BIOLOGICAL ASSESSMENT

PROPOSED RED GATE POWER PLANT AND LATERAL PROJECT

HIDALGO AND STARR COUNTIES, TEXAS

PREPARED FOR

SOUTH TEXAS ELECTRIC COOPERATIVE, INC.

PREPARED BY

Blanton & Associates, Inc.
ENVIRONMENTAL CONSULTING • PLANNING • PROJECT MANAGEMENT
5 LAKEWAY CENTRE COURT, SUITE 200
LAKEWAY, TEXAS 78734
512-264-1095
BLANTONASSOCIATES.COM

AUGUST 2014

EXECUTIVE SUMMARY

South Texas Electric Cooperative, Inc. (Nursery, Texas) (STEC) has submitted a Greenhouse Gas (GHG) Prevention of Significant Deterioration (PSD) permit application for the proposed Red Gate Power Plant project in Hidalgo and Starr Counties, Texas. The federal permitting process requires compliance with Section 7 of the Endangered Species Act (1973) as amended (ESA). This Biological Assessment (BA) was commissioned to fulfill the ESA requirements.

The purpose of the proposed project is to provide a new, stable source of electrical power to meet growing statewide demand. The project would consist of two essential elements: (a) the power generating facility and (b) an approximately 25-mile long natural gas pipeline. The power plant would be built by an engineering, procurement, and construction firm under contract with STEC, and operated by STEC. The power generating facility would consist of 12 spark ignition, reciprocating, internal combustion engines fired with natural gas. This facility would also require ancillary structures (closed-loop cooling radiators, operations and maintenance structures, and a switch yard). The engines would have a nominal power output of roughly 18.75 megawatts (MW) each, for a total generation capability of approximately 225 MW. The natural gas pipeline would be built and operated by NET Midstream, LLC (Houston, Texas) under contract for STEC. It is anticipated that construction would commence in the 4th quarter of 2014. The anticipated commercial operation date for the project is November 2015.

The Action Area for this BA consists of two components:

(a) **Dispersion Modeling *de minimis* Effects Boundary**. This boundary was determined using air dispersion modeling conducted in support of the non-GHG PSD permit application to define the distance beyond which impacts from emissions would disperse from the power plant to a *de minimis* (insignificant) concentration level. This component is circular, centered on the proposed power generating facility, and based on the modeling results, has a radius of approximately 1.86 miles (3 kilometers), and an area of approximately 6,999 acres. This portion of the Action Area is wholly within central Hidalgo County.

(b) **Natural Gas Pipeline Right-of-Way (ROW)**. The pipeline route would be approximately 25 miles long. The ROW would be 300 feet wide (150 feet either side of the centerline). The pipeline ROW begins in northeast Starr County and runs east to the proposed power generating facility in central Hidalgo County. Up to 891 acres would be cleared for pipeline construction. After construction, approximately 209 acres of that would be maintained as permanent easement.

Because these two components of the Action Area overlap by approximately 58 acres, the total area of the Action Area is 7,832 acres.

Section 7 of the ESA requires federal agencies to establish, through consultation (or conferencing for proposed species) with the United States Fish and Wildlife Service (USFWS), that their actions would not jeopardize the continued existence of any threatened, endangered, or proposed species, or result in the destruction or adverse modification of Designated Critical Habitat (DCH). This BA analyzes the potential effects of the proposed action on those species that are protected under the ESA with potential for occurrence in the Action Area, namely those, as determined by USFWS, having potential to occur in Hidalgo or Starr Counties.

Ten species are listed as *endangered* by USFWS under the authority of the ESA that have potential for occurrence in Hidalgo County or Starr County (see Summary Table, below). The BA has determined that the proposed action would not result in adverse impacts to any of the listed species for Hidalgo or Starr County, because it is virtually certain that they do not occur in the Action Area. The recommended determination of effect, therefore, is that the proposed action would have *no effect* on these ten species. Zapata bladderpod has DCH in southwest Starr County that is approximately 16 miles from the Action Area; therefore, the BA recommends a finding of *no effect* on Zapata bladderpod DCH by the proposed action.

These recommendations are summarized in the following table:

Recommended Determinations of Effect for Federally Listed Species with Potential for Occurrence in the Action Area

Listed Species		County Where Listed	Federal Status[1] / DCH[2]	Determination of Effect
Common Name	**Scientific Name**			
Mammalian Carnivores				
Gulf Coast Jaguarundi	*Herpailurus yagouaroundi cacomitli*	Hidalgo, Starr	Endangered	No Effect
			None	NA
Ocelot	*Leopardus pardalis*	Hidalgo, Starr	Endangered	No Effect
			None	NA
Birds				
Interior Least Tern	*Sterna antillarum*	Starr	Endangered	No Effect
			None	NA
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	Hidalgo, Starr	Endangered	No Effect
			None	NA
Flowering Plants				
Ashy Dogweed	*Thymnophylla tephroleuca*	Starr	Endangered	No Effect
			None	NA
Johnston's Frankenia	*Frankenia johnstonii*	Starr	Endangered	No Effect
			None	NA
Star Cactus	*Astrophytum asterias*	Hidalgo, Starr	Endangered	No Effect
			None	NA
Texas Ayenia	*Ayenia limitaris*	Hidalgo	Endangered	No Effect
			None	NA
Walker's Manioc	*Manihot walkerae*	Hidalgo, Starr	Endangered	No Effect
			None	NA
Zapata Bladderpod	*Lesquerella thamnophila*	Starr	Endangered	No Effect
			Yes	No Effect

(1) USFWS *Species by County Report*, June, 2014, for Hidalgo County, Texas and Starr County, Texas
(2) Designated Critical Habitat

Table of Contents

Figures

Tables

ABBREVIATIONS/ACRONYMS AND UNITS

Acronyms:

AERMOD	American Meteorological Society/EPA Atmospheric Dispersion Model
ASI	area of significant impact
AQRV	air quality related values
BA	Biological Assessment
BACT	Best Available Control Technology
BMP	best management practice
CAA	Clean Air Act (1970) as amended
CFR	Code of Federal Regulations
CO	carbon monoxide
DCH	Designated Critical Habitat
EHS	Environmental Health and Safety
EPA	Environmental Protection Agency
ERCOT	Electric Reliability Council of Texas
ESA	Endangered Species Act (1973) as amended
ESL	Effect Screening Level
FM	Farm-to-Market
GHG	greenhouse gas
H_2SO_4	sulfuric acid
HAP	hazardous air pollutant
HHV	higher heating value
IFC	International Financial Corporation
LANWR	Laguna Atascosa National Wildlife Refuge
LRGV	Lower Rio Grande Valley
MINWR	Matagorda Island National Wildlife Refuge
NAAQS	National Ambient Air Quality Standard
NLCD	National Land Cover Database
NOx	oxides of nitrogen
NPS	National Park Service
NSPS	New Source Performance Standards
PM	particulate matter
$PM_{2.5}$	particulate matter, 2.5 µm or less in diameter
PM_{10}	particulate matter, 10 µm or less in diameter
PSD	Prevention of Significant Deterioration
SCR	selective catalytic reduction
SF_6	sulfur hexafluoride
SI RICE	spark ignition reciprocating internal combustion engine
SIL	significant impact level
SO_2	sulfur dioxide
STEC	South Texas Electric Cooperative, Inc.
TCEQ	Texas Commission on Environmental Quality
TNDD	Texas Natural Diversity Database
TNRIS	Texas Natural Resources Information System
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department

TSP	total suspended particulates
USC	United States Code
USFWS	United States Fish and Wildlife Service
VOCs	volatile organic compounds

Units:

$	United States dollar
ac	acre
BTU	British thermal unit
dB	decibel
hp	horse power
kg	kilogram
km	kilometer
kW	kilowatt
L_{Aeq}	A-weighted equivalent sound level
m	meter
MW	megawatt
µm	micrometer
ppmvd	parts per million by volume, dry basis
tpy	tons per year

1.0 INTRODUCTION AND HISTORY

South Texas Electric Cooperative, Inc. (STEC) has submitted to the Region 6 office of the Environmental Protection Agency (EPA) a Greenhouse Gas (GHG) Prevention of Significant Deterioration (PSD) permit application for the proposed Red Gate Power Plant project (henceforth *Red Gate project*) in Hidalgo and Starr Counties, Texas (**Figure 1**). The EPA promulgated the *Tailoring Rule* for phased-in permitting of GHG-emitting sources on June 3, 2010. After January 2, 2011, new sources that have potential to emit 75,000 tons per year (tpy) or more of GHGs are subject to PSD permitting requirements. EPA issued the Federal Implementation Plan for Texas as a final rule on April 22, 2011, under which EPA will be the permitting authority for major sources of GHG. GHGs include the aggregate of carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (40 CFR 52.21(b)(49)(i)).

Federal GHG permitting creates a federal nexus requiring the applicant (STEC) to comply with Section 7 of the Endangered Species Act (1973) as amended (ESA). This Biological Assessment (BA) has been conducted in order to satisfy the Section 7 ESA requirements and provides the results of a detailed study of the potential effects of the proposed federal action on plant and wildlife species that are listed as threatened or endangered under the authority of the ESA. The BA is based on detailed reviews of the proposed actions and pertinent literature; on-site habitat and vegetation assessments; and an analysis of the potential impacts on federally listed species and designated critical habitat (DCH) due to the construction and operation of the facility within the Action Area (i.e., the area of potential impacts) (**Figure 2**). The Action Area is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 CFR 402.02).

1.1 Proposed Action

The Red Gate project would consist of the construction and operation of a new natural gas-fired electrical power plant and an associated natural gas pipeline (**Figure 1**).

The power generating facility would occupy approximately 21 acres of a 336-acre parcel owned by STEC in Hidalgo County, Texas (**Figure 1**). The power generating facility would consist of 12 spark-ignition reciprocating internal combustion engines (SI RICEs) fired with natural gas (**Figure 2**). The engines will have a nominal power output of roughly 18.75 megawatts (MW) each. The total power generation capacity of the Red Gate project would therefore be approximately 225 MW. The power generating facility's auxiliary equipment would consist of a diesel-fired emergency fire water pump engine, a diesel-fired emergency generator, and circuit breakers insulated with SF_6 (**Figure 2**).

Fuel (natural gas) would be delivered to the power generating facility by an approximately 25-mile long underground pipeline owned and operated by NET Midstream that would begin at a tie-in point at the Delmita compressor facility on the NET Mexico pipeline in Starr County, Texas (**Figure 1**). The pipeline would run through 209 acres of permanent easement.

Construction activities for the Red Gate project are anticipated to commence in the 4th quarter of 2014. The scheduled commercial operation date for the proposed project is November 2015.

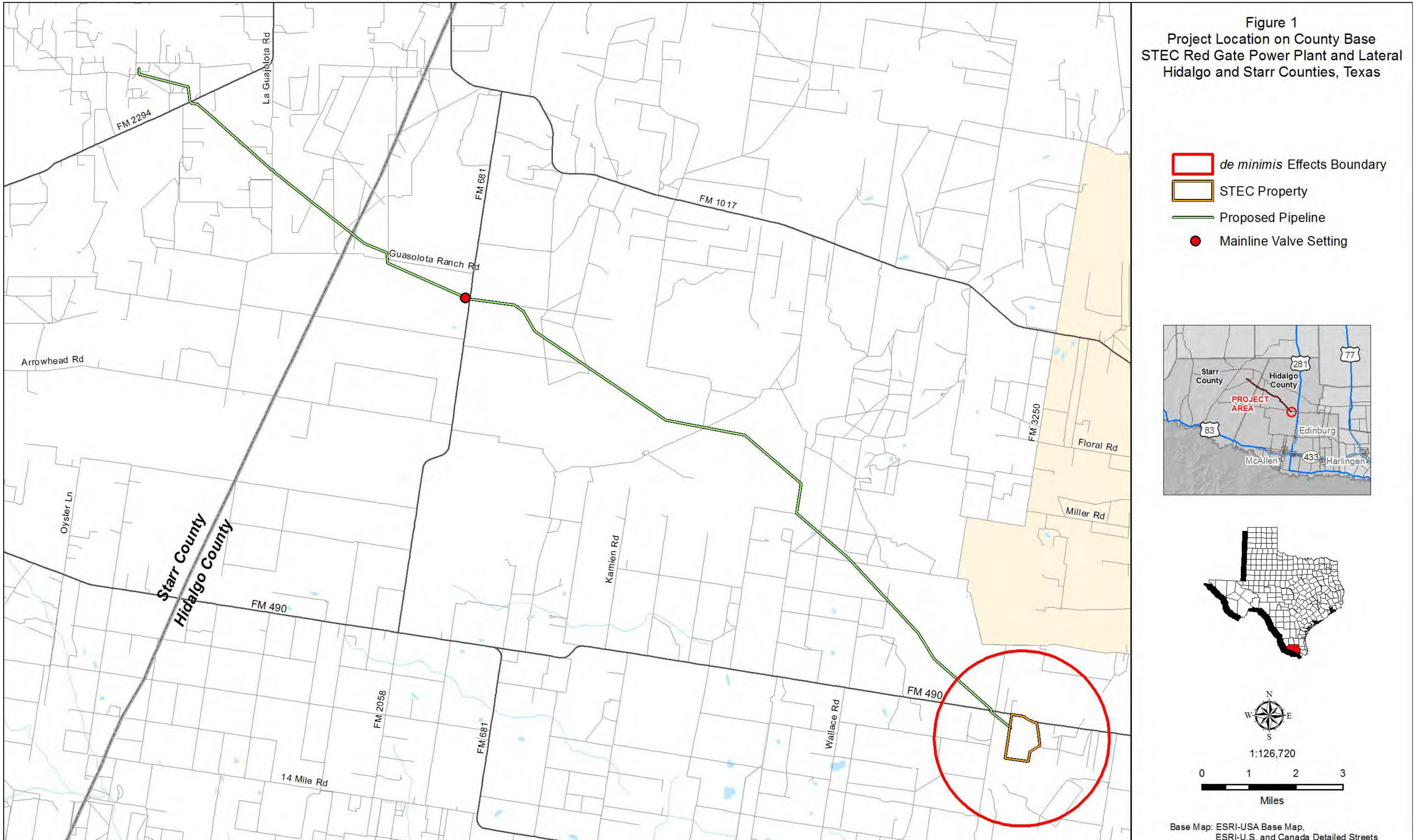


Figure 1
Project Location on County Base
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas
de minimis Effects Boundary
STEC Property
Proposed Pipeline
Mainline Valve Setting
FM 2294
La Guajolota Rd
FM 681
FM 1017
Guasolota Ranch Rd
Arrowhead Rd
FM 3250
Floral Rd
Miller Rd
Oyster Ln
Starr County
Hidalgo County
Kamien Rd
FM 490
FM 2058
Wallace Rd
14 Mile Rd
Starr County
Hidalgo County
PROJECT AREA
Edinburg
McAllen
Harlingen
1:126,720
0
1
2
3
Miles
Base Map: ESRI-USA Base Map,
ESRI-U.S. and Canada Detailed Streets

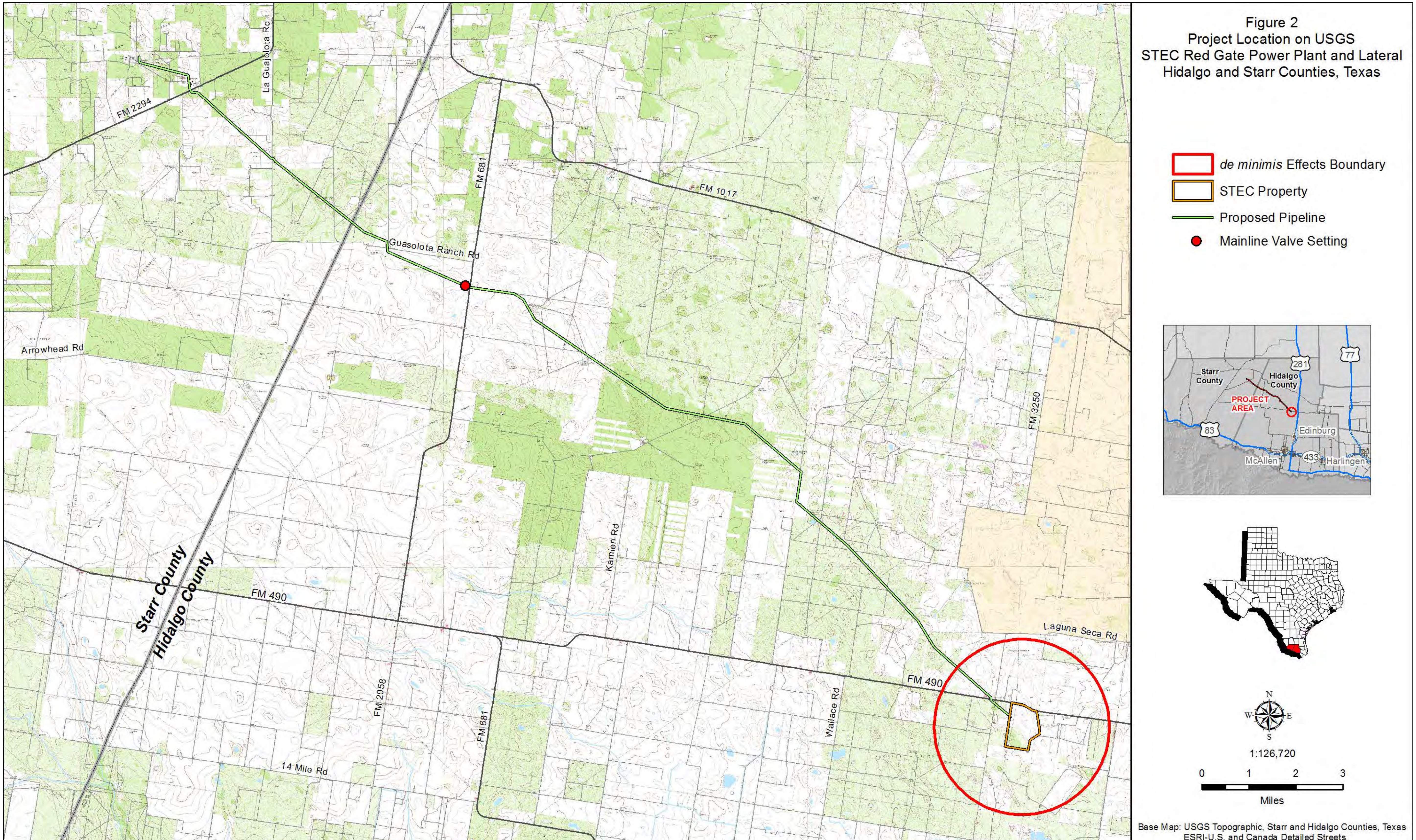


Figure 2
Project Location on USGS
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas
de minimis Effects Boundary
STEC Property
Proposed Pipeline
Mainline Valve Setting
La Guajolota Rd
FM 2294
FM 681
FM 1017
Guasolota Ranch Rd
Arrowhead Rd
FM 3250
Kamien Rd
Starr County
Hidalgo County
FM 490
Laguna Seca Rd
FM 2058
Wallace Rd
14 Mile Rd
Starr County
Hidalgo County
PROJECT AREA
281
77
83
Edinburg
McAllen
433
Harlingen
N
S
E
W
1:126,720
0
1
2
3
Miles
Base Map: USGS Topographic, Starr and Hidalgo Counties, Texas
ESRI-U.S. and Canada Detailed Streets

1.2 Alternatives

STEC conducted a technology assessment to evaluate various generation resource alternatives including simple-cycle combustion turbine, simple-cycle reciprocating engine, and combined-cycle combustion turbine based technologies. Wind and solar resources were not considered due to the inability to control dispatch to meet the intermittent load requirements of STEC's system. Of the technologies evaluated, reciprocating engines by Wärtsilä Corporation (Helsinki, Finland) were selected as the best combination of efficiency, flexibility, and cost. A simple-cycle reciprocating engine plant is composed of multiple smaller units whose dispatch can be optimized to maintain peak plant efficiency over a large operating load range. In the case of the Red Gate project, peak efficiencies can be achieved from approximately eight percent to 100 percent plant output.

In addition to maintaining high efficiency across a broad operating range, the reciprocating engines can be started and achieve full load in less than 10 minutes and achieve full emissions control in less than 30 minutes with no associated start-based maintenance penalty. This rapid start capability, combined with the small dispatchable unit size, minimizes part load operation and results in greater overall plant efficiency and reduced emissions.

1.3 Action Area

Action Area —The Action Area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). The analysis of federally listed species and DCH likely to be affected by the proposed action is focused on impacts within the Red Gate project's Action Area.

The Action Area for the Red Gate project has an approximate total area of 7,832 acres and is composed of two components:

- **Dispersion Modeling *de minimis* Effects Boundary**: A circular region based on dispersion modeling results determining the distance beyond which impacts from air emissions would be *de minimis*. See **Section 3.0**, *Determination of the Action Area*, for modeling details. This component of the Action Area is roughly 1.9 miles in radius from the center of the power generating facility site, and encompasses the entirety of the STEC property (**Figures 1** through **3**). This component is located in central Hidalgo County and comprises approximately 6,999 acres. Contained within this component are the:
    - **STEC Property** — The STEC Property is the land in Hidalgo County owned by STEC for the Red Gate project (**Figure 2**). The area of the STEC property is 336 acres. The power generating facility site would be located on the STEC property.
    - **Power Generating Facility Site** — The power generating facility site (**Figures 2** and **3**) is the location of the physical footprint of the proposed power generating infrastructure on the

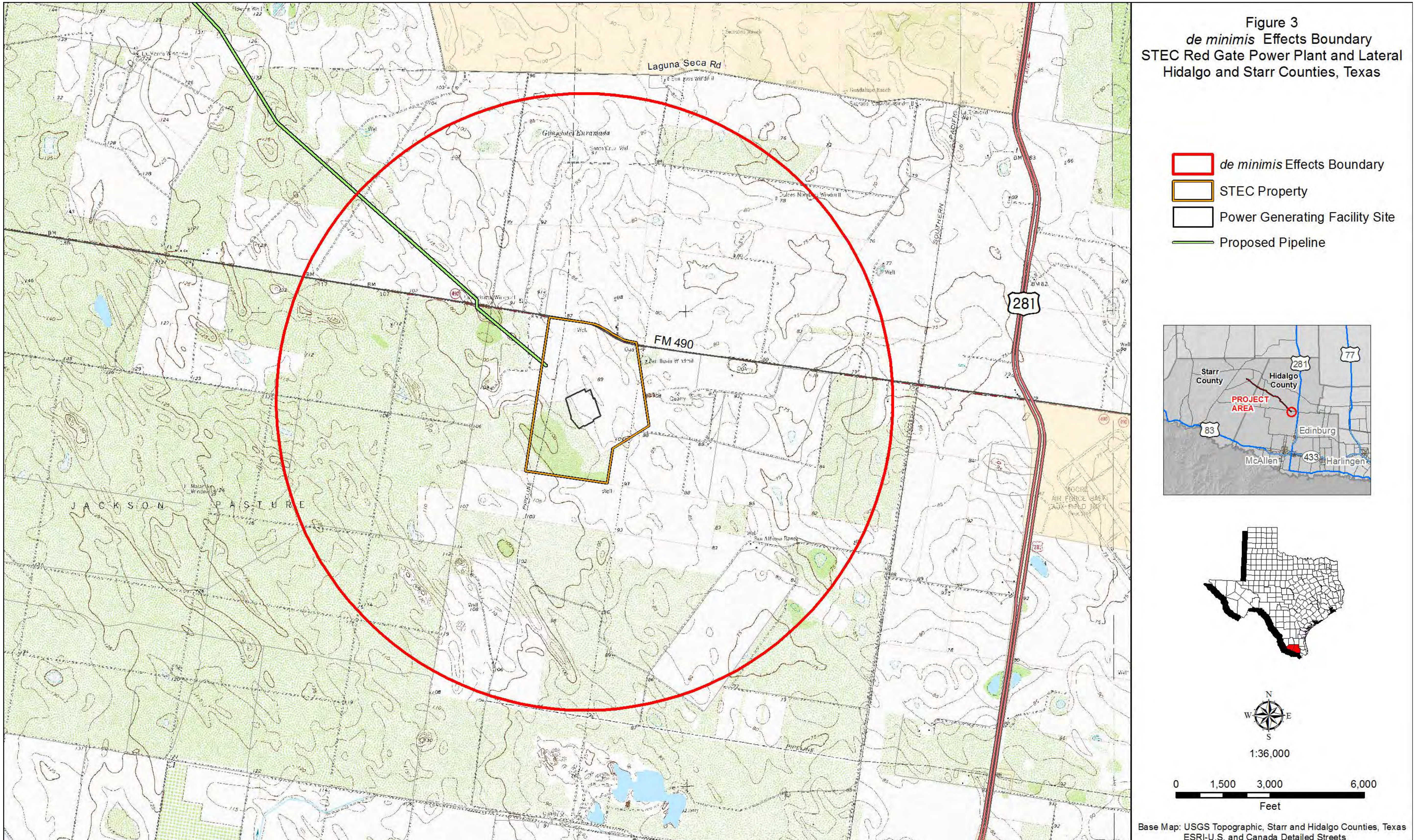


Figure 3
de minimis Effects Boundary
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas
de minimis Effects Boundary
STEC Property
Power Generating Facility Site
Proposed Pipeline
Laguna Seca Rd
FM 490
281
JACKSON PASTURE
Starr County
Hidalgo County
PROJECT AREA
Edinburg
McAllen
Harlingen
77
83
433
N
S
E
W
1:36,000
0
1,500
3,000
6,000
Feet
Base Map: USGS Topographic, Starr and Hidalgo Counties, Texas
ESRI-U.S. and Canada Detailed Streets

STEC Property. The power generating facility site is bordered to the north by FM 490, and is 2.3 miles west of U.S. Route 281, a major U.S. route running from Mexico to Canada. The area of the power generating facility is approximately 21 acres.

