in the general area

Black-tailed prairie dog	*Cynomys ludovicianus*		

dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups

Cave myotis bat	*Myotis velifer*		

colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore

Gray wolf	*Canis lupus*	LE	E

extirpated; formerly known throughout the western two-thirds of the state in forests, brushlands, or grasslands

Plains spotted skunk	*Spilogale putorius interrupta*		

catholic; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie

NOLAN COUNTY

REPTILES

		Federal Status	State Status
Spot-tailed earless lizard	*Holbrookia lacerata*		

central and southern Texas and adjacent Mexico; moderately open prairie-brushland; fairly flat areas free of vegetation or other obstructions, including disturbed areas; eats small invertebrates; eggs laid underground

		Federal Status	State Status
Texas horned lizard	*Phrynosoma cornutum*		T

open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September

PLANTS

		Federal Status	State Status
Dwarf broomspurge	*Chamaesyce jejuna*		

according to specimen collections, found on grama-grass prairie on caliche uplands, also dry caliche slopes, and limestone hills; flowering late March through July

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SCURRY COUNTY

BIRDS

		Federal Status	State Status
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T

year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south, occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	

migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Baird's Sparrow	*Ammodramus bairdii*		

shortgrass prairie with scattered low bushes and matted vegetation; mostly migratory in western half of State, though winters in Mexico and just across Rio Grande into Texas from Brewster through Hudspeth counties

Bald Eagle	*Haliaeetus leucocephalus*	DL	T

found primarily near rivers and large lakes, nests in tall trees or on cliffs near water; communally roosts, especially in winter, hunts live prey, scavenges, and pirates food from other birds

Ferruginous Hawk	*Buteo regalis*		

open country, primarily prairies, plains, and badlands; nests in tall trees along streams or on steep slopes, cliff ledges, river-cut banks, hillsides, power line towers, year-round resident in northwestern high plains, wintering elsewhere throughout western 2/3 of Texas

Interior Least Tern	*Sterna antillarum athalassos*	LE	E

subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony

Mountain Plover	*Charadrius montanus*		

breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous

Peregrine Falcon	*Falco peregrinus*	DL	T

both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south; subspecies (F. p. anatum) is also a resident breeder in west Texas, the two subspecies' listing statuses differ, F p. tundrius is no longer listed in Texas, but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level; see subspecies for habitat

Snowy Plover	*Charadrius alexandrinus*		

formerly an uncommon breeder in the Panhandle; potential migrant, winter along coast

SCURRY COUNTY

BIRDS

		Federal Status	State Status
Sprague's Pipit	*Anthus spragueii*	C	

only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant; strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges

Western Burrowing Owl *Athene cunicularia hypugaea*

open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Western Snowy Plover *Charadrius alexandrinus nivosus*

uncommon breeder in the Panhandle; potential migrant; winter along coast

		Federal Status	State Status
Whooping Crane	*Grus americana*	LE	E

potential migrant via plains throughout most of state to coast, winters in coastal marshes of Aransas, Calhoun, and Refugio counties

MAMMALS

		Federal Status	State Status
Black-footed ferret	*Mustela nigripes*	LE	

extirpated; inhabited prairie dog towns in the general area

Black-tailed prairie dog *Cynomys ludovicianus*

dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups

Cave myotis bat *Myotis velifer*

colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore

		Federal Status	State Status
Gray wolf	*Canis lupus*	LE	E

extirpated; formerly known throughout the western two-thirds of the state in forests, brushlands, or grasslands

Pale Townsend's big-eared bat *Corynorhinus townsendii pallescens*

roosts in caves, abandoned mine tunnels, and occasionally old buildings; hibernates in groups during winter; in summer months, males and females separate into solitary roosts and maternity colonies, respectively; single offspring born May-June; opportunistic insectivore

Plains spotted skunk *Spilogale putorius interrupta*

catholic; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands, prefers wooded, brushy areas and tallgrass prairie

SCURRY COUNTY

REPTILES		Federal Status	State Status
Texas horned lizard	*Phrynosoma cornutum*		T

open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September

PLANTS		Federal Status	State Status
Texas poppy-mallow	*Callirhoe scabriuscula*	LE	E