- **Gas Pipeline Right-of-Way (ROW)**: The ROW for the proposed gas pipeline route includes a 300-foot wide construction corridor as well as additional minor temporary workspace easements located at road crossings and other areas to accommodate construction needs (**Figures 1** and **2**). The total area of the gas pipeline ROW would be 891 acres lying in northeast Starr County and western and central Hidalgo County. The proposed pipeline route runs approximately 24.5 miles southeast from its point of interconnection in Delmita to the STEC Property. After construction, the pipeline would exist in an approximately 209-acre corridor of permanent maintained easement.

1.4 Endangered Species Act

The primary objective of this BA is to evaluate the effects of the proposed action on federally listed species and DCH protected under the ESA. A brief overview of the ESA is presented below to provide the context for the evaluation of regulatory compliance.

As described in the United States Code (USC), the ESA prohibits *take* of any federally listed species (16 USC §1538(a)), where take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC §1532(19)). The ESA requires that federal agencies ensure that any activity that an agency funds, authorizes, or carries out does not jeopardize the continued existence of a listed species or result in the destruction or adverse modification of DCH (16 USC §1536). The United States Fish and Wildlife Service (USFWS) has legislative authority under the ESA to list and monitor the status of wildlife species whose populations are considered to be imperiled (16 USC §1533). Species listed as *endangered* or *threatened* by the USFWS (henceforth, *listed species*) are provided full protection. This protection not only prohibits the direct take of a protected species, but also includes a prohibition of indirect take, such as destruction of DCH. Federal listings for protected animal and plants are provided in separate chapters of the Code of Federal Regulations (CFR): 50 CFR 17.11 for animals; and, 50 CFR 17.12 for plants. The federal process stratifies potential candidates based upon the species' biological vulnerabilities. The vulnerability decision is based upon many factors affecting the species within its range and is always linked to the best scientific data available to the USFWS. While on the *candidate* list, species are not provided any federal protection but may be protected by state law. ESA implementing regulations (50 CFR 402) require completing a BA to determine whether a proposed project may affect a listed species.

There are three possible determinations of effect considered under the ESA (USFWS and NMFS 1998):

1) No effect—A no-effect determination means there are absolutely no effects from the proposed action, positive or negative, to a listed species. No-effect determinations do not require written concurrence from the USFWS, unless the National Environmental Policy Act analysis is an Environmental Impact Statement. However, the USFWS may request copies of no-effect assessments for its files.

2) May affect, but is not likely to adversely affect—This determination may be reached for a proposed action where all effects are *beneficial*, *insignificant*, or *discountable*. Beneficial effects have contemporaneous positive effects without any adverse effect to the species or habitat. Balancing of positive and negative effects does not outweigh adverse effects. Insignificant effects relate to the size of the effects and should not reach the scale where take occurs. Discountable effects are those that are extremely unlikely to occur. This determination is usually reached through the *informal* consultation process, wherein written concurrence from the USFWS exempts the proposed action from *formal* consultation (USFWS and NMFS 1998).

3) May affect, and is likely to adversely affect—This determination means that all adverse effects cannot be avoided. Section 7 of the ESA requires that the federal action agency request initiation of formal consultation with the USFWS when a "may affect, likely to adversely affect" determination is made. A written request for formal consultation should accompany the BA. Note that, if an action agency and the USFWS find that the proposed action *may affect, and is likely to adversely affect* a listed species, or if the USFWS does not concur with an action agency's finding of *not likely to adversely affect,* then formal consultation is required between the action agency and the USFWS (USFWS and NMFS 1998). Formal consultation would result in the USFWS issuing a biological opinion as to whether the action, as proposed, would jeopardize the continued existence of any listed species.

This BA concludes with the recommended determinations of effect for each federally listed species with potential for occurrence in the Action Area.

1.5 Structure and Format of the Biological Assessment

This BA provides a project description (including identification of the Action Area), species and habitat descriptions, and the environmental baseline information necessary to support the analyses of the effects of the proposed action and to provide information to support the determinations of effect (50 CFR 402, USFWS and NMFS 1998). Accordingly, this report contains the following sections:

1) Introduction and History
2) Project Description
3) Identification and Discussion of the Action Area
4) Federally Listed Threatened or Endangered Species and Designated Critical Habitat of Potential Occurrence in the Action Area
5) Existing Conditions in the Action Area
6) Effects of the Proposed Action

2.0 PROJECT DESCRIPTION

2.1 Project Location

The proposed power plant will be located at a greenfield site approximately 10 miles north of Edinburg in central Hidalgo County (**Figure 1**). This county is currently designated as being in attainment/unclassifiable for all criteria pollutants (40 CFR Part 81). The site is approximately 2.5 miles west of United States (U.S.) Route 281, with Farm-to-Market 490 forming the northern border. The project's geographic centroid is located at 26.45075° latitude, -98.17684° longitude. The proposed gas pipeline route runs from northeastern Starr County to the power plant site in central Hidalgo County (**Figure 2**).

2.2 Project Purpose

STEC is a wholesale generation and transmission electricity provider serving eight member-distribution cooperatives over a 42-county area in south Texas. STEC's member cooperatives represent a combined retail load of over 214,745 wired and 21,062 non-wired connections. The eight member cooperatives are Karnes Electric Cooperative, Wharton County Electric Cooperative, Victoria Electric Cooperative, Jackson Electric Cooperative, San Patricio Electric Cooperative, Nueces Electric Cooperative, Magic Valley Electric Cooperative, and Medina Electric Cooperative. The first six of those were the founding members of STEC in 1944. Magic Valley and Medina Electric Cooperative became STEC members in 2005, effectively doubling the size of STEC's load. STEC serves its member load with a diverse resource portfolio incorporating lignite, natural gas, diesel, wind, and hydro-electric power from both owned and purchased resources.

The STEC system experienced strong growth in 2011 as a result of extreme weather conditions in both the summer and winter months. In 2011, sales to member cooperatives increased 11.78 percent to 5,014,032 MW hours. System peak load was 1,242 MW, up over 10 percent from the 1,127 MW peak load realized in 2010. Strong growth is expected to continue, with a projected 219 MW capacity additions required to serve the STEC member load by 2017. Currently, owned resources consist of a 177 MW 3x1 dual-fuel combined-cycle plant located in Victoria County and a 200 MW 24-unit natural gas-fired SI RICE plant located in Frio County. Several smaller units totaling approximately 90 MW are also available to provide power during peak demand periods. An additional 848 MW of generation capacity is provided through long-term power purchase contracts.

An infusion of wind-powered generation into the Energy Reliability Council of Texas (ERCOT) grid has introduced significant variability to the power supply and subsequently to the market clearing prices for energy and ancillary services. Despite the additional wind capacity, reserve margins in ERCOT as a whole are shrinking, putting additional upward pressure on market pricing. To incentivize construction of new generating units in the ERCOT region, pricing caps are currently at $4,500/MW with proposals being considered of up to $9,000/MW. This presents a significant risk to STEC members during peak periods when the member demand exceeds STEC's current resource capacity. To limit exposure of STEC member load to temporary price spikes, STEC proposes the construction and operation of the Red Gate project.

2.3 Construction Information

2.3.1 Power generating facility

The power generating facility would be constructed within the STEC Property (**Figure 3**) according to the following anticipated schedule:

Perform Site Geotechnical Investigation..July 2013
Receive GHG Permit, Issue Full Notice to Proceed, and Start Construction....... 4th Quarter 2014
Start Erection of Buildings and Tanks.. 4th Quarter 2014
Begin Start-up and Testing..August 2015
Complete Testing and Begin Commercial Operation...November 2015

Anticipated Construction Plan: Construction work will entail clearing and grading the site, placement of foundations with the design to be based on a site-specific geotechnical investigation. Construction activities will include erection of buildings and other structures (including tanks); and, installation of equipment, systems and controls necessary to make the facility a complete and functional power generating facility.

Evaporation Pond: The on-site, lined, approximately 0.3-acre evaporation pond will be constructed in the northeast part of the infrastructure footprint. The pond will be isolated by a berm, lined and have a capacity of approximately 1.3 acre-feet.

Dust and Noise: During construction, dust mobilization will be minimized by routinely employing best management practices (BMPs), and any potential impacts are projected to be negligible. Noise during construction is expected to be similar to existing noise levels in this agricultural setting.

2.3.2 Natural Gas Pipeline

NET Midstream LLC would construct an underground, 12-inch diameter, natural gas pipeline that would run from a tie-in point at the Delmita compressor facility to the power generating facility. The pipeline would be constructed according to the following anticipated schedule:

Commence construction...April 2015
Commission Pipeline and Place in Service ....August 2015
First Gas Test Flows to Power Plant .... September 2015
Commercial Operation .... November 2015

Excavation for the pipeline would create a trench that is 4.5 feet deep. The pipeline would be at least 3 feet deep throughout its course, except at road crossings where additional depth would be required. The width of the trench will vary due different types of equipment that will be utilized in the excavation of the trench as well as need for bell holes below grade pipe tie-ins (welds). Trenches excavated by trenching machine would be 30 inches wide; those made by excavators would be no more than four feet wide. Where bell holes are needed for below grade pipe tie-ins (welds), trench width would average six feet at the bottom and up to 15 feet at the top. Bell hole depth will vary due to site specific conditions, but should be no more than 12 feet deep in an extreme case. There will be approximately three bell holes per mile of pipeline.

The pipeline disturbance will be primarily confined to the permanent easement and the temporary work space, both of which combined would be 70 feet wide. There will be a small amount (less than five per cent of total disturbed acreage) of additional temporary work space at road crossings, points of intersections (bends), and at pipeline crossings. As required by regulatory statutes, there would be a mainline valve setting (**Figures 1** and **2**) that would have a surface impact of approximately 50 by 50 feet.

The site will be fenced and its surface will be rocked. For pipeline maintenance, a pig launcher and pig receiver would be installed at each end of the pipeline; the dimensions of each of these facilities would be similar to that required for the mainline valve setting. All surveys conducted in support of this BA for the pipeline ROW component of the Action Area were conducted within a 300-foot wide ROW in order to accommodate all anticipated temporary and permanent disturbances for the pipeline, including minor deviations from the proposed pipeline route, mainline valve setting and pig launcher/receiver sites.

2.4 Emissions and Emission Controls

The non-GHG PSD permit issued by the Texas Commission on Environmental Quality (TCEQ) in December 2013 indicates that the proposed power generating facility will be a major emission source and has emissions above the PSD thresholds for oxides of nitrogen (NOx), carbon monoxide (CO), volatile organic compounds (VOCs), particulate matter (PM) less than 10 micrometers in diameter (PM_{10}), and PM less than 2.5 micrometers in diameter ($PM_{2.5}$). Emissions from the SI RICE and auxiliary equipment are summarized in **Table 1**. SI RICE start-up emissions are included in the annual emissions, with two start-up/shutdown cycles per day assumed for each engine. Emissions are conservatively assumed to be 8,760 hours of operation per year at full load.

The proposed SI RICEs are subject to emission standards under the New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants regulations; however, emission rates proposed as Best Available Control Technology (BACT) are more stringent. The proposed SI RICEs are fired with pipeline quality natural gas, which contains negligible amounts of nitrogen and particulates compared to other fossil fuels. The proposed engines are lean-burn, i.e., natural gas and air are premixed in a low fuel/air ratio before being fed into the cylinders. In addition to the use of natural gas and good combustion practices, add-on control devices include selective catalytic reduction (SCR) and oxidation catalysts. Both of these add-on control devices are the top-ranked technology from the BACT analysis.

The diesel-fired emergency generator and fire pump engine are subject to NSPS Subpart IIII and will be certified by the manufacturers to comply with the applicable emission standards. The diesel-fired engines will also implement good combustion controls and have limited hours of operation. Limiting the annual operation will significantly reduce the potential annual emissions from these engines.

Table 1. Annual Emissions (tpy)

Equipment	Hours of Operation/ year	NOx	CO	SO_2	PM_{10} & $PM_{2.5}$ total[ǂ, #]	VOC	H_2SO_4[*]	HAPs[**]
SI Engines, ENG01-12	8,760	331.2	398.3	22.9	182.4	380.9	3.5	101.1
Generator, GEN01	500	0.83	0.96	0.002	0.06	0.28	0.0003	$6.4x10^{-4}$
Fire pump engine, FP01	100	0.04	0.05	0.02	0.004	0.01	0.0024	$7.2x10^{-5}$

[*] Assumes 10 percent conversion of SO_2 to SO_3, and 100 percent conversion of SO_3 to H_2SO_4.
[**] Hazardous Air Pollutants (HAPs) including formaldehyde.
[ǂ] Total PM: PM_{10} and $PM_{2.5}$ are assumed to be equivalent.
[#] Includes filterable and condensable PM.

2.5 Operation and Maintenance Information

2.5.1 Operation

In order to meet the peaking requirements of the proposed plant, the project includes SI RICEs operated in simple-cycle mode. The four-stroke lean-burn natural gas-fired engine model being proposed is the Wärtsilä 18V50SG. In order to meet the plant's nominal power output, 12 such engines would be required. **Figure 4** presents a diagram of the 12-engine configuration (emission points ENG01-ENG12). Proposed GHG-emitting auxiliary equipment includes an emergency diesel-fired fire pump (FP01) and black start generator (GEN01). The circuit breakers (CB-FUG01-02) associated with the transformers will be insulated with SF_6. The proposed combustion engines and auxiliary equipment are discussed in further detail below.

Spark Ignition Reciprocating Internal Combustion Engines

As mentioned above, the Wärtsilä 18V50SG engine is being proposed for the project. Two other SI RICEs were evaluated, and **Table 2** presents the engine specifications for comparison. Selection of an appropriate engine depends on many factors including project cost, engine energy efficiency and emissions, as well as schedule. The internal combustion engines considered are nominally rated at approximately 10 MW to 18.7 MW each. Thus, the number of engines would vary depending on the vendor (either 12 or 24). The SI RICEs will be natural gas-fired and assumed to operate 8,760 hours per year. As indicated in **Table 2** below, the operating load range varies, depending on the engine manufacturer.

Table 2. Engine Specifications for Comparison

Specification	Wärtsilä 18V50SG	Caterpillar G20CM34	MAN 20V35/44G
Engine Rating (MW)	18.7	10	10.2
Number of Engines	12	24	24
MMBTU/hr at 100 %	153.2	78.6	80.1
Heat Rate (BTU/kWh) (HHV* at 100 % Load)	8,302	8,512	8,450**
Electrical Efficiency (%)	48.6	45.7	47.3
Load Range (%)	40-100	25-100	50-100

* HHV (higher heating value)

** Converted from lower heating value, provided by manufacturer

As shown in the process flow diagram (**Figure 5**), add-on emission controls include SCR for NOx reduction and an oxidation catalyst for CO and VOC control.

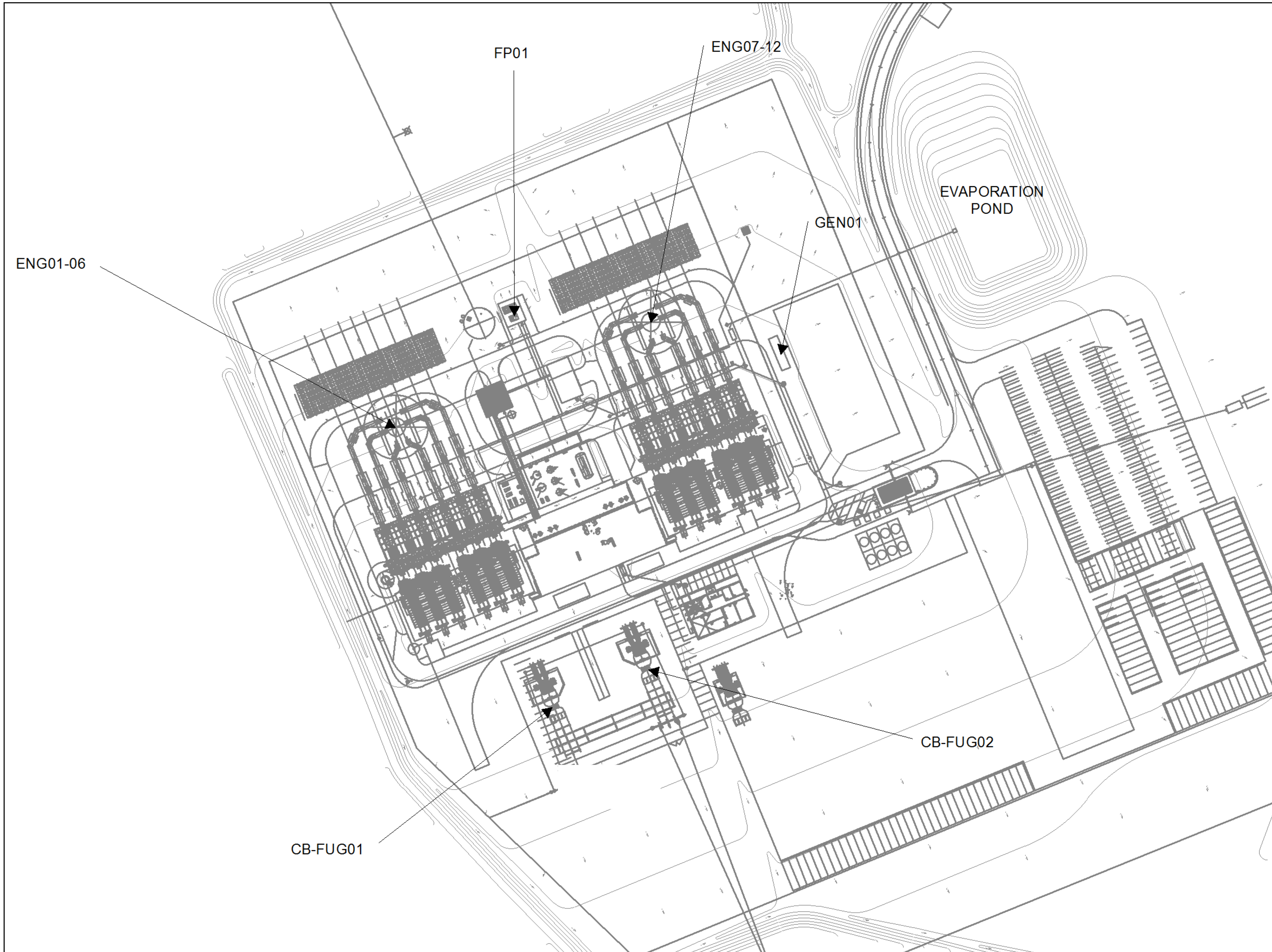


Figure 4
Power Generating Facility
Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

Power Generating Facility

N
W E
S

1:20,000

0 1,500 3,000
Feet

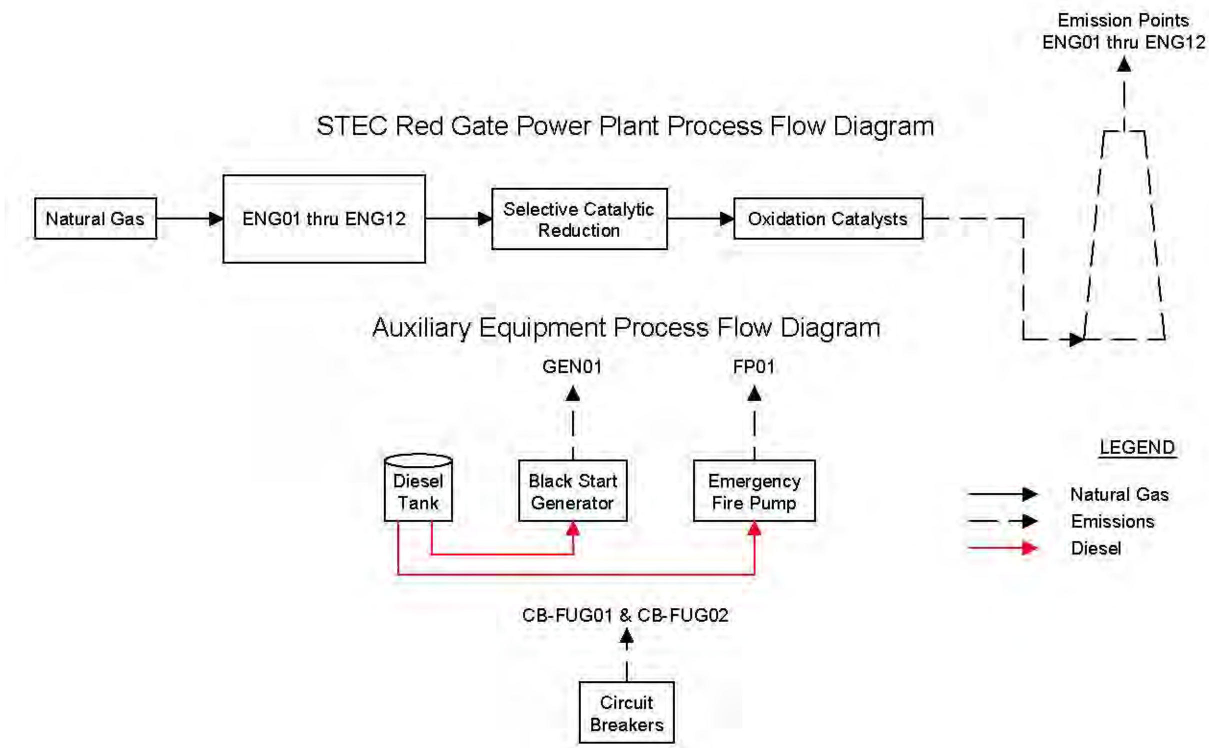


Figure 5. Process Flow Diagram

Auxiliary Equipment

Auxiliary equipment includes a 150 horsepower (hp) diesel-fired emergency fire pump engine and a 500 kW (670 hp) diesel-fired emergency black start generator. The emergency fire pump engine will supply water in the event of a fire at the facility. The hours of operation are limited to 100 hours per year for maintenance and required testing. The emergency black start generator is intended to provide black start capability for the ERCOT market; the function is to provide the plant with emergency back-up power in case of disconnection of the grid. Operation is assumed to be 500 hours per year.

High-voltage electrical equipment has been insulated with SF_6 for years because it is an efficient electrical insulator. The fluorinated compound is very stable and used in sealed systems that, under normal circumstances, do not leak. The circuit breakers on the high-voltage side of the transformers associated with the project are insulated with SF_6. For the purposes of estimating emissions, two large circuit breakers are assumed with a capacity of 200 lb each. Thus, the estimated SF_6 capacity is 400 lb.

2.5.2 Water Use and Handling (Cooling and Stormwater)

The Red Gate project makes use of reciprocating internal combustion engine (RICE) generators in a simple cycle configuration; therefore the water usage for the plant is small when compared to other generating technologies, such as combined cycle generation and solid fuel power generation. Water for the plant is provided from two wells located on the plant site with each well capable of supplying water at a rate of 200 to 250 gallons per minute (gpm). Water use for the plant includes makeup to the RICE generator closed cooling loop with a usage rate of approximately 0.002 gpm per engine (12,615 gallons per year), RICE generator turbo washing with a usage rate of four gpm per engine for 30 minutes per month (17,280 gallons per year), plant washdown water with a usage rate of 1.3 gpm (686,400 gallons per year), sanitary and potable water with a usage rate of 0.23 gpm (120,900 gallons per year), and fire water for the fire protection system with a one-time fire water tank fill of 240,000 gallons. Water will be supplied to all users via piping connected to the on-site supply wells. There will be no off site source of cooling water. The sanitary and potable wastewater will go to an on-site leach field. The washdown wastewater will be discharged into an on-site evaporation pond. There will be no off site discharge of wastewater associated with the project. Stormwater will be managed during construction in accordance with regulatory requirements, including use of appropriate BMPs.

2.5.3 Noise Levels

Noise is a potential direct or indirect effect on listed species that may cause their relocation away from the project or disruption of behaviors that are critical to survival. The project is located in a rural locale, with mixed agricultural, industrial, and transportation uses. There is no local noise ordinance governing the site, therefore the proposed facility will be designed to be conformant to the Equator Principles as defined by the International Finance Corporation (IFC) of the World Bank Group. The IFC has established industry-specific Environmental Health and Safety (EHS) Guidelines to set benchmark standards for environmental stewardship. The EHS Noise Level Guidelines specify the maximum A-weighted equivalent sound levels (L_{Aeq}) in decibels (dB) (sound-pressure level) permitted to occur beyond the property boundaries of the facility (IFC 2007). The EHS Guidelines establish that noise impacts should not result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

EPA guidance for the protection of the public health and welfare with an adequate margin of safety from environmental noise suggests a screening level of 55 dB (day-night average sound level) for outdoor settings (EPA 1974). By contrast, several studies report that noise up to 70 dB appears to cause little to no impairment to auditory function nor disturbance in behavior for a variety of animal species (EPA 1971). By conforming to the IFC-EHS Guidelines for environmental noise, the Red Gate project will also comply with the EPA's suggested guidance for protection of wildlife from environmental noise. Moreover, sound levels measured at a receptor at a distance from a point source fall five dB with each doubling of distance away from the source. Given the safe noise levels at or near the facility, as well as the additional distance between the facility and potential habitat for listed species, the noise levels from the Red Gate project facility are anticipated to have no adverse effect on any listed species.

2.5.4 Dust

Dust mobilization will be minimized during operations by routinely employing BMPs, and any potential impacts to listed species are expected to be negligible.

3.0 IDENTIFICATION AND DISCUSSION OF THE ACTION AREA

Per 50 CFR 402.02, the Action Area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." Direct impacts are those occurring immediately from construction or operating activities, such as excavation or air emissions, and are limited to the Project Site. Indirect impacts, which may include air emissions, noise, lighting, dust and erosion, are those that occur inside the Action Area but beyond the Project Site, and that may occur with delay after the proposed activity. The potential impacts to federally listed species and DCH are evaluated within the Action Area. The Action Area is determined by identifying the maximum area that the proposed action may result in significant direct and indirect impacts from the proposed action.

The Action Area for the proposed action is located in Hidalgo and Starr Counties, Texas, and is shown in **Figure 1**. As discussed in Section 1.3, the Action Area is 7832-acre region consisting of a) the area within the dispersion modeling *de minimis* effects boundary of 6,999 acres and b) the gas pipeline ROW of 891 acres. The total area of the Action Area is approximately 58 acres less than the sum of the areas within the *de minimis* effects boundary and pipeline ROW because they overlap. Specific methodologies for determining these two components are discussed below.

3.1 Air Pollutant Dispersion Zone Component of the Action Area

The air pollutant dispersion zone of the Action Area was determined using air dispersion modeling to define the distance from the source beyond which impact from emissions would, by stringent Federal and state regulatory definitions, be *de minimis,* or insignificant.

3.1.1 Federal and State Regulatory Background

The federal Clean Air Act (CAA) requires the EPA to establish National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to human health and the environment for various exposure times (or averaging periods). The CAA identifies two types of NAAQS:

Primary NAAQS: a level set to afford health protection to the general public and to "sensitive" populations such as asthmatics, children, and the elderly.

Secondary NAAQS: a level set to afford protection to public welfare by limiting damage to animals, crops, vegetation, and buildings, and by avoiding decreased visibility.

NAAQS have been set for six principal pollutants that are called "criteria" pollutants: CO; lead; nitrogen dioxide (NO_2); ozone (O_3); particle pollution, including $PM_{2.5}$ and PM_{10}; and, sulfur dioxide (SO_2). EPA has established a "significant impact level" (SIL) for each NAAQS. The SILs are set at concentrations significantly less than the corresponding NAAQS to levels below which potential impacts from air pollutants would be considered *de minimis*. In an air dispersion modeling analysis, the emissions from the project alone are modeled and compared to the SILs. A full impact analysis, consisting of a NAAQS analysis and PSD Increment analysis, is conducted for each pollutant and averaging period with predicted concentrations above the corresponding SIL.

The State of Texas requires additional modeling analyses for criteria and non-criteria pollutants. TCEQ has set Property Line Standards for H_2SO_4 mist and SO_2, and Effects Screening Levels (ESL) for speciated air contaminants. ESLs are "…used to evaluate the potential for effects to occur as a result of exposure to concentrations of constituents in the air. ESLs are based on data concerning health effects, odor/nuisance potential, and effects on vegetation." (TCEQ 2013). For each constituent evaluated, if predicted concentrations do not exceed the screening levels, then adverse health or welfare effects from it are not expected.

3.1.2 Results of Air Dispersion Analysis

As part of the PSD permit application submitted to TCEQ, emissions associated with the proposed project were modeled using the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) air dispersion model. The modeling determined the radius of an area of significant impact (ASI), i.e., the distance to which a pollutant would disperse from the source to a *de minimis* concentration level. **Table 3** presents the predicted concentrations compared with the *de minimis* levels associated with the Primary NAAQS, Secondary NAAQS, and TCEQ Property Line Standards.

Table 3. Red Gate Project ASI Results

Pollutant	Averaging Period	NAAQS		TCEQ Property Line Standard** (μg/m³)	SIL (μg/m³)	ASI Modeling Results	
		Primary (μg/m³)	Secondary (μg/m³)			Maximum Predicted Concentration (μg/m³)	ASI (km)
NO_2	1-Hour	188	*	*	7.5	12.5	1.3
	Annual	100	100	*	1	2.0	1.4
CO	1-Hour	40,000	*	*	2,000	17.7	0.0
	8-Hour	10,000	*	*	500	14.2	0.0
SO_2	30-Minutes	*	*	715	*	1.28	0.0
	1-Hour	196	*	*	7.8	1.28	0.0
	3-Hour	*	1300	*	25	1.15	0.0
	24-Hour	365	*	*	5	0.78	0.0
	Annual	80	*	*	1	0.16	0.0
PM_{10}	24-Hour	150	150	*	5	5.9	0.8
	Annual	*	*	*	1	1.36	1.0
$PM_{2.5}$	24-Hour	35	35	*	1.2	5.9	3.0
	Annual	12	12	*	0.3	1.36	2.7
H_2SO_4	1-Hour	*	*	50	*	0.2	0.0
	24-Hour	*	*	15	*	0.12	0.0
						Proposed Action Area	3.0

* Undefined / no regulatory definition
****** TCEQ *de minimis* value ≈ 2 percent of the standard, Air Dispersion Modeling Guidelines, RG-25, Feb. 1999.

Following TCEQ's guidance, the predicted concentrations of speciated contaminants were compared to their respective ESL. Only emissions of acrolein are above the *de minimis* level, thus the short-term emissions were modeled using AERMOD (**Table 4**). As shown in **Table 4**, the AERMOD predicted maximum concentrations for acrolein are below the TCEQ ESLs.

Table 4. Red Gate ESL Analysis Results

Pollutant	Averaging Period	Maximum Predicted Concentration* (µg/m^3)	TCEQ ESL (µg/m^3)	Exceeds ESL?
Acrolein	1-Hour	1.14	3.2	No
	Annual	0.09	0.15	No

* AERMOD modeling analysis results.

All short-term modeling concentrations correspond to the maximum proposed emission rates during normal operations. All annual modeling concentrations correspond to the proposed annual emission rates. The area of significant impact (ASI) for a given pollutant and averaging period is the circular region centered on the Project with a radius defined by the distance to predicted concentrations that are greater than the respective SILs. The Action Area is defined as the largest ASI modeled for any pollutant and averaging period. Based upon the 24-hour average $PM_{2.5}$ modeling results, the Action Area was determined to extend up to 3.0 km (1.86 miles) from the center of the proposed facility (**Figure 3**, **Table 3**). Because the Action Area is not defined by compliance with the NAAQS, but instead by the SILs and the TCEQ *de minimis* levels, all of which are significantly less than the NAAQS and the TCEQ ESLs, this approach is conservative, i.e., protective.

3.1.3 Additional Impacts – Sources of Air Pollution on Plants, Soils, and Animals

Guidance from Smith and Levenson (1980) was followed to assess whether the proposed action has the potential to exceed experimentally determined air quality related values (AQRV). AQRVs provide minimum levels at which adverse effects have been reported in the literature for use as screening concentrations. These screening concentrations can be concentrations of pollutants in ambient air, in soils, or in aerial plant tissues. This guidance has the following steps:

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

No trace metals are associated with the combustion of natural gas in reciprocating engines. Therefore, only Steps 1 and 2 of Smith and Levenson (1980) were required for this analysis.

Table 5 presents the results from the ambient air quality modeling analysis for pollutants included in Smith and Levenson (1980), i.e., SO_2, NO_2 and CO. As shown, the maximum predicted concentrations are orders of magnitude lower than their respective AQRV screening concentrations.

Table 5. Screening Analysis – Impacts on Plants, Soil, and Animals – Direct Impacts

Pollutant	**Averaging Period**	**Project Sources Only**			**Project Sources, Nearby Sources, Plus Background Concentration**	
		Maximum Predicted Concentration ($\mu g/m^3$)	**AQRV Screening Concentration† ($\mu g/m^3$)**	**PSD Class II Increment Consumption ($\mu g/m^3$)**	**Maximum Predicted Concentration ($\mu g/m^3$)**	**NAAQS ($\mu g/m^3$)**
SO_2	1-Hour	1.28	917	---	Not Required*	196
	3-Hour	1.15	786	512	Not Required*	1,300
	24-Hour	0.78	> 18**	91	Not Required*	365
	Annual	0.16	18	20	Not Required*	80
NO_2	1-Hour	12.5	>3,760**	---	154.76	188
	4-Hour	5.31	3,760	---	---	---
	8-Hour	5.31	3,760	---	---	---
	1-Month	2.00	564	---	---	---
	Annual	2.00	100	25	9.16	100
CO	1-Hour	112.75	>1,800,000**	---	Not Required*	40,000
	8-Hour	49.63	>1,800,000**	---	Not Required*	10,000
	1-Week	49.63	1,800,000	---	---	---

* The respective project source concentrations are *de minimis*. NAAQS modeling not required.
** Value not available. A conservative value (the next longer averaging period) is provided.
†Table 3.1, Smith and Levenson (1980).

For total suspended particulate matter (TSP), Smith and Levenson (1980) state that “no useable information other than that used to develop the ambient standards...was found in the review literature” and that “EPA’s current procedure for TSP should suffice for the review of generic TSP.” The EPA’s “current procedure” for TSP review corresponds to demonstrating compliance with the $PM_{2.5}$ and PM_{10} NAAQS. Secondary NAAQS apply to protection of animals, crops, and vegetation. Smith and Levenson (1980) state “…trace metals in TSP may have greater impacts on vegetation and soils than the total amount of particulates.” However, there are no trace metals associated with the combustion of natural gas in reciprocating engines. **Table 6** provides the PM_{10} and $PM_{2.5}$ NAAQS modeling results. As shown in **Tables 5 and 6**, the Red Gate project predicted concentrations are less than the AQRV screening concentrations, PSD Class II increment consumption concentrations, as well as the Primary and Secondary NAAQS. Therefore, according to this analysis, the proposed project would not result in significant impacts to animals, crops, or vegetation.

Table 6. NAAQS Modeling Results

Pollutant	Averaging Period	Project Sources Only	Project and Nearby Sources	
		Maximum Predicted Concentration* (µg/m^3)	Maximum Predicted Concentration** (µg/m^3)	NAAQS*** (µg/m^3)
PM_{10}	24-Hour	5.9	5.58	150
$PM_{2.5}$	24-Hour	5.9	6.35	35
	Annual	1.36	1.49	12

* The maximum concentrations for the project only are based on the highest first high modeling results.

** The maximum concentrations are based on the form of the NAAQS (for the project, inventory, and background based on the highest sixth high over five years).

*** Primary and Secondary NAAQS (have the same value).

3.2 Gas Pipeline ROW Component of the Action Area

Construction of the natural gas pipeline and all associated infrastructure, including the mainline valve setting and pig launcher/receiver sites, would occur in the 300-foot wide ROW defined in Section 1.3. Construction would result in direct impacts to all or part of the 300-foot gas pipeline ROW due to clearing of vegetation, movement of construction vehicles and personnel, trenching, and pipeline assembly. The permanent 70-foot wide easement would be periodically cleared for maintenance purposes, while all adjacent land within the 300-foot wide ROW would be allowed to revegetate. Details of the pipeline construction activities are provided in Section 2.3.2. Potential impacts to listed species are provided in Section 6.

4.0 FEDERALLY LISTED SPECIES AND DESIGNATED CRITICAL HABITAT WITH POTENTIAL FOR OCCURRENCE IN THE ACTION AREA

The following subsections identify and describe each of the ten federally listed threatened or endangered species with potential for occurrence in the Action Area according to current listings from the USFWS for Hidalgo or Starr Counties, Texas (USFWS 2014) (**Table 7**). These subsections also provide the results of habitat and/or presence-absence surveys conducted in the Action Area for each species. The Texas Natural Diversity Database (TNDD) (TPWD 2014) was queried to determine if any federally listed species have documented occurrences within the Action Area. No occurrences of any of the ten federally listed species were documented in the Action Area (**Figure 6**, **Table 7**). Lack of documentation in the TNDD, by NatureServe.org or eBird.org, for occurrence of a species in a given region is not proof of absence of a species from that region. The only species with potential for occurrence in Hidalgo or Starr Counties that has DCH is Zapata bladderpod; this DCH is 16 miles from the Action Area (**Figure 6**). The effects analysis, based on desktop analysis and survey results, for each species is presented in **Section 6**.

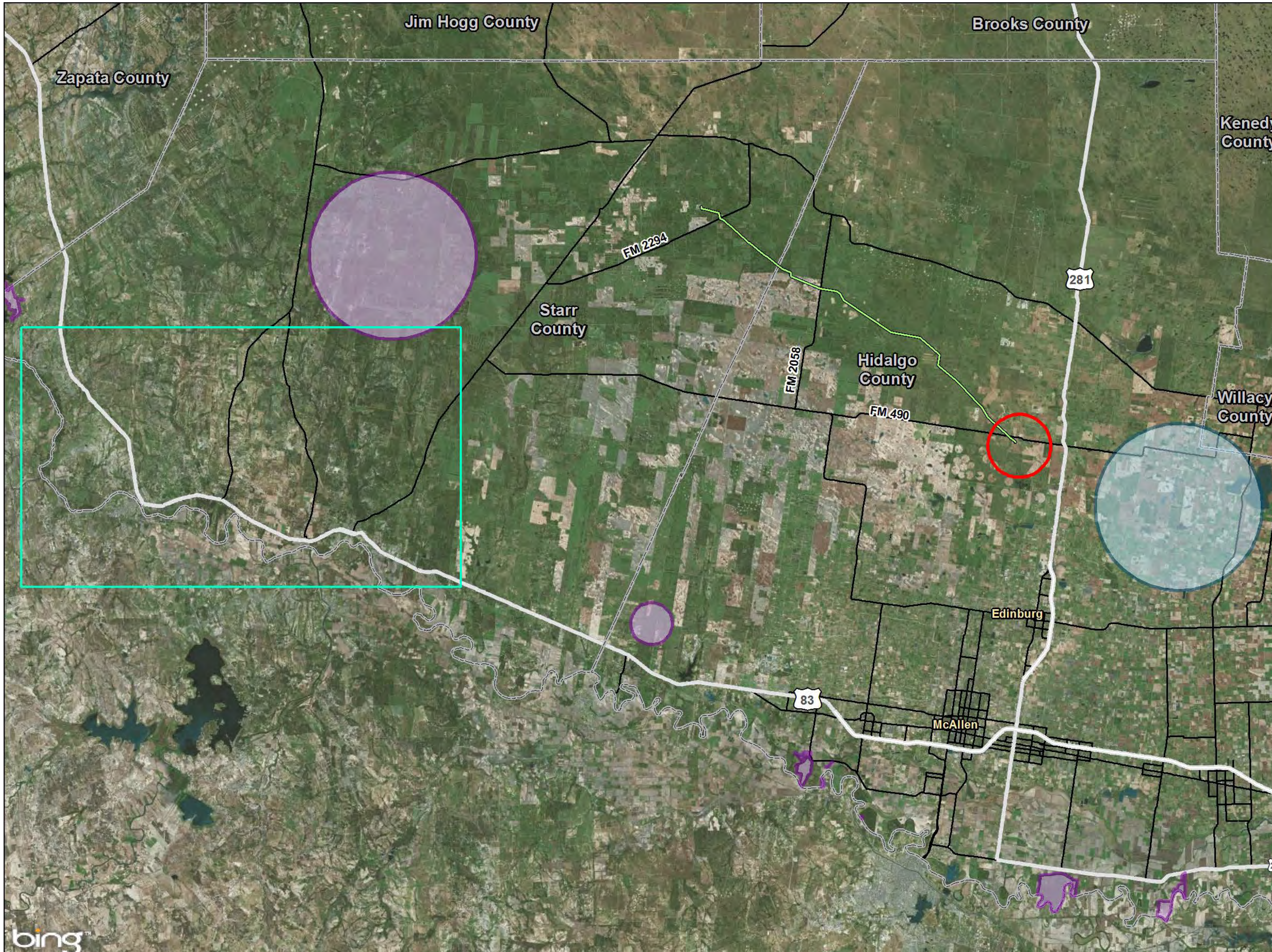


Figure 6
Texas Natural Diversity Database
and Designated Critical Habitat
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

de minimis Effects Boundary
Proposed Pipeline

Elements of Occurrence
Jaguarundi
Ocelot

Designated Critical Habitat
Zapata Bladderpod

N W E S

1:400,000

0 5 10
Miles

Service Layer Credits: © Harris Corp, Earthstar Geographics LLC Earthstar Geographics SIO © 2014 Microsoft Corporation

Table 7. ESA Listed Species for Hidalgo or Starr Counties, Texas.

Listed Species		County	Potential to Occur[1]	Federal Status[1]	Documented Occurrences within the Action Area
Common Name	**Scientific Name**				
Mammalian carnivores					
Gulf Coast Jaguarundi	*Herpailurus yagouaroundi cacomitli*	Hidalgo	yes	Endangered	None[2]
		Starr	yes		
Ocelot	*Leopardus pardalis*	Hidalgo	yes	Endangered	None[2]
		Starr	yes		
Birds					
Interior Least Tern	*Sterna antillarum*	Hidalgo	no	Endangered	None[2,3]
		Starr	yes		
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	Hidalgo	yes	Endangered	None[2,3]
		Starr	no		
Flowering plants					
Ashy Dogweed	*Thymnophylla tephroleuca*	Hidalgo	no	Endangered	None[2]
		Starr	yes		
Johnston's Frankenia	*Frankenia johnstonii*	Hidalgo	no	Endangered	None[2]
		Starr	yes		
Star Cactus	*Astrophytum asterias*	Hidalgo	yes	Endangered	None[2]
		Starr	yes		
Texas Ayenia	*Ayenia limitaris*	Hidalgo	yes	Endangered	None[2]
		Starr	no		
Walker's Manioc	*Manihot walkerae*	Hidalgo	yes	Endangered	None[2]
		Starr	yes		
Zapata Bladderpod	*Lesquerella thamnofila*	Hidalgo	no	Endangered	None[2]
		Starr	yes		

Sources: (1) USFWS 2014, (2) Texas Natural Diversity Database (TPWD 2014), (3) eBird.org (2014)

4.1 Gulf Coast Jaguarundi

History of federal listing: The U.S. population of the gulf coast jaguarundi (henceforth *jaguarundi*) was federally listed as endangered under the ESA in 1976 (USFWS 1976).

Description: The jaguarundi is a small, slender, long-tailed, short-legged, unspotted cat that can be described as "weasel-like" due to the flattened shape of its head and its manner of movement (Campbell 2003). There are two color phases: a grayish phase comprised of a salt-and-pepper gray that becomes more of a solid black in the winter, and a red phase with a reddish-brown body and brownish extremities and head (Schmidly 2004).

Life history: Little is known about the elusive jaguarundi in Texas. Most of the information is based on the Mexican populations and occasional sightings during ocelot surveys in Mexico. Jaguarundi are unique among wild cats in that they are primarily diurnal (TPWD 2013, Campbell 1994, Tewes and Grassman 2005), although they will also hunt at dawn and dusk (Schmidly 2004). Jaguarundi forage mainly on the ground for birds, rodents, rabbits, and reptiles but have been seen climbing trees for prey (Tewes and Grassman 2005, TPWD 2013).

Relatively little is known about their native breeding habits or life cycle. Jaguarundis are said to be solitary except during the mating season (November and December), and kits have been found in summer and winter (Campbell 2003, Schmidly 2004). Lifespan is thought to be up to 15 years.

Population: Currently, the known northern range limit of the jaguarundi is northern Mexico. A known population of jaguarundi lives in the state of Tamaulipas, Mexico, which borders the Texas counties of Cameron, Hidalgo, Starr and Zapata (Caso 2007). Historically, the jaguarundi is known to have occurred in south Texas from trapping and road-kill reports (TPWD 2014); however, the last verified jaguarundi in Texas was a road-killed individual on State Highway 4 east of Brownsville in Cameron County in 1986 (Tewes and Grassman 2005, Grassman 2006). Population estimates in Texas are not available due to a lack of credible presence data (i.e., photographs or carcasses), and it is unlikely that the species occurs in Texas (Tewes and Grassman 2005).