Texas endemic; grasslands and open oak shrublands or mesquite woodlands on deep, loose sands (Tivoli Series) of ancient and contemporary Colorado River terraces; flowering (April-) May-June; in late July the plants die back to the taproots, in late August-September basal rosettes form, in April the flowering stems bolt

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STERLING COUNTY

BIRDS

		Federal Status	State Status
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T

year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south, occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Arctic Peregrine Falcon	*Falco peregrinus tundrius*	DL	

migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands

Baird's Sparrow	*Ammodramus bairdii*		

shortgrass prairie with scattered low bushes and matted vegetation; mostly migratory in western half of State, though winters in Mexico and just across Rio Grande into Texas from Brewster through Hudspeth counties

Bald Eagle	*Haliaeetus leucocephalus*	DL	T

found primarily near rivers and large lakes, nests in tall trees or on cliffs near water; communally roosts, especially in winter, hunts live prey, scavenges, and pirates food from other birds

Black-capped Vireo	*Vireo atricapilla*	LE	E

oak-juniper woodlands with distinctive patchy, two-layered aspect; shrub and tree layer with open, grassy spaces; requires foliage reaching to ground level for nesting cover, return to same territory, or one nearby, year after year; deciduous and broad-leaved shrubs and trees provide insects for feeding; species composition less important than presence of adequate broad-leaved shrubs, foliage to ground level, and required structure; nesting season March-late summer

Ferruginous Hawk	*Buteo regalis*		

open country, primarily prairies, plains, and badlands; nests in tall trees along streams or on steep slopes, cliff ledges, river-cut banks, hillsides, power line towers; year-round resident in northwestern high plains, wintering elsewhere throughout western 2/3 of Texas

Mountain Plover	*Charadrius montanus*		

breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields, primarily insectivorous

Peregrine Falcon	*Falco peregrinus*	DL	T

both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south, subspecies (F. p. anatum) is also a resident breeder in west Texas, the two subspecies' listing statuses differ, F.p. tundrius is no longer listed in Texas; but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level, see subspecies for habitat

STERLING COUNTY

BIRDS

		Federal Status	State Status
Snowy Plover	*Charadrius alexandrinus*		

formerly an uncommon breeder in the Panhandle, potential migrant; winter along coast

Sprague's Pipit	*Anthus spragueii*	C	

only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant, strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges

Western Burrowing Owl	*Athene cunicularia hypugaea*		

open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports, nests and roosts in abandoned burrows

Western Snowy Plover	*Charadrius alexandrinus nivosus*		

uncommon breeder in the Panhandle, potential migrant; winter along coast

Whooping Crane	*Grus americana*	LE	E

potential migrant via plains throughout most of state to coast, winters in coastal marshes of Aransas, Calhoun, and Refugio counties

MAMMALS

		Federal Status	State Status
Black-footed ferret	*Mustela nigripes*	LE	

extirpated; inhabited prairie dog towns in the general area

Black-tailed prairie dog	*Cynomys ludovicianus*		

dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups

Cave myotis bat	*Myotis velifer*		

colonial and cave-dwelling, also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore

Gray wolf	*Canis lupus*	LE	E

extirpated; formerly known throughout the western two-thirds of the state in forests, brushlands, or grasslands

Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*		

roosts in caves, abandoned mine tunnels, and occasionally old buildings, hibernates in groups during winter; in summer months, males and females separate into solitary roosts and maternity colonies, respectively; single offspring born May-June; opportunistic insectivore

STERLING COUNTY

MOLLUSKS

		Federal Status	State Status
Texas pimpleback	*Quadrula petrina*	C	T

mud, gravel and sand substrates, generally in areas with slow flow rates; Colorado and Guadalupe river basins

REPTILES

		Federal Status	State Status
Spot-tailed earless lizard	*Holbrookia lacerata*		

central and southern Texas and adjacent Mexico; moderately open prairie-brushland; fairly flat areas free of vegetation or other obstructions, including disturbed areas; eats small invertebrates; eggs laid underground

Texas horned lizard	*Phrynosoma cornutum*		T

open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September

PLANTS

		Federal Status	State Status
Irion County wild-buckwheat	*Eriogonum mealleyi*		

Texas endemic; grasslands and shallow stony soils over limestone and indurated caliche, often collected from ungrazed but sparsely vegetated roadsides, particularly where limestone or caliche is exposed on hilltops; flowering June-September