Habitat: The jaguarundi prefers dense thornshrub, one component of the Tamaulipan biotic province (USFWS 1990a). Although jaguarundis may be more tolerant of open area grasslands and pastures, large (greater than 100-acre) tracts of isolated dense brush or smaller tracts connected by brush corridors appear to be important habitat (TPWD 2013, Tewes and Grassman 2005). Historically, dense brush occurred throughout south Texas but in the 20th century this was reduced to less than one percent of its former distribution by conversion into agricultural and suburban land use (Grassman 2006, Tewes and Everett 1986).

Habitat Surveys: In January of 2013, and April, May and June of 2014, qualified biologists conducted 100% pedestrian surveys for potential jaguarundi thornshrub habitat in the Action Area. No suitable thornshrub habitat was documented within the Action Area. A total of 23.07 acres of moderately dense thornshrub habitat (76-95% horizontal canopy coverage) was documented within the Action Area; however, this habitat type consisted on 14 small, fragmented patches of 0.24 to 7.60 acres in size. Additionally, there exists no connectivity to larger, *optimal* habitat patches that would be capable of supporting one or more resident jaguarundis. The last documented occurrence of the jaguarundi in Texas was in Cameron County in 1986. There is no evidence that a jaguarundi population exists in the Action Area.

Documented occurrences within the Action Area: A search of the TNDD revealed no elements of occurrence for jaguarundi in Hidalgo or Starr Counties since 1993 (TPWD 2014). The vast majority of these historical elements of occurrence are within five miles of the Rio Grande. The Action Area is roughly 25 miles from the Rio Grande, and separated from it by urban and agricultural development. No historical elements of occurrence are within, or closer than 13 miles from, the Action Area.

4.2 Ocelot

History of federal listing: The foreign population of the ocelot was federally listed as endangered in 1972 and should have gained federal protection with the passage of the ESA in 1973. However, due to an oversight, the U.S. population of the ocelot was not formally listed as endangered until 1982 (USFWS 1982).

Description: The ocelot is a medium-sized, spotted cat similar in size to the bobcat, about 30 to 41 inches in length and weighing from 14 to 30 pounds (Campbell 2003). Its pelage is grayish or buffy and is heavily marked with black spots, small rings, blotches, and short bars (Schmidly 2004). Unlike the bobcat, the ocelot has a long tail that is ringed or marked with dark bars on the upper surface, parallel stripes running down the nape of the neck, much larger spots, and a shorter pelage (Campbell 2003, Schmidly 2004).

Life history: Ocelots are primarily nocturnal, normally beginning their activity at dusk when they commence their nightly hunt for rodents, rabbits, other small mammals, as well as birds, snakes, and lizards (Schmidly 2004, Tewes 2001). Mean home range sizes for male and female ocelots from Cameron County are 4.1 and 2.5 square miles, respectively (Navarro-Lopez 1985, Tewes 1986, Laack 1991). Male ocelots sometimes conduct exploratory trips, or *sallies*, beyond their normal home range, probably in search of females in estrus (Campbell 2003). Young males may disperse several miles from their natal range in search of new territory (Tewes 2001).

Females prepare a den in dense brush, and one or two kittens are born sometime between late spring and December (Campbell 2003). Male ocelots play no role in raising or protecting their offspring. Age to maturity of free-ranging ocelots is believed to be about 1.5 to two years. In captivity, ocelots have reached ages of about 20 years. Typical ages of free-ranging ocelots are four to five years with some wild individuals documented in Texas living to about eight years of age (Campbell 2003, USFWS 2010a).

Population: The ocelot is widely distributed from South Texas to South America (Novarro-Lopez 1985). Although ocelots were historically found in Arizona, a viable resident population has not been substantiated there. It is estimated that fewer than 100 ocelots remain in Texas with the majority distributed in Cameron and Willacy Counties (Tewes and Everett 1986, Jackson et al. 2005, Haines et al. 2006a). Three known breeding populations represent an estimated one-third of the total ocelot population in Texas: one located at Laguna Atascosa National Wildlife Refuge (LANWR) in Cameron County, and two in Willacy County on the Yturria Ranch and East El Sauz Ranch (Laack 1991, Tewes 2011, Tewes 2012). These populations are at least 30 miles from the Action Area.

Habitat: Ocelots prefer dense thornshrub and rocky areas typical of the Tamaulipan Biotic Province (USFWS 1990a, 2010a). Typical brush species include granjeno (*Celtis pallida*), brasil (*Condalia hookeri*), desert yaupon (*Schaefferia cuneifolia*), wolfberry (*Lycium* spp.), lotebush (*Ziziphus obtusifolia*), althorn goatbush (*Castela texana*), whitebrush (*Aloysia gratissima*), catclaw acacia (*Acacia greggii*), blackbrush acacia (*A. rigidula*), lantana (*Lantana* spp.), guayacan (*Guaicum angustifolium*), cenizo (*Leucophyllum frutescens*), elbowbush (*Forestiera angustifolia*), and Mexican persimmon (*Diospyros* *texana*), with some interspersed trees such as honey mesquite (*Prosopis glandulosa*), live oak (*Quercus virginiana*), Texas ebony (*Ebenopsis ebano*), and hackberry (C*eltis* spp.) (Campbell 2003).

As characterized by Tewes and colleagues for populations in south Texas, potential ocelot habitat depends in part on the degree of canopy cover and density of shrubs: *optimal* habitat has greater than 95 percent canopy cover of shrubs, while marginal, *sub-optimal I* habitat has 75 to 95 percent canopy cover (Navarro-Lopez 1985, Tewes 1986, Laack 1991, Harveson et al. 2004). Habitat with less than 75 percent canopy cover is considered to be inadequate (Campbell 2003) and avoidance of this habitat by ocelots has been documented (Horne 1998, Harveson et al. 2004). Tracts of at least 100 acres of dense thornshrub with greater than 75 percent canopy cover, or 75 acres of brush interconnected with other dense brush patches by corridors are important habitat for ocelots (Campbell 2003). Historically, potential ocelot habitat occurred throughout south Texas, but in the 20th century ocelot habitat has been reduced to less than one percent of its former distribution by agricultural, suburban and urban development (Tewes and Everett 1986, Grassman 2006).

Habitat Surveys: In January of 2013, and April, May and June of 2014, qualified biologists conducted 100% pedestrian surveys for potential ocelot thornshrub habitat in the Action Area. No *optimal* habitat was documented within the Action Area. A total of 23.1 acres of *sub-optimal I* habitat, comprising 14 patches of 0.2 to 7.6 acres each, was documented within the Action Area. This *sub-optimal I* habitat has no connectivity to *optimal* habitat patches capable of supporting one or more resident ocelots. The habitat assessment survey indicates that habitat capable of supporting an ocelot population does not exist in the Action Area.

Documented occurrences within the Action Area: A search of the TNDD (TPWD 2014) revealed no elements of occurrence for ocelot within the Action Area. However, an ocelot sighting was reported in 1984 that was 3.4 miles from the Action Area (TPWD 2014) (**Figure 6**). No evidence of ocelot presence (sightings, photographs or road kills) has been documented in the region since this 30 year-old element of occurrence. Additionally, a relatively recent survey for ocelots on the nearest known historical ocelot population in Willacy County (approximately 20 miles northeast of the Action Area) resulted in no ocelot observations (Haines et al. 2006b). These data strongly suggest that ocelots do not inhabit the Action Area.

4.3 Interior Least Tern

History of federal listing: The U.S. population of the interior least tern was federally listed as endangered under the ESA in 1985 (USFWS 1985).

Description: The interior least tern is the smallest of North American terns with a body length of 8.6 - 10.2 inches and average wingspan of 22 inches. This colonial nesting shorebird is characterized by a black crown, white forehead, grayish back and dorsal wing surfaces, snowy white undersurfaces and orange legs (USFWS 1985c, 1990c).

Life history: The interior least tern is piscivorous, feeding in shallow waters of rivers, streams and lakes. Other food items include crustaceans, insects, mollusks, and annelids. The nest is typically a shallow and inconspicuous depression in an open, sandy area, gravelly patch, or exposed flat. Egg laying and incubation occur from late May to early August, depending on the geographical location and availability of habitat. Chicks hatch after a 26-day incubation period. The interior least tern's home range during the breeding season usually is limited to a reach of river near the sandbar nesting site (Lott 2006, USFWS 1990c).

Population: Interior least tern annual reproductive success varies greatly along a given river or shoreline. Because tern's use ephemeral habitats, they are susceptible to frequent nest and chick loss. Consequently, there are great local differences in productivity. In 1987, total number of interior least terns reached 4,800. This is considerably higher than the 1,200 interior least terns estimated by a partial survey in 1975. There are no comprehensive historic numbers to compare with these figures, although early qualitative descriptions indicate that the interior least tern was rather common (Campbell 2003, USFWS 1990c). In Texas, interior least tern is quite rare along the Rio Grande, numbering about 80 individuals (USFWS 1985). Occurrence of the interior least tern in Starr or Hidalgo Counties would be considered exceptional (NatureServe 2014).

Habitat: The interior least tern is a migratory bird that breeds along inland river systems in the US and winters in Central and South America. It is adapted to lacustrine and riverine sandbar and gravel beach habitats of relatively large drainage systems for inland breeding sites. In recent times, this tern has been known to nest along the Canadian River near Canadian, Texas and along the Prairie Dog Town Fork of the Red River (Lott 2006, Campbell 2003, USFWS 1990c).

Documented occurrences within the Action Area: There are no documented occurrences of the interior least tern in Hidalgo or Starr Counties (eBird 2014, TPWD 2014).

Habitat and Presence-Absence Surveys: In April, May and June of 2014, qualified biologists and conducted 100% pedestrian surveys for interior least tern habitat in the Action Area. No habitat consistent with interior least tern breeding or nesting was observed in the Action Area. Based on a literature review of occupied habitats, the locations of known extant populations, and the habitat assessment that were conducted in the Action Area, there is no evidence that the interior least tern occurs in the Action Area.

4.4 Northern Aplomado Falcon

History of federal listing: The U.S. population of the northern aplomado falcon was federally listed as endangered under the ESA in 1986 (USFWS 1986).

Description: The northern aplomado falcon is a medium-sized falcon that ranges in length from 15 to 18 inches and in wingspan from 32 to 36 inches (Campbell 2003). The northern aplomado falcon is dark gray above with a buffy white breast and cinnamon patches on posterior under parts, and has a distinctive facial pattern that includes a black postocular stripe and a white or buffy stripe that extends back from the top of the eye and forms a narrow collar on back of the head (Oberholser 1974).

Life history: The northern aplomado falcon hunts prey individually, in pairs, and in family groups (Burnham et al. 2002). Small birds and insects are common prey items pursued in low horizontal flight, though pursuit is readily continued on foot through trees, brush, or dense grass (USFWS 1990b).

Northern aplomado falcons do not construct their own nests but appropriate stick platforms built by other raptors and corvids (Campbell 2003). In southern Texas, nests have been found in Spanish dagger (*Yucca treculeana*), honey mesquite, Texas ebony, and on artificial structures such as electric transmission poles. Recent surveys have found northern aplomado falcons nesting on the ground (Burnham et al. 2002). Northern aplomado falcons usually lay two to three brown speckled eggs. Both parents provide incubation (Campbell 2003).

Although little is known concerning seasonal movements of northern aplomado falcons, there is no evidence that they are migratory (Campbell 2003). Adult pairs are typically territorial and are found on their breeding territories throughout the year (Burnham et al. 2002).

Population: Although it is difficult to precisely determine former abundance of the species in the U.S., most observers in the latter half of the 19th century described it as fairly common (USFWS 1990b). Dramatic diminution of the U.S. population of northern aplomado falcons occurred between 1890 and 1910 (Oberholser 1974). Until a pair of northern aplomado falcons that were bred in captivity nested in the Brownsville area in 1995, no nesting attempt by northern aplomado falcons had been reported in the U.S. since 1952 (USFWS 1990b). Some, but not all, experts believe that the decline in the U.S. northern aplomado falcon population has been due to habitat destruction caused by agricultural development and catastrophic channelization of once-permanent desert streams (Oberholser 1974). Extirpation of the species in the continental U.S. predated use of industrial pesticides (GRIN 2014). Continued use of synthetic pesticides may contribute to survival pressure through habitat degradation (USFWS 1990b) and eggshell thinning (Mora et al. 2008).

Re-introduction of the northern aplomado falcon into the U.S. began in the mid-1980s at the LANWR in South Texas. In conjunction with USFWS, the Peregrine Fund has raised and released northern aplomado falcons at the LANWR and other sites in Texas and New Mexico, with more than 1,500 captive-bred northern aplomado falcons having been released through the Northern Aplomado Falcon Restoration Project (Peregrine Fund 2012a). There are two introduced populations of northern aplomado falcons currently known to occupy Texas. These include a South Texas coastal population and another in the mountains of the Chihuahuan Desert in west Texas. The South Texas coastal population is divided into two subpopulations, one centered on the LANWR and one centered on a release site on Matagorda Island National Wildlife Refuge (MINWR). In 2011, 44 northern aplomado falcon territories were observed and surveyed by the Peregrine Fund, 34 of which were occupied: 14 at MINWR and 20 at LANWR (Peregrine Fund 2012b). An apparently unsuccessful attempt to re-introduce the species in Hidalgo County occurred in 2000-2002 (Juergens 2014) and is discussed in detail in the subsection, "Habitat and Presence-Absence Surveys", below.

The nearest known occupied nesting territories of the northern aplomado falcon are in the LANWR, which is 50 miles east of the Project Site. According to eBird (*eBird.org*), the three sightings of the northern aplomado falcon closest to the Project Site are: 1) Bentsen-Rio Grande Valley State Park (2011), 23 miles south of the Project Site; 2) Harlingen, Texas (2009), 34 miles southeast of the Project Site; and, 3) San Benito, Texas (2011), 38 miles southeast of the Project Site. Occurrence of the northern aplomado falcon in Starr or Hidalgo Counties would be considered exceptional (NatureServe 2014).

Habitat: In the southwestern U.S., prime northern aplomado falcon habitat is arid grassy plain with scattered honey mesquites and various yuccas and cacti (Oberholser 1974). In fact, northern aplomado falcons are associated with plains or savannahs throughout their range whether it is the moist coastal savannahs of eastern Mexico, the xeric Chihuahuan Desert, or the coastal prairies of South Texas (Burnham et al. 2002).

Documented occurrences within the Action Area: A search of the TNDD (2014) revealed no elements of occurrence for northern aplomado falcons within Hidalgo or Starr Counties. In south Texas, eBird.org (2014) shows that the vast majority of sightings of the northern aplomado falcon occur in far southwest Cameron County. eBird.org shows one documented occurrence of a northern aplomado falcon in Hidalgo County in 2011 that was located in the Bentsen-Lower Rio Grande State Park, 23 miles south-southwest of the Action Area.

Habitat and Presence-Absence Surveys: In April, May and June of 2014, qualified biologists conducted 100% pedestrian habitat and presence-absence surveys for the northern aplomado falcon and its habitat in the Action Area. No individuals or nests of the northern aplomado falcon were observed in the Action Area. Of particular note, the Peregrine Fund released a total of 53 captively bred northern aplomado falcons from 2000 to 2002 at two sites in Hidalgo County, one of which was in the Action Area (Juergens 2014). The hack stand within the Action Area was observed by survey teams for this BA, and showed no evidence of usage or occupation. Isolated segments of degraded habitat (plowed fields and cultivated prairie with scattered yucca) were observed near this release site. The Peregrine Fund is unaware of any evidence that any of these individuals or any progeny exist in the Action Area (Juergens 2014). Based on a literature review of occupied habitats, the locations of known extant populations, and the habitat assessment and presence-absence surveys that were conducted in the Action Area, there is no evidence that the northern aplomado falcon occurs in the Action Area.

4.5 <u>Ashy Dogweed</u>

History of federal listing: The U.S. population of ashy dogweed was federally listed as endangered under the ESA in 1984 (USFWS 1984a). DCH has not been determined for ashy dogweed.

Description: Ashy dogweed is an erect, perennial herb with stems up to 12 inches in height. The leaves are mostly alternate, simple and linear and covered with soft, wooly, ashy-white hairs. Crushed leaves emit a pungent odor. The flower heads (both ray and disk florets) are solitary at branch tips, are yellow to bright yellow, and are about one inch in diameter. In poorer habitats or under physiological stress, individuals are shorter, have fewer and smaller flowers, and have a less dense covering of hairs. Flowering is from March to May, but may occur at other times of the year depending upon rainfall (Poole et al. 2007, USFWS 1984a).

Population: Ashy dogweed has been documented in Webb, Zapata and southwestern Hidalgo counties in Texas (NatureServe 2014); recently, however, it is known to occur only in Zapata County (Poole et al. 2007). It is associated with other relict grassland species and is subject to heavy grazing pressure. The species biology is not well understood, but there is evidence of poor reproductive capability as seedlings and newly established plants appear to be absent from known populations. At present, the most immediate threats to the range of this species are grazing and cultivation (Poole et al. 2007, USFWS 1984a).

Habitat: Ashy dogweed occurs in fine, sandy-loam soils in level or very gently rolling topography of open areas of a grassland-shrub community. Soils are of the Hebbronville and Aguilares series, or the Maverick-Caterina soils, which are clayey, saline, deep to shallow, fine-textured, and slowly permeable soils (USFWS 1984a, USFWS 1987, Poole et al. 2007). Saline soil types do not occur in the Action Area.

Documented occurrences within the Action Area: A search of the TNDD (2014) revealed no elements of occurrence of ashy dogweed within at least 10 miles of the Action Area.

Habitat and Presence-Absence Surveys: In April, May and June of 2014, qualified biologists and botanists conducted 100% pedestrian habitat and presence-absence surveys for ashy dogweed in the Action Area. No individuals or populations of ashy dogweed were observed in the Action Area. Based on a literature review of occupied habitats, the locations of known extant populations, and the habitat assessment and presence-absence surveys that were conducted in the Action Area, there is no evidence that ashy dogweed occurs in the Action Area.

4.6 Johnston's Frankenia

History of federal listing: The U.S. population of Johnston's frankenia was federally listed as endangered under the ESA in 1984 (USFWS 1984b). DCH has not been determined for Johnston's frankenia.

Description: Johnston's frankenia is a small, wiry, perennial shrub around 12 inches tall. The opposite leaves and stems are gray- or blue-green, are somewhat oblong and are 1/8 to 1/2 inches long. The white flowers are small, 1/8 inches long, sessile and usually solitary at the apex of short axillary branches. The roots are dark and wiry and give rise to many elongate, recurved stems. Johnston's frankenia will flower throughout the year, depending upon local rainfall (Poole et al. 2007, USFWS 1984b).

Population: At the time of listing as endangered under the ESA (1984), there were five known populations of Johnston's frankenia (two of which were in Zapata County, two in Starr County, and one in Nuevo Leon, Mexico) (Janssen and Williamson 1996). In 1999, 58 identified populations of Johnston's frankenia, all on private land, were documented by an extensive survey (Janssen 1999). Of these 58, seven occurred in Webb County, 35 in Zapata County, and 16 in Starr County. Each population typically had hundreds or thousands of individuals per acre.

Habitat: Johnston's frankenia is a halophyte that occurs in sizable populations on valley flats or rocky slopes of rocky gypseous hillsides or saline flats (NatureServe 2014). It associates with dwarf shrubland and halophytic species such as saladillo (*Varilla texana*) and tornillo (*Prosopis reptans*) (Poole et al.

2007, USFWS 1984b). The known populations grow in highly alkaline, saline clayey soils that occur in Webb, Zapata and Starr Counties (Janssen 1999). It occurs in dwarf shrubland plant associations valley flats or rocky slopes. Known sites comprise the Catarina or Maverick series at the most saline end of their ranges. Other mapped soil series include Copita, Brennan, Zapata, and Montell (USFWS 1984b, Janssen 1999, Poole et al. 2007). Gypseous or saline soils do not occur in the Action Area.

Documented occurrences within the Action Area: A search of the TNDD (2014) revealed no elements of occurrence of Johnston's frankenia within at least 10 miles of the Action Area.

Habitat and Presence-Absence Surveys: In April, May and June of 2014, qualified biologists and botanists conducted 100% pedestrian presence-absence and habitat surveys for Johnston's frankenia in the Action Area. A reference population was observed in southern Starr County. No individuals or populations of Johnston's frankenia were observed in the Action Area. Based on a literature review of occupied habitats, the locations of known extant populations, and the habitat assessment and presence-absence surveys that were conducted in the Action Area, there is no evidence that Johnston's frankenia occurs in the Action Area.

4.7 Star Cactus

History of federal listing: The U.S. population of star cactus was federally listed as endangered under the ESA in 1993 (USFWS 1993). DCH has not been determined for star cactus.

Description: Star cactus is a spineless, relatively flat, dark green, perennial succulent that in profile from root to top resembles the turnip. Seen from above, the disc is typically divided into eight uniform triangular segments that are separated by dark, incised ribs and that have one to three small protruding grey buttons. The ribs and tops of the segments often display sparse, but distinctive, tiny white scales. The flowers are relatively short, with slender yellow petals emerging from an orange-red base. The root system emerges at the base of the main body as a spray of fine rootlets growing from a short, slender tap root. The star cactus is frequently described as cryptic, owing to its earthy coloration and very low profile in normal to dry conditions. In extremely dry conditions, the top can completely recede below the ground surface. (USFWS 2003, Poole et al. 2007). Star cactus typically flowers in late spring, although flowering can also occur after wet periods in summer months.

Population: Historically, star cactus is known in several locations in the Lower Rio Grande Valley (LRGV). Currently, however, the only known locations of star cactus are in Starr County, a minimum of 31 miles from the Project Site (USFWS 2003, Terry et al. 2007). Although it grows readily from seed, it is intensely harvested for sale to collectors. Excavation of the plant usually irreparably injures its fine root system. Habitat destruction in the LRGV, principally due to its conversion to agriculture, has severely limited the potential range of star cactus. Details of its reproductive biology in the wild (e.g., pollinators, seed dispersal, and genetic diversity) are scarce or unknown (USFWS 2003, Poole et al. 2007).

Habitat: Star cactus grows in gravelly clays and loams in south Texas grassland and thornshrub, in association with honey mesquite and granjeno thickets. Star cactus appears to prefer soils overlying the Tertiary Catahoula and Frio formations (clay, mudstone, sandstone, conglomerate and caliche) in western

Starr County (USFWS 2003, Poole et al. 2007; Nico et al. 2010). These soils only occur in southern and western Starr County (USDA 1981).

Documented occurrences within the Action Area: A search of the TNDD (2014) revealed no elements of occurrence of star cactus within 10 miles of the Action Area.

Habitat and Presence-Absence Surveys: In January of 2013 and April, May and June of 2014, qualified biologists and botanists conducted 100% pedestrian habitat and presence-absence surveys for star cactus in the Action Area. Two reference populations were observed in southern Starr County. No individuals or populations of star cactus were observed in the Action Area. Based on a literature review of occupied habitats, the locations of known extant populations, and the habitat assessment and presence-absence surveys that were conducted in the Action Area, there is no evidence that star cactus occurs in the Action Area.

4.8 Texas Ayenia

History of federal listing: The U.S. population of Texas ayenia was federally listed as endangered under the ESA in 1994 (USFWS 1994). DCH has not been determined for Texas ayenia.

Description: Texas ayenia is a thornless shrub in the cacao family (Sterculiaceae) that grows to a height of three to five feet. The simple, alternate leaves bear coarse serrations on the margins and range between 1.5 in to five in length. The small greenish-yellow flowers (ca. 3/8-in diameter) are born in groups of three or four, on short axillary peduncles. The fruit is a round five-parted capsule with pubescent prickles. Texas ayenia has red-brown stems and lenticels (USFWS 1994, 2010b; Poole et al. 2007).

Population: Texas ayenia historically occurred in the contiguous LRGV counties of Cameron, Hidalgo, and Willacy in Texas. Today, what is left of this range appears to be restricted to scant dwindling populations in Cameron and Hidalgo Counties (NatureServe 2014). In Mexico, Texas ayenia may persist in reduced numbers in the states of Coahuila and Tamaulipas (USFWS 1994, Poole et al. 2007. NatureServe 2014).

Habitat: Texas ayenia requires relatively moist subtropical riparian woodlands with extensive canopy cover or semitropical brushland – habitat that has been virtually eliminated in the Action Area largely due to its conversion to crop land and improved pasture. Texas ayenia prefers well-drained, calcareous, sandy clay-loam soils (USFWS 1994, Poole et al. 2007). In particular, known locations of Texas ayenia in the LRGV are associated with two soil types: sandy clay loam (Hidalgo Series), and fine sandy loam (Willacy Series). Current populations, if they exist within the Action Area, would likely occur in thornshrub areas along fence rows, near ditches, or in remnant riparian thornshrub/woodland communities.

Documented occurrences within the Action Area: A search of the TNDD (2014) revealed no elements of occurrence of Texas ayenia within 10 miles of the Action Area.

Habitat and Presence-Absence Surveys: In January of 2013 and April, May and June of 2014, qualified biologists and botanists conducted 100 percent pedestrian habitat and presence-absence surveys for Texas ayenia in the Action Area. Two reference populations (one of which was managed) were observed in southern Hidalgo County. A potential third reference population site in proximity to the Action Area was thoroughly searched and no individuals were observed. No individuals or populations of Texas ayenia were observed in the Action Area. Riparian habitat required for Texas ayenia was not observed during the habitat surveys. Based on a literature review of occupied habitats, the locations of known extant populations, and the habitat assessment and presence-absence surveys that were conducted in the Action Area, there is no evidence that Texas ayenia occurs in the Action Area.

4.9 Walker's Manioc

History of federal listing: The U.S. population of Walker's manioc was federally listed as endangered under the ESA in 1991 (USFWS 1991). DCH has not been determined for Walker's manioc.

Description: Walker's manioc, a member of the spurge family (Euphorbiaceae), is a moneocious, herbaceous shrub with deeply incised leaves that grows from a perennial, carrot-shaped tuber. It produces white flowers with five petals, and round, three-seeded fruit that dehisce (burst) to eject their seeds many feet from the plant (Poole et al. 2007, USFWS 2008).

Population: As of 2008, there were nine occurrences documented by professional biologists in the U.S., all in southern Hidalgo, southern Starr, or Duval Counties. A few of these populations consist of upwards of 90 individuals and are considered self-sustaining. Several populations also exist in Mexico (Poole et al. 2007, USFWS 2008).

Habitat: Walker's manioc grows in shallow (approximately 12 inches in depth or less), gravelly-sandy loam soils in close association with indurate outcroppings of caliche in the Goliad formation that extend to the LRGV in Hidalgo and Starr counties. It is often found growing beneath and within the stems of taller shrubs. The extant populations in the U.S. are found in shallow sandy loams associated with caliche outcrops in undisturbed ROW, fields, and cemeteries in the lower Rio Grande valley of southern Hidalgo and Starr Counties (Poole et al. 2007, USFWS 2008, NatureServe 2014).

Documented occurrences within the Action Area: A search of the TNDD (2014) revealed no elements of occurrence of Walker's manioc within 10 miles of the Action Area.

Habitat and Presence-Absence Surveys: In January of 2013 and April, May and June of 2014, qualified biologists and botanists conducted 100% pedestrian surveys habitat and presence-absence surveys for Walker's manioc in the Action Area. A reference population was observed in southern Starr County. No individuals or populations of Walker's manioc were observed in the Action Area. Gravelly sandy-loam soils consistent with preferred habitat were not observed in the Action Area. Based on a literature review of occupied habitats, the locations of known extant populations, and the habitat assessment and presence-absence surveys that were conducted in the Action Area, there is no evidence that Walker's manioc occurs in the Action Area.

4.10 Zapata Bladderpod

History of federal listing: The U.S. population of Zapata bladderpod was federally listed as endangered under the ESA in 1999 (USFWS 1999). Critical habitat for Zapata bladderpod has been designated in the Rio Grande Valley in southwest Starr County, Texas, and in northern Tamaulipas, Mexico (USFWS 2000).

Description: Zapata bladderpod is a pubescent, somewhat silvery-green herbaceous plant, with sprawling stems 17–34 inches long. The plant exhibits a taproot system indicating a perennial life habit. The long and narrow stem leaves are 1–1.5 inches long and 0.1–0.3 inch wide, with margins similar to basal leaves. The flowers are bright yellow and appear typically between April through September, but appear throughout the year depending upon timing of rainfall. Fruits are round, smooth, 0.2 - 0.8 inches in diameter, on short, downward curving pedicels (slender stalks) (Poole et al. 2007, USFWS 1999).

Population: Zapata bladderpod is documented in Starr and Zapata Counties (USFWS 1999, NatureServe 2014). Populations have been lost primarily due to the effects of long-term grazing and conversion of native rangeland to improved pasture, and urban development. Habitat at the type locality for this species has been reduced to a small vacant lot in a resort subdivision near Falcon Reservoir in the City of Zapata (Poole et al. 2007, USFWS 1999).

Habitat: Zapata bladderpod populations occur on open, thornshrub in gravelly to sandy-loam upland terraces above the Rio Grande floodplain. In Zapata County, Zapata bladderpod occurs within the Zapata-Maverick soil association. Known historic Starr County populations occurred within the Jimenez-Quemado soil association and on Catarina series soils (Poole et al. 2007, USFWS 1999). These soil associations are not found in the Action Area.

Documented occurrences within the Action Area: A search of the TNDD (2014) revealed no elements of occurrence of Zapata bladderpod within 10 miles of the Action Area.

Habitat and Presence-Absence Surveys: In April, May and June of 2014, qualified biologists and botanists conducted 100 percent pedestrian presence-absence surveys for Zapata bladderpod in the Action Area. Two reference populations were observed in southwestern Starr County. No individuals or populations of Zapata bladderpod were observed in the Action Area. Based on a literature review of occupied habitats, the locations of known extant populations, and the habitat assessment and presence-absence surveys that were conducted in the Action Area, there is no evidence that Zapata bladderpod occurs in the Action Area.

5.0 EXISTING CONDITIONS IN THE ACTION AREA

5.1 Introduction

This section provides an overview of the environmental baseline conditions in the Action Area, virtually all of which is privately owned land. The proposed project is located in the central region of the LRGV, approximately 25 miles north of the Rio Grande, in a region where land use is predominately agricultural (cotton, sugar cane, sorghum, hay, as well as rangeland for cattle operations), with significant petroleum industry installations (oil and gas wells, pipelines, power stations and transmission lines).

5.2 Overview of the Action Area

Biogeographic categorization of southern Texas is based on two independent schemes: biotic provinces (Blair 1950) and ecological zones (Diamond et al. 1987; Hatch et al. 1990). Biotic provinces are based on climate, plant and non-avian habitats, geological formations that form migratory boundaries, and soil types. Ecological zones take into account similar criteria but place greater emphasis on defining domains that are occupied by consistent floral associations.

The Action Area (**Figure 1**) encompasses 7,832 acres that fall within the Nuecian District of the subtropical Tamaulipan biotic province (Blair 1950) and hence shares the biotic and climatic imprint of much of southern Texas and northeastern Mexico. The Action Area is topographically flat, and the soils are typically varieties of deep sandy loams (**Figures 7** and **8**). The Action Area can be further refined ecologically as lying across the boundary of two adjacent ecological zones, the South Texas Brush Country to the south and the South Texas Plains to the north. However, the vast majority of historically native brush in and around the Action Area has been cleared for cropland and pasture; thus, the transition between these zones is not readily evident. Brush clearing techniques include root-plowing, which effectively removes woody plants and disturbs the top soil strata affecting ground cover plant species and the seed bank. Root-plowed areas left to cattle grazing tend to develop into mesquite savannah conditions, with low plant diversity.

Geologically, the Action Area is located in the Interior Coastal Plains subdivision of the Gulf Coastal Plains physiographic province (Bureau of Economic Geology 1996). The proposed project is situated primarily on the Goliad Formation of Pliocene-Miocene age, which is comprised of clay, sand, sandstone, marl, and caliche, originally deposited in fluvial and alluvial fan environments (Baskin and Hulbert 2008, Hoel and Galloway 1983, Texas Water Development Board 1976, U.S. Department of Agriculture 1981, USGS 2014). The Goliad Formation dips gently toward the Gulf of Mexico (Hoel and Galloway 1983, USDA 1981). A mantle of shifting windblown sand and silt of the Holocene-aged South Texas Sand Sheet overlies the Goliad Formation in portions of the project area (Texas Water Development Board 1976, U.S. Geological Survey 2014).

There are no major bodies in proximity to the Action Area. The Action Area is 44 miles west of the Laguna Madre, a major estuary, 55 west of the Gulf of Mexico, and no closer than 23 miles from the Rio Grande to the south. There are no TCEQ Water Quality Segments in the Action Area.

The predominant economic activities in the Action Area are agriculture and commercial hunting operations. Significant petroleum and natural gas extraction, and power generation, occurs in the region, but not within the Action Area. Three commercial/ industrial centers exist near the Action Area: the Edinburg Regional Air Freight Center is 2.8 miles east of the Action Area; and, two gas-fired co-generation power plants (Magic Valley Electric Cooperative and Calpine Hidalgo Energy Center) are 6.3 miles to the south of the Action Area.

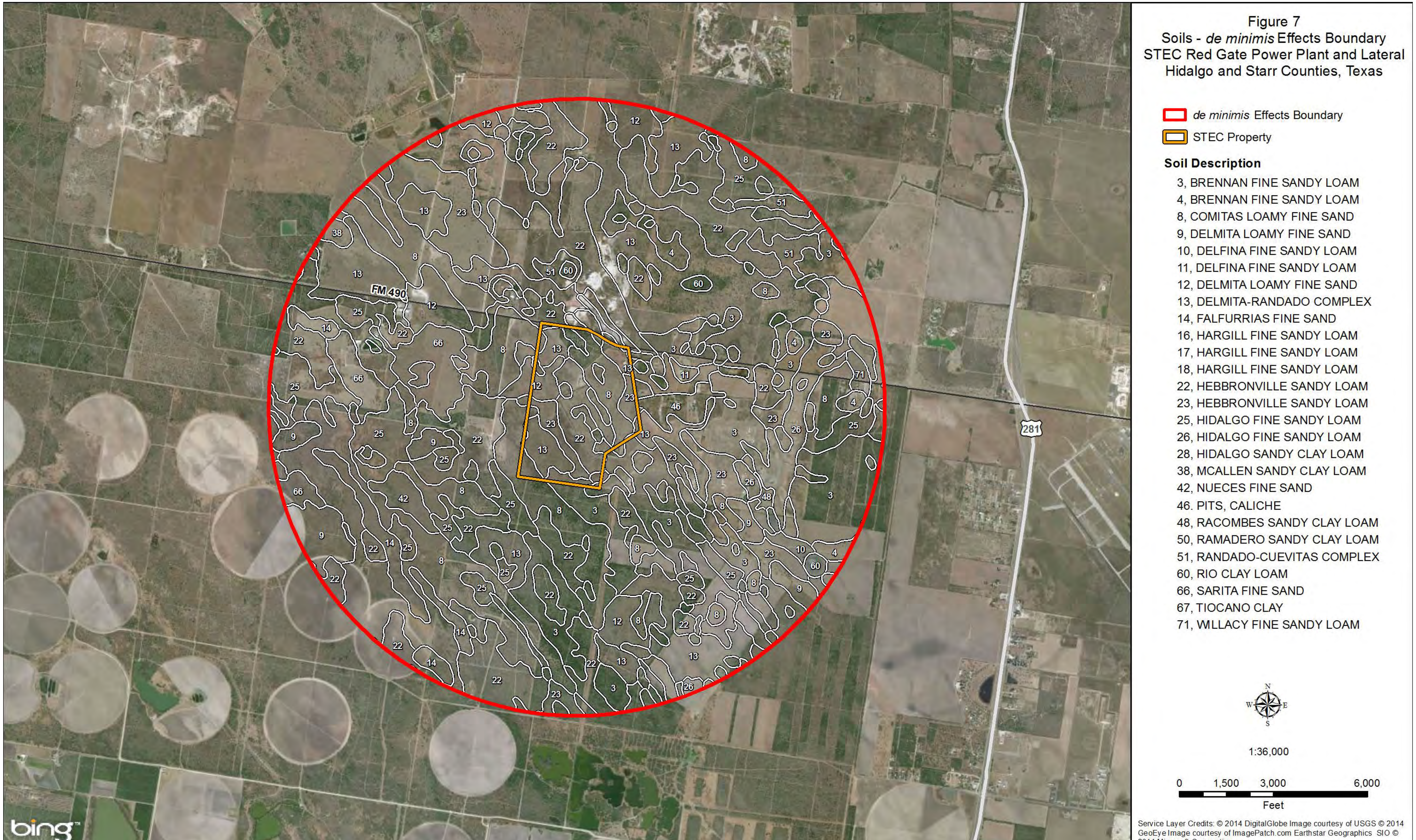


Figure 7
Soils - *de minimis* Effects Boundary
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

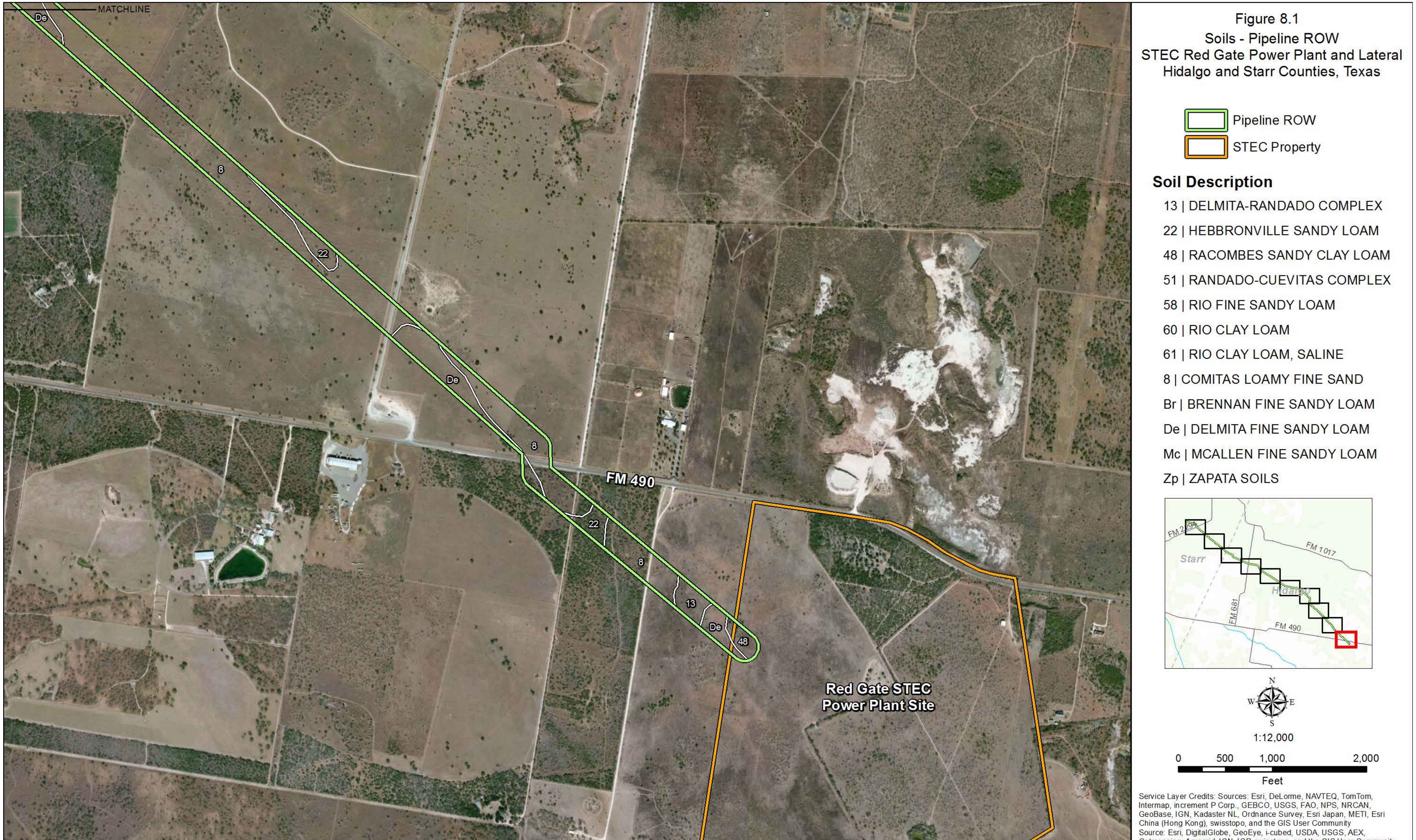


Figure 8.1
Soils - Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas
Pipeline ROW
STEC Property
Soil Description
13 | DELMITA-RANDADO COMPLEX
22 | HEBBRONVILLE SANDY LOAM
48 | RACOMBES SANDY CLAY LOAM
51 | RANDADO-CUEVITAS COMPLEX
58 | RIO FINE SANDY LOAM
60 | RIO CLAY LOAM
61 | RIO CLAY LOAM, SALINE
8 | COMITAS LOAMY FINE SAND
Br | BRENNAN FINE SANDY LOAM
De | DELMITA FINE SANDY LOAM
Mc | MCALLEN FINE SANDY LOAM
Zp | ZAPATA SOILS
MATCHLINE
FM 490
Red Gate STEC
Power Plant Site
FM 1017
Starr
Hidalgo
FM 681
FM 490
N
W
E
S
1:12,000
0
500
1,000
2,000
Feet
Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 8.2
Soils - Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

MATCHLINE
13
58
8
13
8
13
8
13
8
13
MATCHLINE
Figure 8.3
Soils - Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas
Pipeline ROW
STEC Property
Soil Description
13 | DELMITA-RANDADO COMPLEX
22 | HEBBRONVILLE SANDY LOAM
48 | RACOMBES SANDY CLAY LOAM
51 | RANDADO-CUEVITAS COMPLEX
58 | RIO FINE SANDY LOAM
60 | RIO CLAY LOAM
61 | RIO CLAY LOAM, SALINE
8 | COMITAS LOAMY FINE SAND
Br | BRENNAN FINE SANDY LOAM
De | DELMITA FINE SANDY LOAM
Mc | MCALLEN FINE SANDY LOAM
Zp | ZAPATA SOILS
FM 1017
Starr
Hidalgo
FM 681
FM 490
N
W
E
S
1:12,000
0
500
1,000
2,000
Feet
Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 8.4
Soils - Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

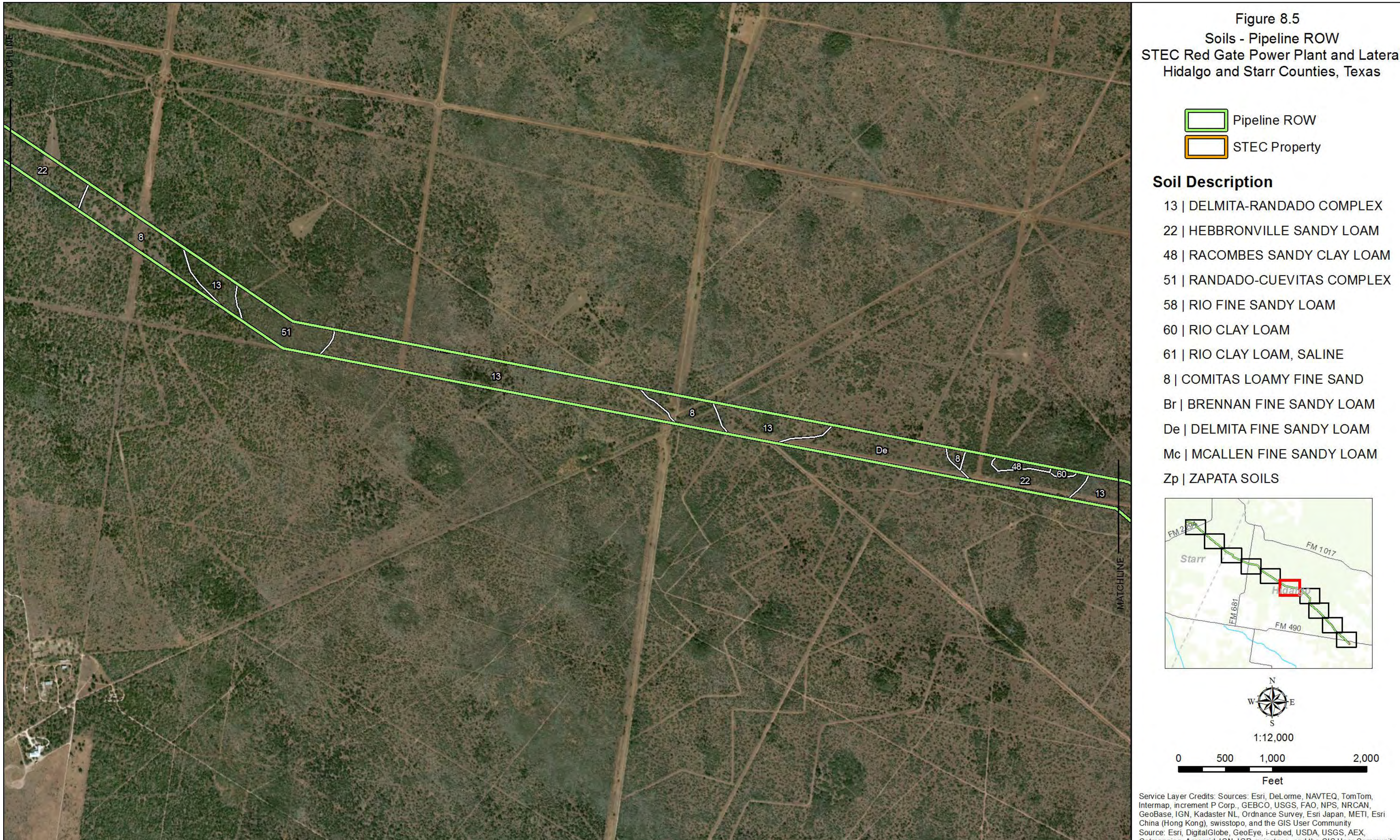


Figure 8.5
Soils - Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

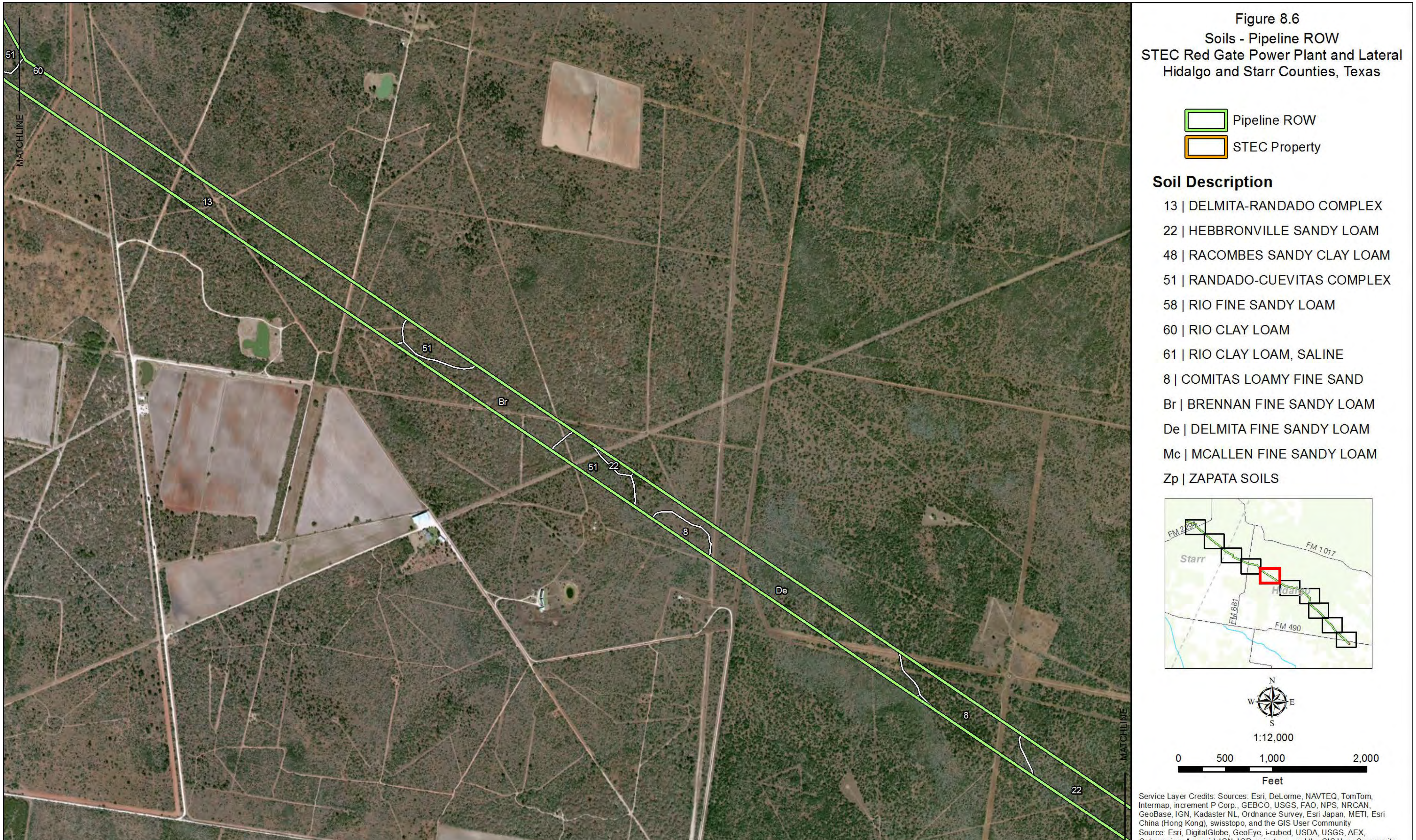


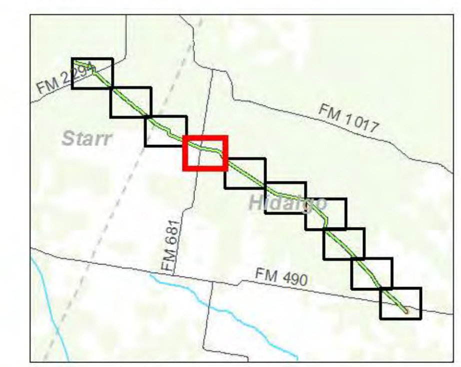
Figure 8.6
Soils - Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas
Pipeline ROW
STEC Property
Soil Description
13 | DELMITA-RANDADO COMPLEX
22 | HEBBRONVILLE SANDY LOAM
48 | RACOMBES SANDY CLAY LOAM
51 | RANDADO-CUEVITAS COMPLEX
58 | RIO FINE SANDY LOAM
60 | RIO CLAY LOAM
61 | RIO CLAY LOAM, SALINE
8 | COMITAS LOAMY FINE SAND
Br | BRENNAN FINE SANDY LOAM
De | DELMITA FINE SANDY LOAM
Mc | MCALLEN FINE SANDY LOAM
Zp | ZAPATA SOILS
MATCHLINE
51
60
13
51
Br
51
22
8
De
8
22
MATCHLINE
FM 1017
Starr
Hidalgo
FM 681
FM 490
N
W
E
S
1:12,000
0
500
1,000
2,000
Feet
Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 8.7
Soils - Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

Pipeline ROW
STEC Property

Soil Description

13 | DELMITA-RANDADO COMPLEX
22 | HEBBRONVILLE SANDY LOAM
48 | RACOMBES SANDY CLAY LOAM
51 | RANDADO-CUEVITAS COMPLEX
58 | RIO FINE SANDY LOAM
60 | RIO CLAY LOAM
61 | RIO CLAY LOAM, SALINE
8 | COMITAS LOAMY FINE SAND
Br | BRENNAN FINE SANDY LOAM
De | DELMITA FINE SANDY LOAM
Mc | MCALLEN FINE SANDY LOAM
Zp | ZAPATA SOILS

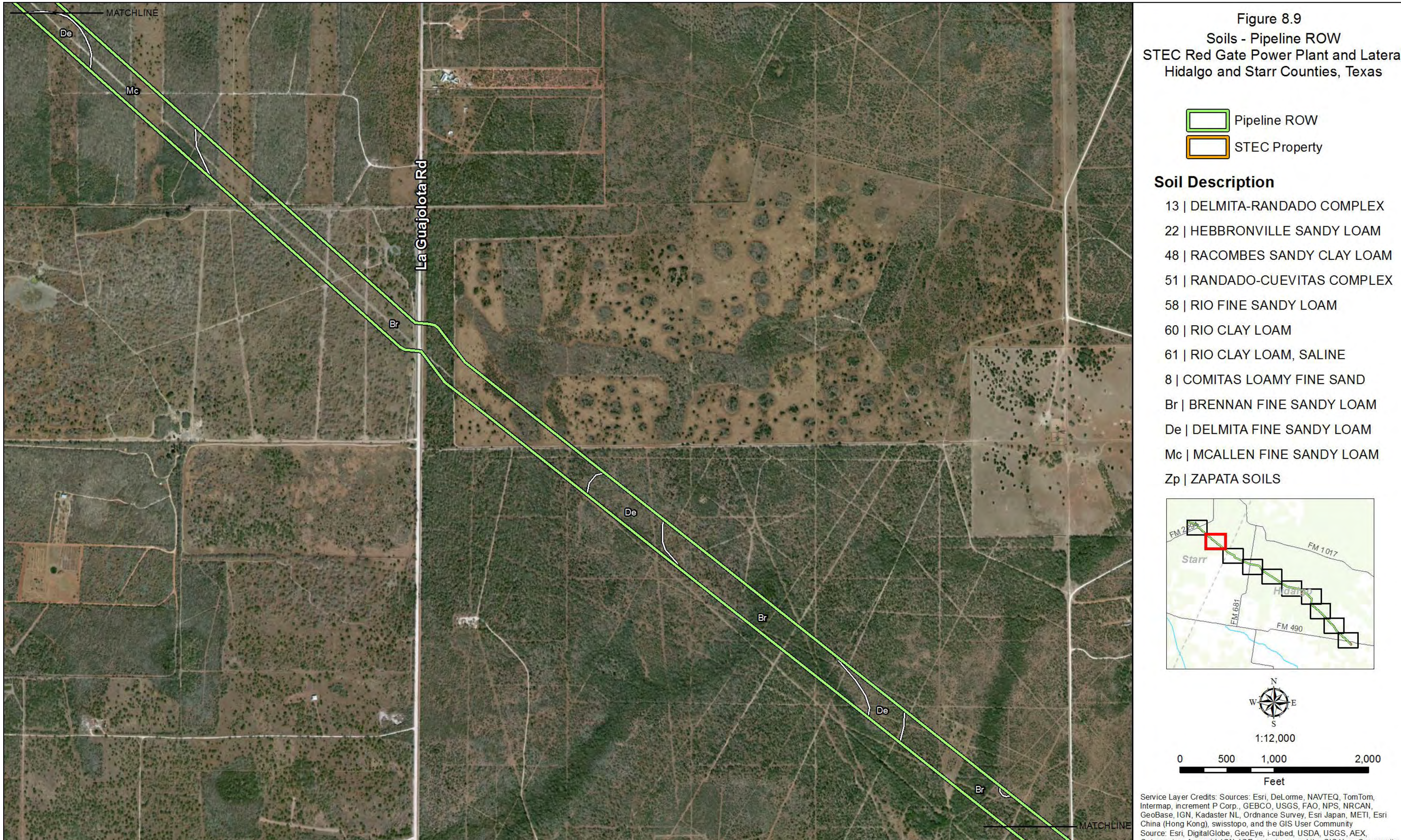


1:12,000

0 500 1,000 2,000
Feet

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


MATCHLINE
Br
13
Mc
Br
Mc
22
Guasolota Ranch Rd
Br
13
51
Br
13
51
60
MATCHLINE
Figure 8.8
Soils - Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas
Pipeline ROW
STEC Property
Soil Description
13 | DELMITA-RANDADO COMPLEX
22 | HEBBRONVILLE SANDY LOAM
48 | RACOMBES SANDY CLAY LOAM
51 | RANDADO-CUEVITAS COMPLEX
58 | RIO FINE SANDY LOAM
60 | RIO CLAY LOAM
61 | RIO CLAY LOAM, SALINE
8 | COMITAS LOAMY FINE SAND
Br | BRENNAN FINE SANDY LOAM
De | DELMITA FINE SANDY LOAM
Mc | MCALLEN FINE SANDY LOAM
Zp | ZAPATA SOILS
FM 1017
Starr
Hidalgo
FM 681
FM 490
N
W
E
S
1:12,000
0
500
1,000
2,000
Feet
Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


MATCHLINE
De
Mc
La Guajolota Rd
Br
De
Br
De
Br
MATCHLINE
Figure 8.9
Soils - Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas
Pipeline ROW
STEC Property
Soil Description
13 | DELMITA-RANDADO COMPLEX
22 | HEBBRONVILLE SANDY LOAM
48 | RACOMBES SANDY CLAY LOAM
51 | RANDADO-CUEVITAS COMPLEX
58 | RIO FINE SANDY LOAM
60 | RIO CLAY LOAM
61 | RIO CLAY LOAM, SALINE
8 | COMITAS LOAMY FINE SAND
Br | BRENNAN FINE SANDY LOAM
De | DELMITA FINE SANDY LOAM
Mc | MCALLEN FINE SANDY LOAM
Zp | ZAPATA SOILS
FM 1017
Starr
Hidalgo
FM 681
FM 490
N
W
E
S
1:12,000
0 500 1,000 2,000
Feet
Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

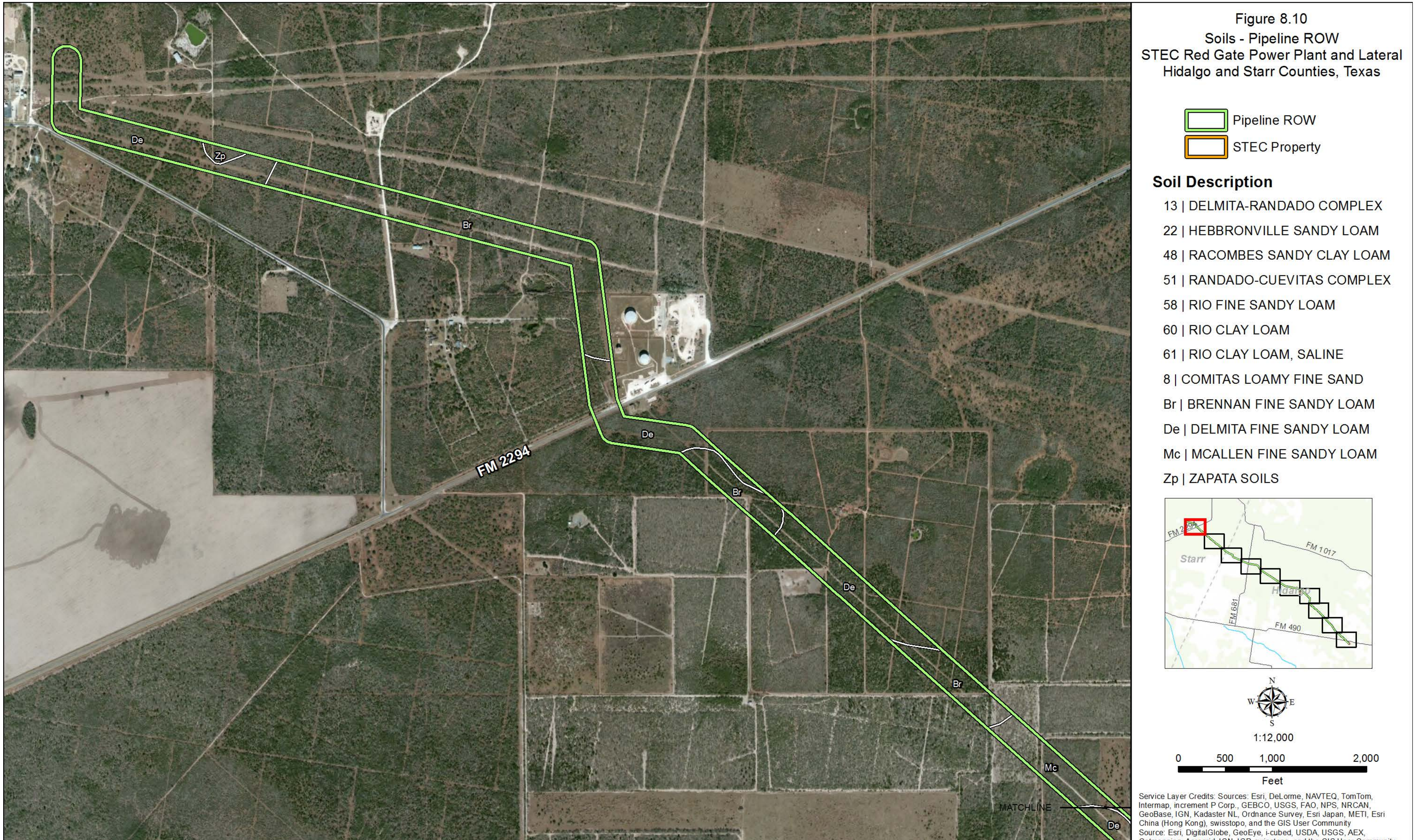


Figure 8.10
Soils - Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

Hidalgo County rainfall averages about 23 inches per year. The prevailing wind is south-southeasterly. Average daily temperature extremes are 8°C (low) to 21°C (high) in January, and 23°C to 36°C in August (Larkin and Bomar 1983). Starr County rainfall averages about 22 inches per year. The prevailing wind is south-southeasterly. Average daily temperature extremes are 7°C (low) to 21°C (high) in January, and 23°C to 37°C in August (Larkin and Bomar 1983).

5.3 Assessment of Habitat in the Action Area

Direct disturbance from proposed construction activity would be limited to the power generating facility site and the pipeline ROW. Intensive, 100 percent pedestrian habitat and presence-absence surveys were therefore conducted on the STEC Property and on the pipeline ROW.

Virtually all of the *de minimis* air dispersion zone that is outside of the STEC Property (except where it overlaps the pipeline ROW) was not legally accessible for pedestrian survey, but is traversed by numerous public roadways. Therefore, areas of potential habitat within the *de minimis* air dispersion zone, outside of the STEC Property and the pipeline ROW, were assessed by windshield surveys to verify the land classifications, as well as by consulting various remote sensing databases, including the U.S. Department of Interior National Land Cover Data (NLCD) maps, Natural Resources Conservation Service (NRCS) soil maps, National Wetland Inventory maps, black and white and color infrared aerial photography, U.S. Geographic Service topographic maps, and TPWD-Texas Natural Resources Information System (TNRIS) Texas Vegetation Classification Project maps (**Figure 9**).

5.3.1 STEC Property

Four major vegetation communities are found within the STEC Property and include thornscrub woodland, mesquite savanna, fencerow, and stock pond area (**Figure 9**). These vegetation communities are described below:

Mesquite Savanah**:** The predominant vegetation community within the STEC property is mesquite savannah, which is a result of root plowing, brush maintenance, and the establishment of non-native forage grasses for cattle production. Its current status is highly degraded. The dominant tree species of the mesquite savannah areas is honey mesquite, often hosting mistletoe (*Phoradendron tomentosum*). The shrub layer is dominated by scattered clumps of Texas prickly pear (*Opuntia engelmannii*) and occasional coyotillo (*Karwinskia humboldtiana*) shrubs and low mounds of old-man's beard (*Clematis drummondii*). Ground cover within the Red Gate project property is sparse due to over-grazing, well-draining sandy soils, and recent drought conditions. Common forbs include espanta vaqueros (*Tidestromia lanuginosa*), ridge-seed sand mat (*Chamaesyce glyptosperma*), wooly croton (*Croton capitatus*), and silverleaf nightshade (*Solanum elaeagnifolium*). Buffelgrass (*Pennisetum cilare*) and common sandbur (*Cenchrus spinifex*) (Syn. = *C. incertus*) are the dominant grasses of the mesquite savannah, found in scattered patches throughout the area. Other herbaceous plant species found in shaded areas beneath honey mesquite and Texas prickly pear include three-lobed florestina (*Florestina tripteris*), bristly tropic croton (*Croton glandulosus* var. *pubentissimus)*, pigeon berry (*Rivina humilis*), cow pen daisy (*Verbesina encelioides*),

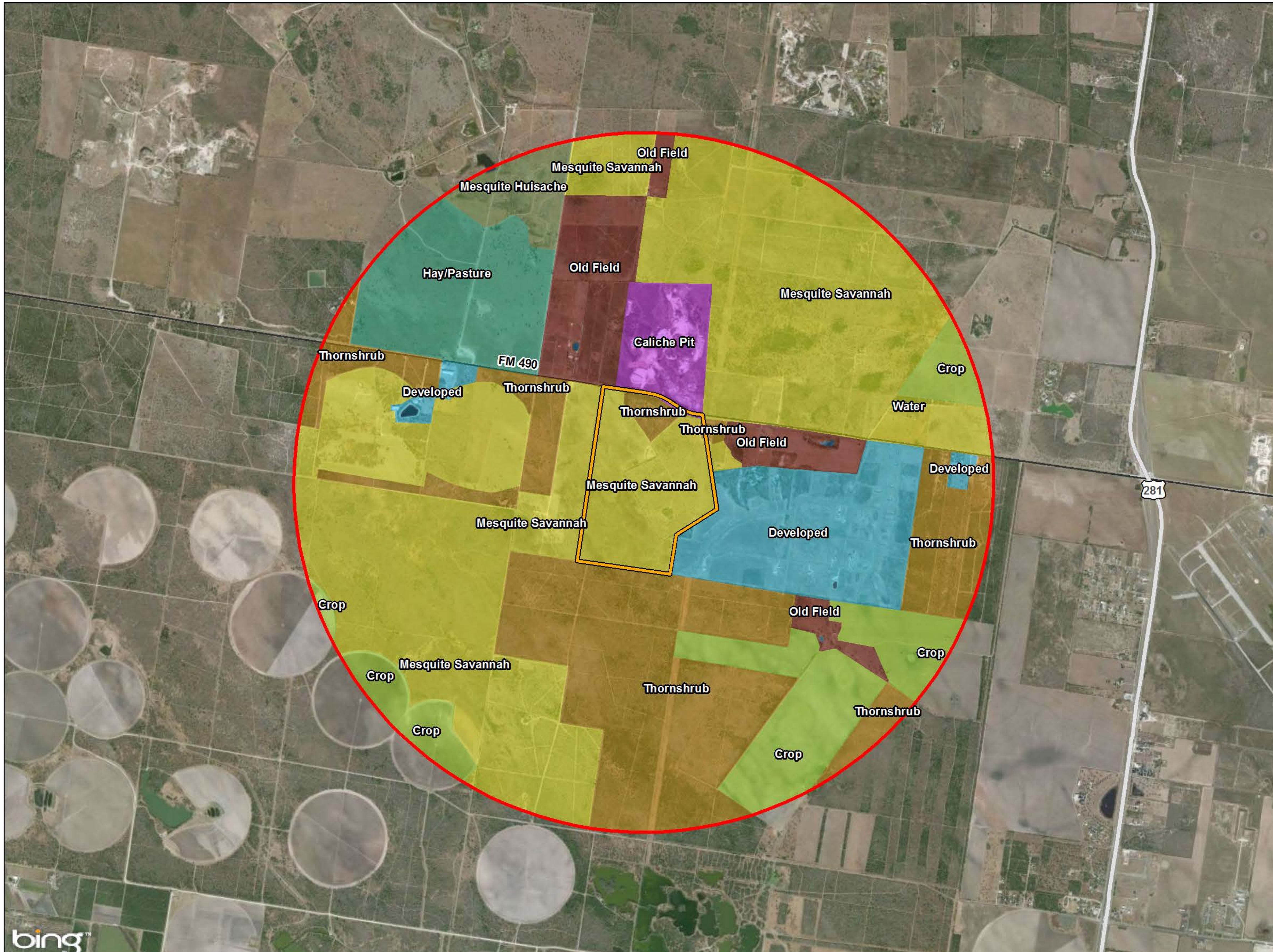


Figure 9
Land Use/Land Cover
de minimis Effects Boundary
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

de minimis Effects Boundary
STEC Property

	% of Action Area
Thornshrub	21.1
Caliche Pit	2.7
Crop	9.2
Developed	8.3
Mesquite Savannah	43.8
Mesquite Huisache	2.0
Old Field	6.2
Hay/Pasture	6.6
Water	0.1

N W E S

1:36,000

0 3,000 6,000
Feet

Service Layer Credits: © 2014 DigitalGlobe Image courtesy of USGS © 2014 GeoEye Image courtesy of ImagePatch.com Earthstar Geographics SIO © 2014 Microsoft Corporation yellow flower oxalis (*Oxalis stricta*) (Syn. = *O. dillenii*), bladder mallow (*Herissantia crispa*), cylindrical yellow-grass (*Rorripa teres*), hierba del soldado (*Waltheria indica*), bermudagrass (*Cynodon dactylon*), hooded windmillgrass (*Chloris cucullata*), and crabgrass (*Digitaria bicornus*).

***Thornshrub Woodland*:** Located at the north end of the STEC Property is a more densely wooded thornshrub section. Although this area has denser vegetation, it is apparent that it has also been disturbed at some point in the past. The species assemblage was similar to that along the fencerows including honey mesquite, Mexican olive (*Cordia boissieri*), lime prickly-ash (*Zanthoxylum fagara*), Mexican persimmon, spiny hackberry, desert yaupon, snake-eyes, elbowbush, cenizo and shrubby blue sage (*Salvia ballotaeflora*). Ground cover was sparse to absent (within the denser brush areas) with occasional patches of buffelgrass, leather stem (*Jatropha dioica*) and Spanish dagger occurring within the openings of the brush. Cacti observed within this area were Texas prickly pear, tasajillo (*Opuntia leptocaulis*), hedgehog cactus (*Echinocereus* sp.), and a few nipple cactus (*Mammalaria* sp.). Marine ivy (*Cissus incisa*) was also observed within the area.

Fencerow: Fencerows within the STEC project property exhibit a more diverse assemblage of remnant native shrubs and trees than found in the mesquite savannah. However, the ground cover is sparse and composed of herbaceous species typical of the surrounding mesquite savannah. Common trees in the fencerows include honey mesquite, Mexican olive, lime prickly-ash, Mexican persimmon, Texas ebony, and huisache (*Acacia farnesiana*). Common shrubs of the fencerows include granjeno, desert yaupon, snake-eyes (*Phaulothamnus spinescens*), elbowbush, and cenizo, with old-man's beard occurring as a vine within the shrub layer. The sparse ground cover consists of wild petunia (*Calibrachoa parviflora*) (Syn. = *Petunia parviflora*), pigeon berry, Texas croton (*Croton texana*), yellow flower oxalis, silver nightshade, bladder mallow, cylindrical yellow-grass, hierba del soldado, and forked panicgrass (*Panicum dichotomum*).

Stock Pond Area: The stock pond area is a depression excavated in the past, with remnant mounds of sandy soil adjacent to the area that appear to be soil periodically removed from the stock pond for depth maintenance. At the time of the field visits, the bottom of the stock pond exhibited ponded water in deeper sections, with saturated soils occurring throughout the bottom of the pond. The heavily grazed area surrounding the pond showed evidence of livestock use. The dominant tree surrounding the stock pond is huisache, with honey mesquite being common. Shrub species occurrence and diversity is low within this area, with scattered granjeno, snake-eyes, and elbowbush composing the shrub stratum. The very sparse ground cover included such species as pigeon berry, yellow flower oxalis, bladder mallow, cylindrical yellow-grass, and crabgrass.

5.3.2 Pipeline ROW

Four major vegetation communities are found within the STEC pipeline corridor and include thornscrub woodland, mesquite savanna, improved pasture, and cultivated row crops (**Figure 10**). These vegetation communities are described below.

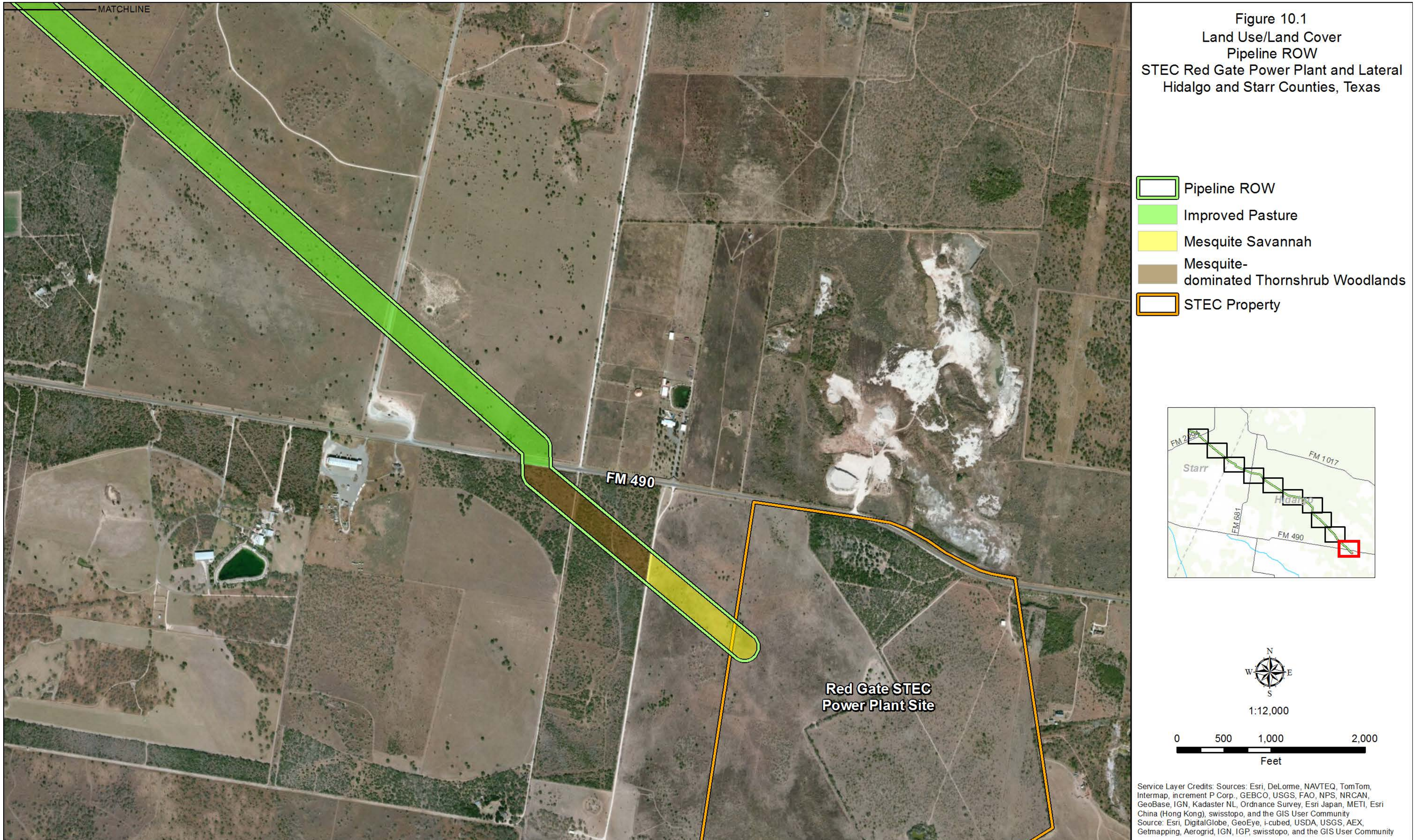


Figure 10.1
Land Use/Land Cover
Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

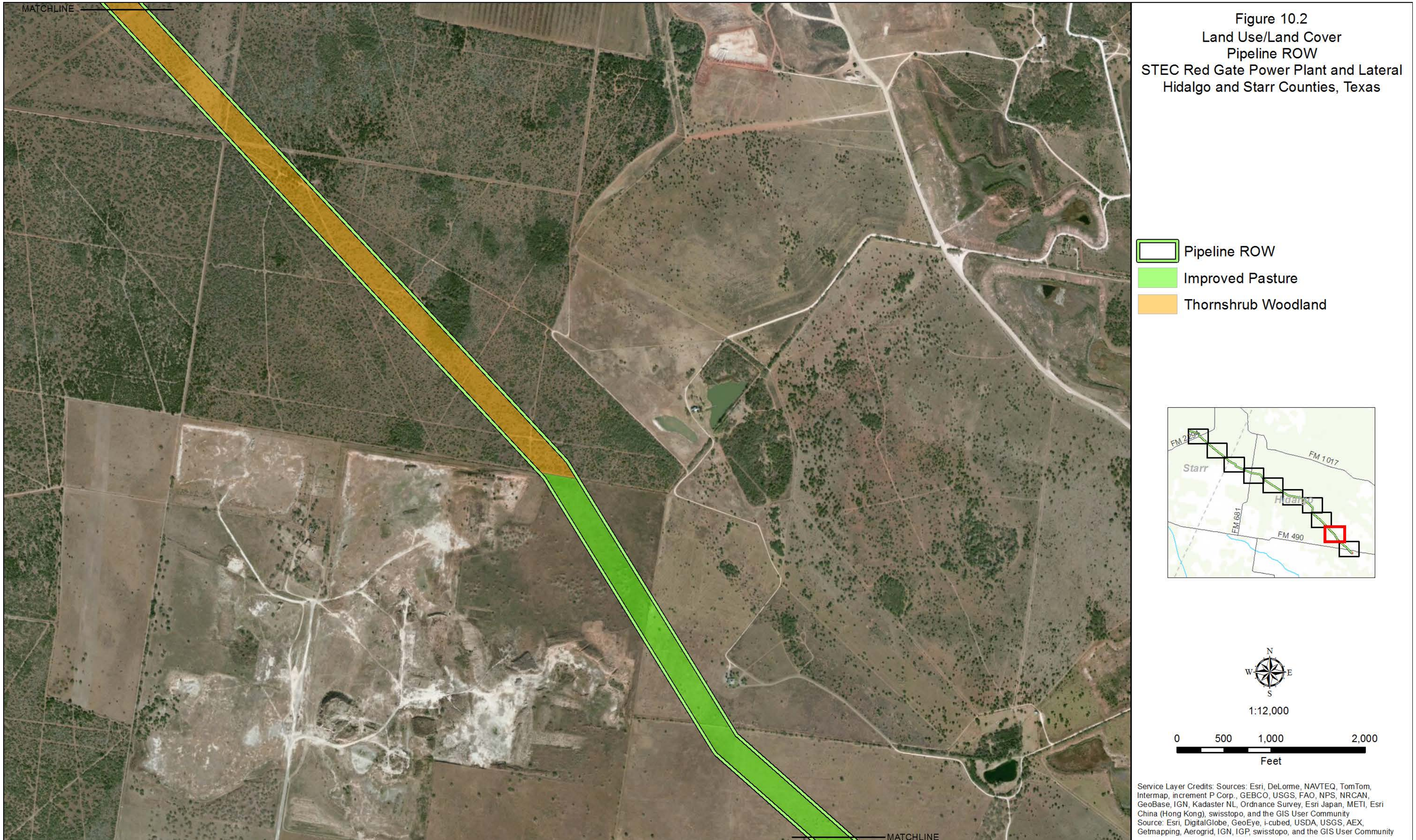


Figure 10.2
Land Use/Land Cover
Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

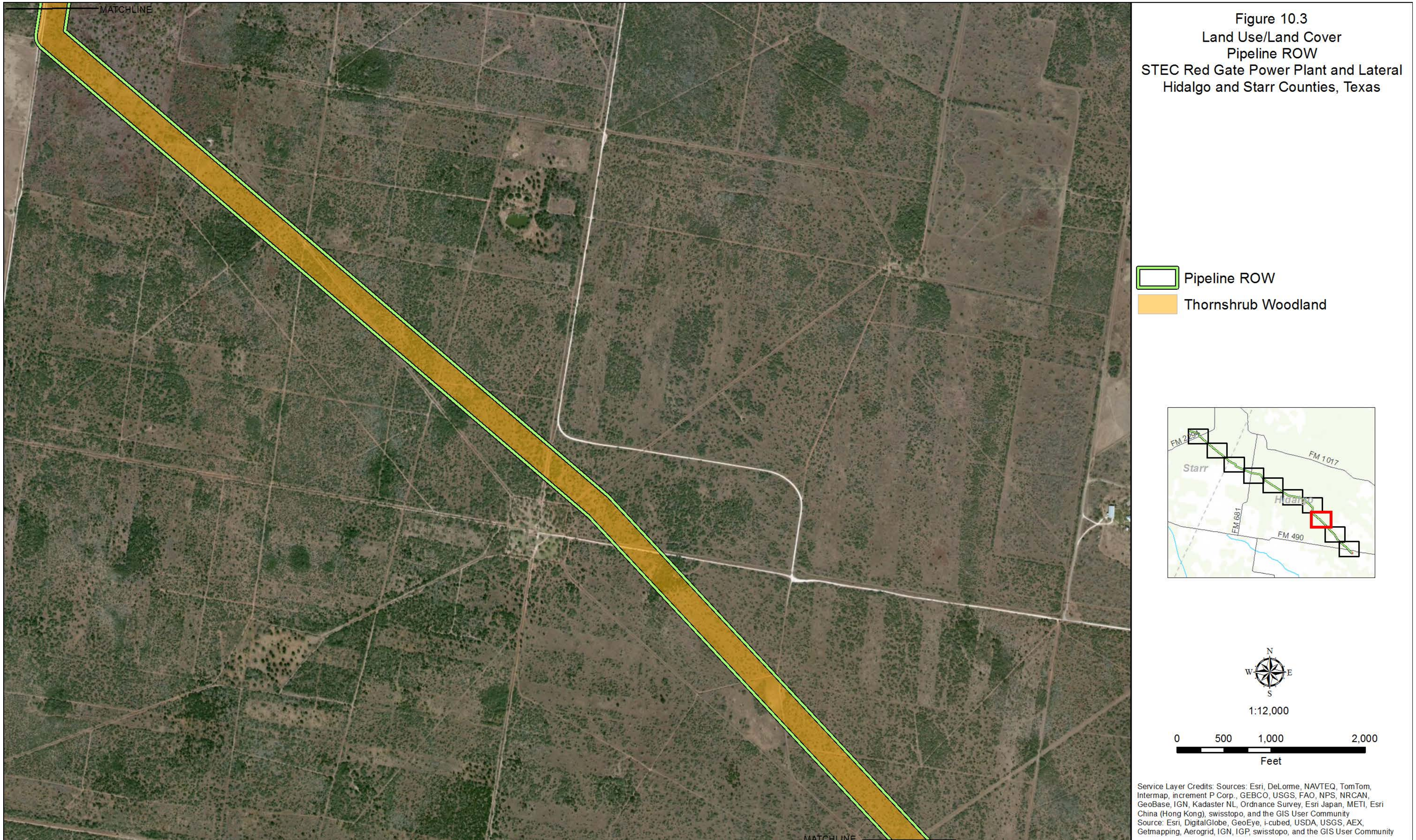


Figure 10.3
Land Use/Land Cover
Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

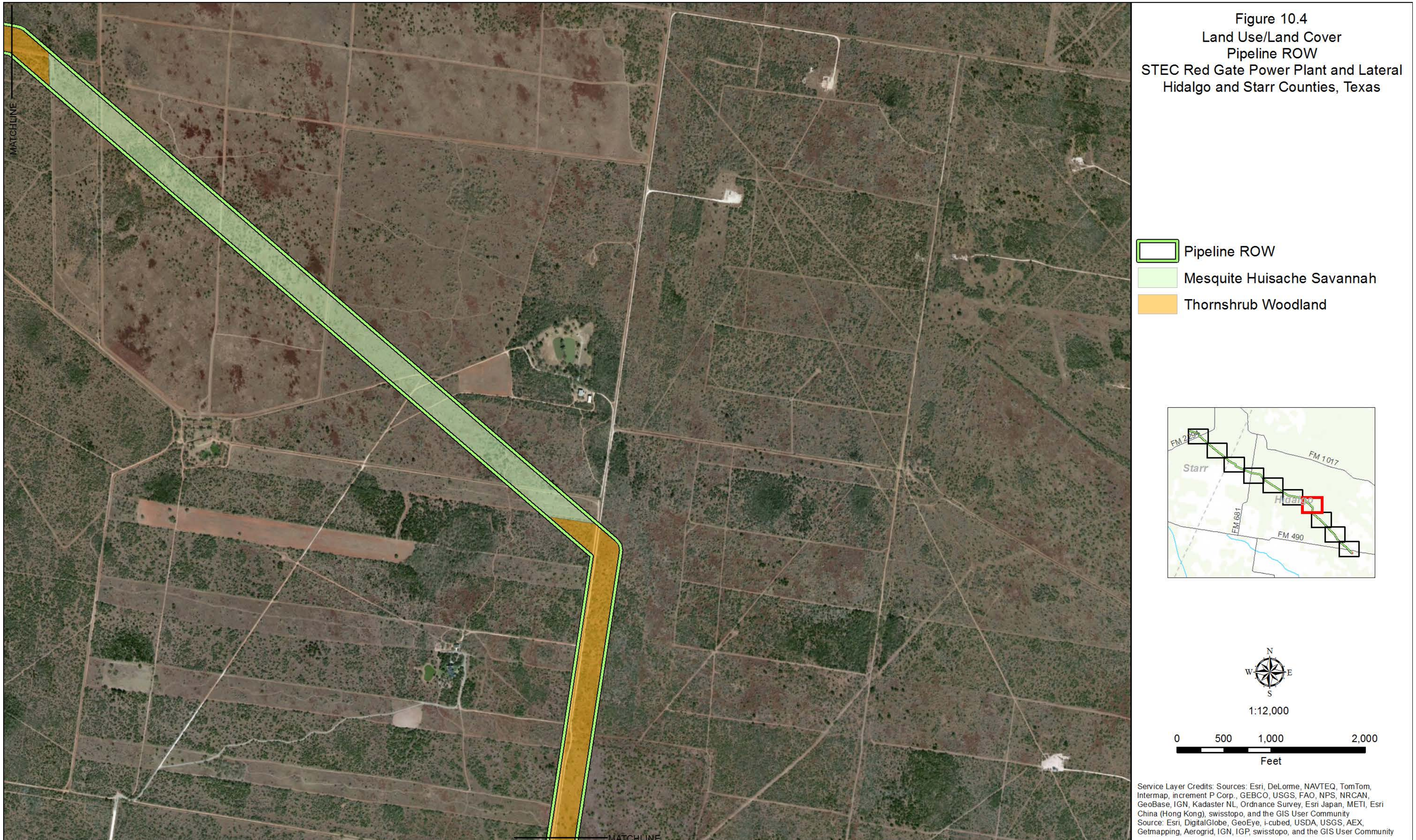


Figure 10.4
Land Use/Land Cover
Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

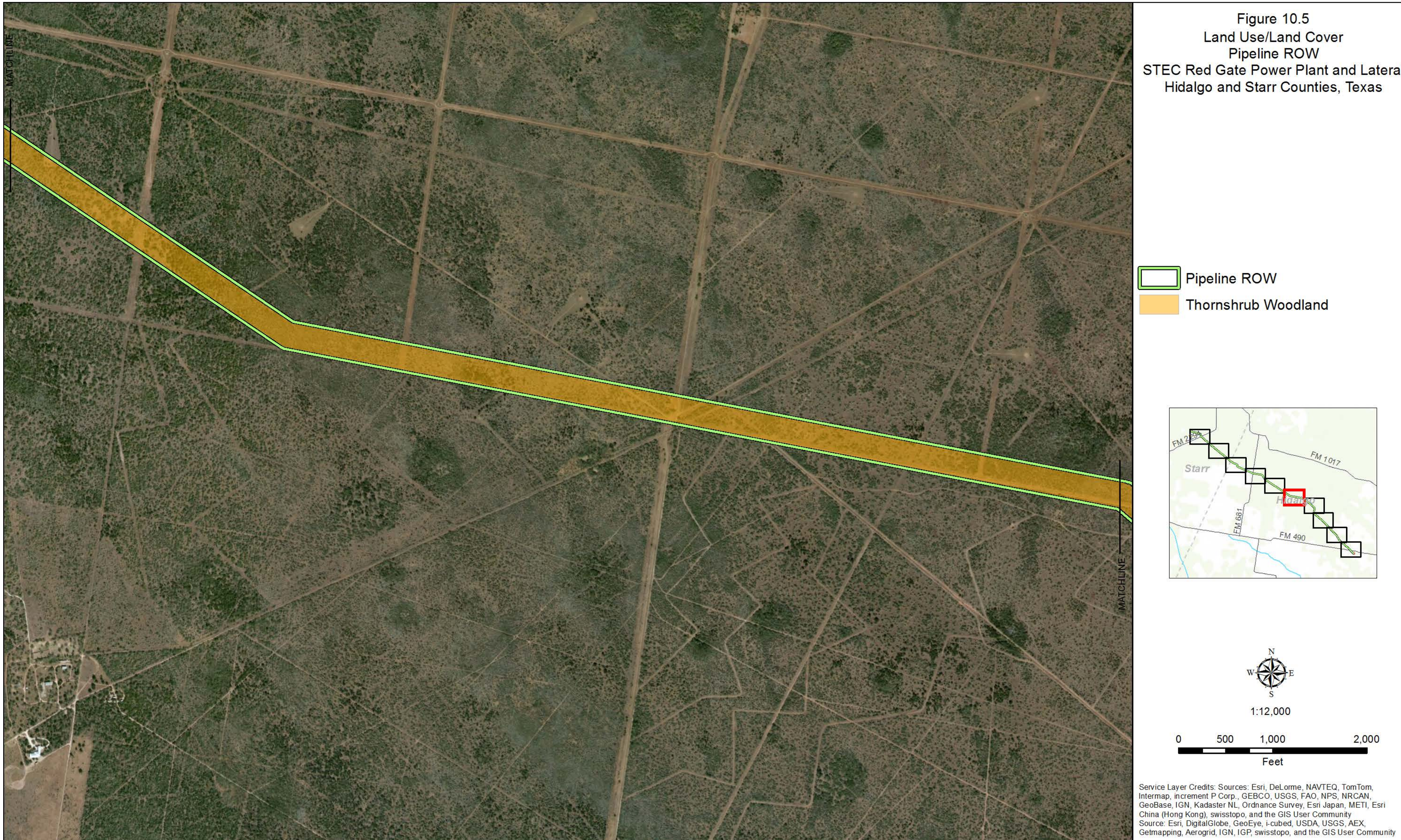


Figure 10.5
Land Use/Land Cover
Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

Pipeline ROW
Thornshrub Woodland

1:12,000

0 500 1,000 2,000
Feet

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

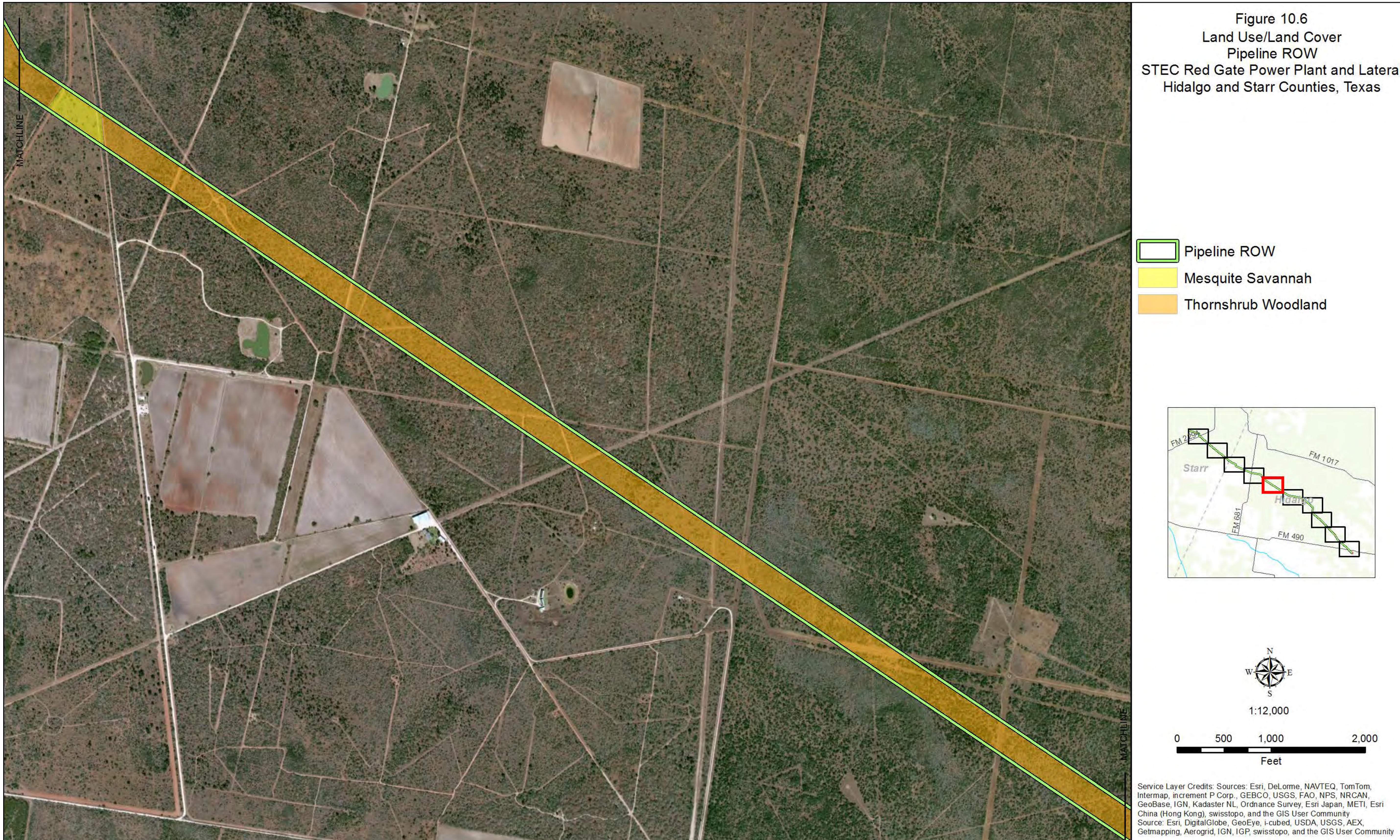


Figure 10.6
Land Use/Land Cover
Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas
MATCHLINE
MATCHLINE
Pipeline ROW
Mesquite Savannah
Thornshrub Woodland
FM 1017
Starr
Hidalgo
FM 681
FM 490
N
W
E
S
1:12,000
0
500
1,000
2,000
Feet
Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 10.7
Land Use/Land Cover
Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

Pipeline ROW
Cultivated Row Crops
Developed
Mesquite Savannah
Thornshrub Woodland

1:12,000

0 500 1,000 2,000
Feet

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 10.8
Land Use/Land Cover
Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

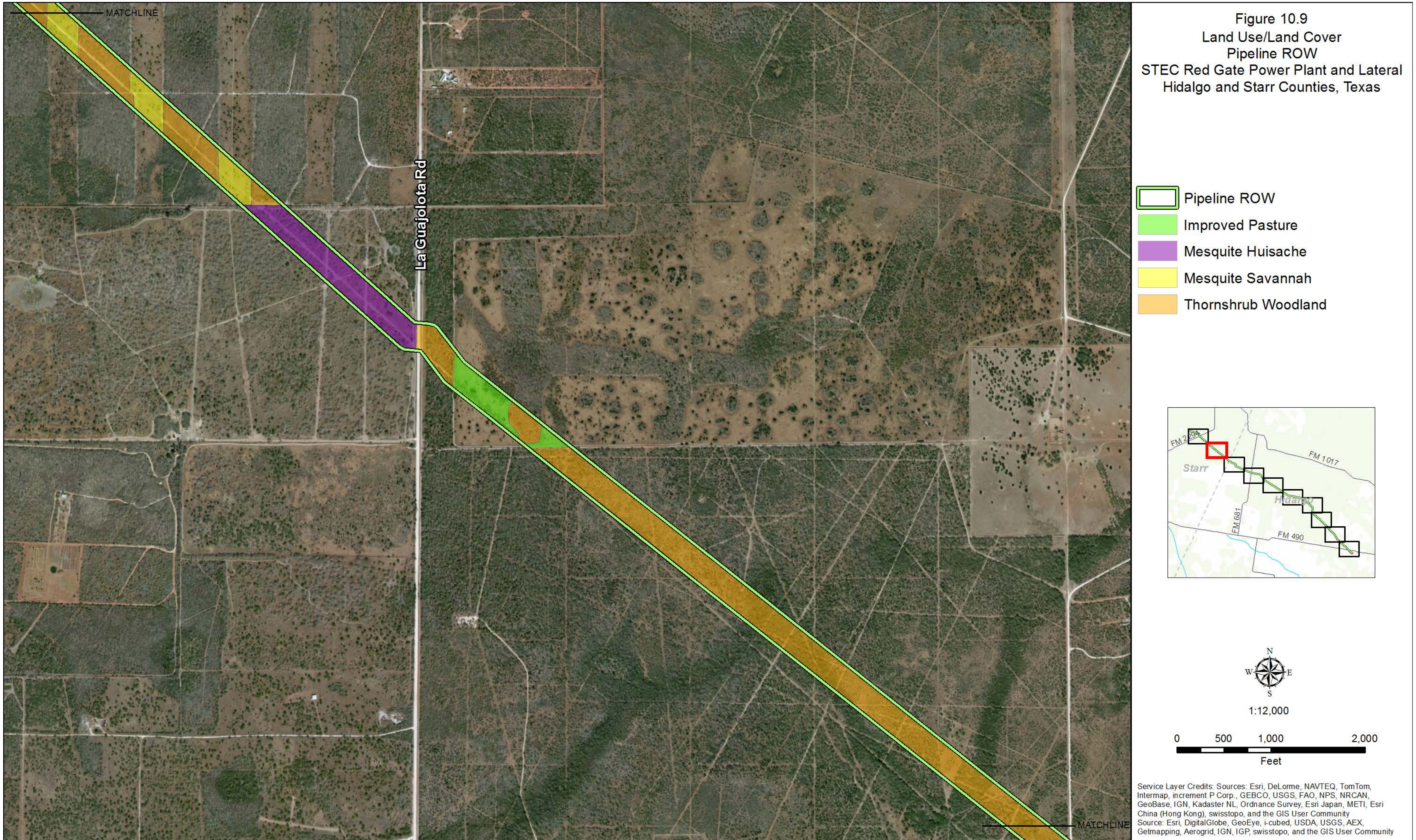


Figure 10.9
Land Use/Land Cover
Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

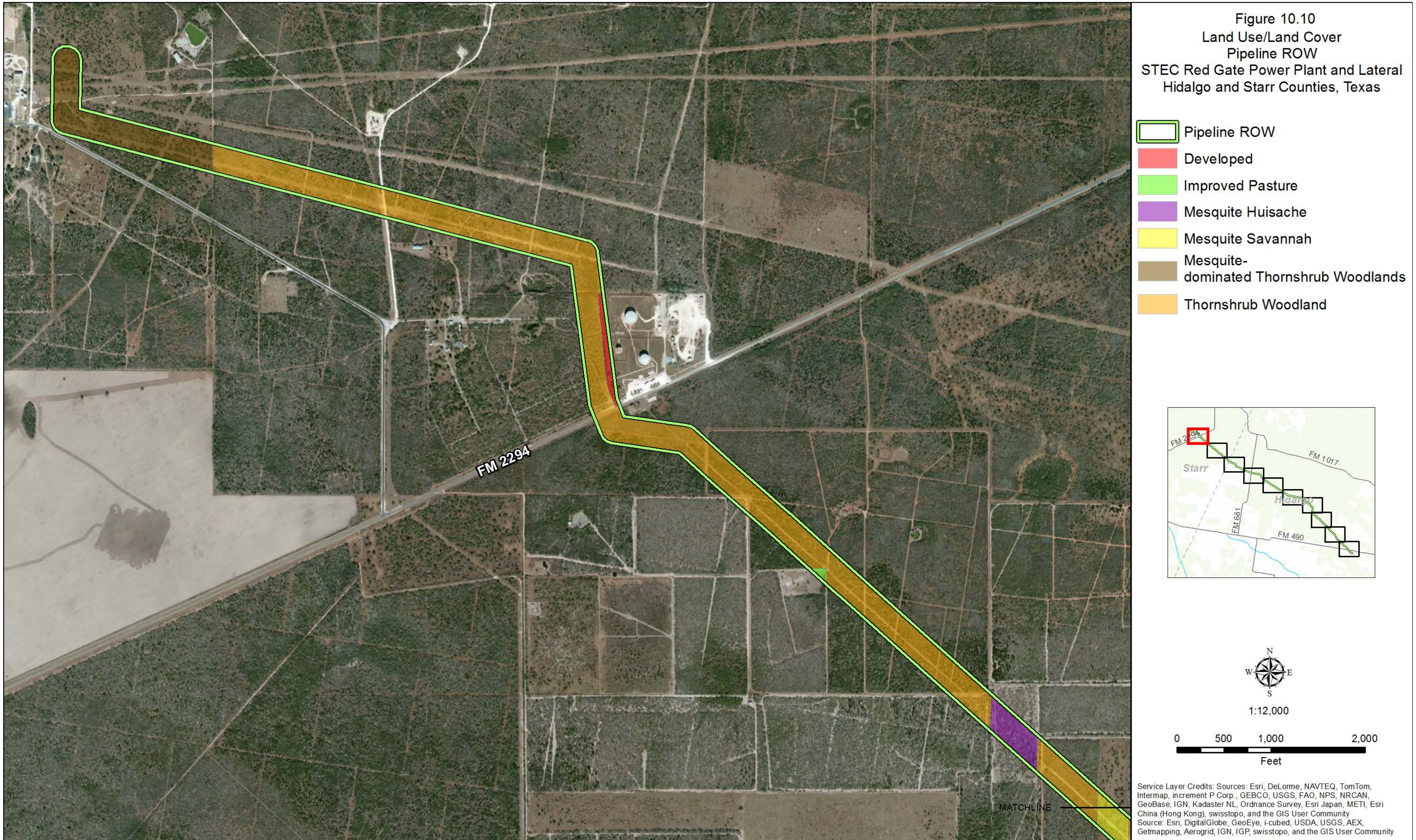


Figure 10.10
Land Use/Land Cover
Pipeline ROW
STEC Red Gate Power Plant and Lateral
Hidalgo and Starr Counties, Texas

Thornscrub Woodland: Thornscrub woodland are dominated by tree and shrub species such as honey mesquite, Texas ebony, lime pricklyash (*Zanthoxylum fagara*), Mexican persimmon, blackbrush acacia, granjeno, sugar hackberry (*Celtis laevigata*), Mexican olive, lotebush (*Zizyphus obtusifolia*), desert yaupon, cenizo, knife-leaf condalia (*Condalia spathulata*), althorn goatbush, la coma (*Bumelia celastrina*), brasil, kidneywood (*Eysenhardtia texana*), leatherstem (*Jatropha dioica*), coyotillo (*Karwinskia humboldtiana*), tasajillo, prickly pear (*Opuntia lindheimeri*), and Spanish dagger. Common vines found in the project area include old-man's beard and milkweed vines (*Matelea reticulata* and *M. sagittifolia*). Common herbaceous plant species include Indian blanket (*Gaillardia pulchella*), peppergrass (*Lepidium austrinum*), slender vervain (*Verbina halei*), Western ragweed (*Ambrosia psilostachya*), lazy daisy (*Aphanostephus skirrhobsis*), pale-seed plantain (*Plantago virginiana*), and Texas croton (*Croton texana*). Grasses and sedges common in the thornscrub wooldlands include buffelgrass (*Pennisetum ciliare*), forked panicm (*Panicum dichotomum*), Texas wintergrass (*Nasella leucotricha*), hooded windmillgrass, common sandbur (*Cenchrus spinifex*), bristlegrass (*Setaria ramiseta*), and purple nut-grass (*Cyperus rotundus*). Woody plant species within depressional areas within the thornscrub wooldlands include honey mesquite, huisache, sugar hackberry, Mexican paloverde (*Parkinsonia aculeata*), granjeno, snake-eyes (*Phaulothamnus spinescens*), and elbowbush. Common herbaceous species in low areas include pigeon-berry (*Rivina humilis*), Cuban germander (*Teucrium cubense*), Lozano's false Indian mallow (*Allowissadula lozanii*), bladder mallow, cylindrical yellow-grass, buffelgrass, crabgrass, purple nut-grass, and guineagrass (*Megathyrsus maximus*).

Mesquite Savanah*:* The mesquite savanna vegetation community exhibits scattered honey mesquite and blackbrush within grasslands dominated by buffelgrass, King Ranch bluestem (*Bothriochloa ischaemum*), Texas wintergrass, hooded windmillgrass, and common sandbur. Other grasses and forbs include red lovegrass (*Eragrostis secundiflora*), bermudagrass, thin paspalum (*Paspalum setaceum*), forked panicum (*Panicum dichotomum*), bristlegrass (*Setaria ramiseta*), Indian blanket, peppergrass, slender vervain, Western ragweed, lazy daisy, pale-seed plantain, and Texas croton. Cuban germander (*Teucrium cubense*) was the dominant herbaceous species in low areas found in the mesquite savanna in the project area during the spring (April). Low percentages of upland plant species such as slender vervain, purple nut-grass, and King Ranch bluestem.

Improved Pasture: Improved pasture within the project area are typically dominated by King Ranch bluestem. Other common plant species within these areas include lazy daisy, red lovegrass, peppergrass, thin paspalum, common sandbur, and hooded windmillgrass.

Cultivated Row Crops: Cotton is the major crop on irrigated fine sandy loam soils in northern Hidalgo County. On non-irrigated fine sandy loams, sorghum is often planted, with some areas used for citrus orchards. On sandy soils, melons and other vegetable crops are grown.

5.3.3 *de minimis* Effects Zone

Land-use and land-cover, including vegetational communities assessed for the *de minimis* effects zone, outside of the STEC Property and the pileline ROW, were dominated by mesquite savanah and thornschrub (**Figure 9**). Approximately10 percent of this area was in agricultural use.

6.0 EFFECTS OF THE PROPOSED ACTION

6.1 Background

This section analyzes the potential for effect of the proposed action on federally listed species for Hidalgo County with potential for occurrence in the Action Area. This analysis is used to support the recommended determinations of effect. Regulatory guidance for the ESA (USFWS and NMFS 1998) defines three levels of effect: a) no effect; b) potential effect that is unlikely to be adverse; and, c) potential effect that is likely to be adverse. The proposed project has two potential sources of adverse effect: construction-related activity and air emissions during operation of the proposed facility (See Section 1.4). Construction-related activity would have direct impacts on habitat and species at the site of construction. For the power generating facility, the impacts would be restricted to the construction site, i.e., the power generating facility site, an area of approximately 22 acres. For the natural gas pipeline, these impacts would be limited to the 300-foot wide construction corridor. A review was conducted of pertinent literature and current information on potential impacts of air emissions on threatened and endangered species of potential occurrence in the Action Area. This literature review was conducted by searching the University of Texas at Austin digital library (*www.lib.utsystem.edu*) as well as the online journal databases JSTOR (*www.jstor.org*) and BioOne (*www.bioone.org*). An extensive review of the literature did not find any publication that identified adverse impacts of air emissions on any endangered plant or animal species in the BA. Concentrations of air pollutants within the Action Area are well below the SILs, ESL and/or the NAAQSs deemed protective of human health and wildlife (**Tables 3-5**). Adverse impacts from operation of the power generating facility due to air pollution are not expected for any species. There are, therefore, no data that attribute take of any species to these concentrations of the modeled air pollutants.

6.2 Recommend Determinations of Effect

6.2.1 Jaguarundi

Potential to Occur in the Action Area: Jaguarundi have not been confirmed in Texas for over 20 years, and are likely extirpated in the state (Tewes and Grassman 2005, Grassman 2006). The Action Area does not include adequately dense thornshrub habitat that could be utilized by the jaguarundi as preferred habitat. Any thornshrub dense enough to favor occupation by the jaguarundi is patchy and isolated from any extensive zones of preferred habitat by urban, residential, roadway and agricultural development. The TNDD (TPWD 2014) has no elements of occurrence for jaguarundi in the Action Area.

Potential Effect: The jaguarundi is not expected to occur in the Action Area. The jaguarundi is reclusive and instinctively avoids human activity. No effects are anticipated from noise (**Section 2.6.2**). Concentrations of air pollutants within the Action Area are well below the SILs and/or the NAAQSs deemed protective of human health and wildlife (**Tables 3-5**). There are no data that attribute take of jaguarundi to these concentrations of the modeled air pollutants (**Section 5.4**). No impacts to the jaguarundi are expected from the proposed action.

Recommended Determination of Effect: Because the jaguarundi almost certainly does not occur in the Action Area, and there is no likelihood for impacts to this species, the recommended determination of effect is that the proposed action will have *no effect* on the jaguarundi.

6.2.2 Ocelot

Potential to Occur in the Action Area: No *optimal* ocelot habitat (>95% horizontal canopy coverage) and less than 2.5% of *sub-optimal I* ocelot habitat (76-95%) occur within the Action Area. Any patches of thornshrub dense enough to favor occupation by the ocelot are well below the size capable of supporting the ocelot and are isolated from any extensive zones of preferred habitat by urban, residential, roadway and agricultural development. Research has shown that ocelots prefer a minimum of 70 contiguous acres of dense thornshrub habitat (Jackson et al. 2005). No suitable habitat patches of this size occur within the Action Area. A total of 23.1 acres of *sub-optimal I* habitat was documented within the entire Action Area; however, this habitat type consisted on 14 small, fragmented patches of 0.24 to 7.60 acres in size. Although there is one element of occurrence for the ocelot in Hidalgo County from 1984 located 3.4 miles southeast of the Action Area (TPWD 2014) (**Figure 5**), a recent survey from the nearest ocelot historical population failed to provide any evidence for ocelot presence (Haines et al. 2006b). Taken together, these data indicate that the possibility of an occurrence of the ocelot in the Action Area is remote.

Potential Effect: The ocelot is not expected to occur in the Action Area. Because there is no *optimal* habitat in the Action Area, and no connectivity small patches of sub *optimal I habitat* within the Action Area to *optimal* habitat outside the Action Area, the proposed action will not affect habitat for the ocelot. Furthermore, no effects are anticipated from noise (**Section 2.6.2**).Concentrations of air pollutants within the Action Area are well below the SILs and/or the NAAQSs deemed protective of human health and wildlife (**Table 5**). There are no data that attribute take of ocelot to these concentrations of the modeled air pollutants (**Section 5.4**). No impacts to the ocelot are expected from the proposed action.

Recommended Determination of Effect: Because no impacts to the ocelot are expected, the recommended determination of effect is that the proposed action will have *no effect* on the ocelot.

6.2.3 Interior Least Tern

Potential to Occur in the Action Area: The Action Area includes no lacustrine and riverine sandbar and gravel beach habitats for inland breeding sites for interior least tern. The TNDD (2014) has no elements of occurrence for interior least tern in Hidalgo or Starr Counties. It is virtually certain that the interior least tern does not exist in the Action Area.

Potential Effect: The chance of an occurrence of the interior least tern in the Action Area is remote. The proposed action will not affect habitat for the interior least tern. No effects are anticipated from noise (**Section 2.6.2**). Concentrations of air pollutants within the Action Area are well below the SILs and/or the NAAQSs deemed protective of human health and wildlife (**Tables 3-5**). There are no data that attribute take of interior least tern to these concentrations of the modeled air pollutants (**Section 5.4**). . The proposed project would not be expected to result in any adverse impact to the interior least tern.

Recommended Determination of Effect: Because no impacts to the interior least tern are expected, the recommended determination of effect is that the proposed action will have *no effect* on the interior least tern.

6.2.4 Northern Aplomado Falcon

Potential to Occur in the Action Area: There is no evidence that the northern aplomado falcon exists in the Action Area. No northern aplomado falcons or nests were observed on pedestrian surveys of the Action Area. The Action Area has limited degraded habitat for the northern aplomado falcon (disturbed open grassland with low density, isolated perches) and, therefore is unlikely to be attracted to the area. The TNDD (2014) has no elements of occurrence for the northern aplomado falcon in Hidalgo County. However, eBird (2014) indicates recent, likely incidental, sightings of the northern aplomado falcon in Hidalgo County, where the closest record was 23 miles from the Action Area. Moreover, it appears that none of the 53 individuals released in the Action Area from 2000-2002 (Juergens 2014) were able to survive, remain, or establish a self-sustaining breeding population in the Action Area. These latter data strongly suggest that the Action Area is unsuitable for the northern aplomado falcon.

Potential Effect: There is virtually no potential for occurrence of the northern aplomado falcon in the Action Area. The proposed action will not affect habitat for the northern aplomado falcon. No effects are anticipated from noise (**Section 2.6.2**). Concentrations of air pollutants within the Action Area are well below the SILs and/or the NAAQSs deemed protective of human health and wildlife (**Tables 3-5**). There are no data that attribute take of northern aplomado falcon to these concentrations of the modeled air pollutants (**Section 5.4**).

Recommended Determination of Effect: Because the northern aplomado falcon almost certainly does not occur in the Action Area, and there is no likelihood for impacts to this species, the recommended determination of effect is that the proposed action will have *no effect* on the northern aplomado falcon.

6.2.5 Ashy Dogweed

Potential to Occur in the Action Area: Potential soil types (e.g., fine, sandy-loam soils) and suitable open grassland-shrubland habitat for ashy dogweed occur within the Action Area; however, the only known population of this species is in Zapata County, Texas (USFWS 1987, 1984a). There are no elements of occurrence for ashy dogweed in Starr or Hidalgo Counties (TNDD 2014) The only known location anywhere in the LRGV is 50 miles southwest of the Action Area in Zapata County (USFWS 1987, 1984a). Ashy dogweed was not observed during pedestrian surveys of the Action Area.

Potential Effect: Ashy dogweed does not appear to occur in the Action Area. Modeled worst-case levels for air pollutants in the Action Area are below EPA screening levels for adverse effects on sensitive plants (**Table 5**). The proposed project would not be expected to result in any adverse impact to ashy dogweed.

Recommended Determination of Effect: Because no impacts to ashy dogweed are expected, the recommended determination of effect is that the proposed action will have *no effect* on ashy dogweed.

6.2.6 Johnston's Frankenia

Potential to Occur in the Action Area: Johnston's frankenia may be found on Brennan fine sandy loam and Zapata soils, but only under strongly saline, highly alkaline, calcareous, or gypseous conditions. Brennan fine sandy loam and Zapata soils occur in the northwestern half of the Action Area; however, this area is not representative of the dwarf shrublands habitat associated with Johnston's frankenia (Poole et al. 2007). There are no elements of occurrence for Johnston's frankenia in Starr or Hidalgo Counties (TPWD 2014). Johnston's frankenia is unlikely to occur in the Action Area due to absence of the dwarf shrubland habitat type. Johnston's frankenia was not observed during pedestrian surveys of the Action Area.

Potential Effect: Johnston's frankenia does not appear to occur in the Action Area. Modeled worst-case levels for air pollutants in the Action Area are below EPA screening levels for adverse effects on sensitive plants (**Table 5**). The proposed project would not be expected to result in any adverse impact to Johnston's frankenia.

Recommended Determination of Effect: Because no impacts to Johnston's frankenia are expected, the recommended determination of effect is that the proposed action will have *no effect* on Johnston's frankenia.

6.2.7 Star Cactus

Potential to Occur in the Action Area: The Action Area has no preferred habitat for the star cactus (gravelly clay/loam soils associated with the Catahoula/Frio formation - soils that do not occur in Hidalgo County) it is therefore extremely unlikely that the star cactus occurs in the Action Area. TNDD has no elements of occurrence for the star cactus in the Action Area. The only known location anywhere in the LRGV, is 40 miles to the west in Starr County (Terry and Poole et al. 2007, TPWD 2014).

The STEC Property, an accessible subset of the Action Area, was intensively surveyed for the presence of potential habitat for the star cactus by qualified botanists. As mentioned in section 4.1.4, star cactus grows in gravelly clays and loams in the South Texas grassland and thornshrub country, associated with soils overlying the Tertiary Catahoula and Frio formations (clay, mudstone, sandstone, conglomerate and caliche) in western Starr County (USFWS 2003, Poole et al. 2007; Nico et al. 2010). These soils do not occur in Hidalgo County (USDA 1981). Star cactus was not observed during pedestrian surveys of the Action Area.

Potential Effect: Star cactus does not appear to occur in the Action Area. Modeled worst-case levels for air pollutants in the Action Area are below EPA screening levels for adverse effects on sensitive plants (**Table 5**). The proposed project would not be expected to result in any adverse impact to star cactus.

Recommended Determination of Effect: Because no impacts to star cactus are expected, the recommended determination of effect is that the proposed action will have *no effect* on star cactus.

6.2.8 Texas Ayenia

Potential to Occur in the Action Area: Texas ayenia is an extremely rare plant that, where known, grows in very specific conditions. Two USDA soil types are associated with known populations of Texas ayenia: sandy clay loam of the Hidalgo Series and fine sandy loam of the Willacy Series (Poole et al., 2007). Limited patches of both soil types are found in the eastern section of the Action Area. Known populations of Texas ayenia are located in riparian microhabitats, conditions that do not occur within the Project Site. The closest known population of Texas ayenia is 25 miles to the southeast of the Action Area, and consists of 20-150 plants in a park that is 2.5 miles southwest of Mercedes on the Llano Grande Lake in Hidalgo County (USFWS 2010b). Texas ayenia was not observed during pedestrian surveys of the Action Area.

Potential Effect: Texas ayenia does not appear to occur in the Action Area. Modeled worst-case levels for air pollutants in the Action Area are below EPA screening levels for adverse effects on sensitive plants (**Table 5**). The proposed project would not be expected to result in any adverse impact to Texas ayenia.

Recommended Determination of Effect: Because no impacts to Texas ayenia are expected, the recommended determination of effect is that the proposed action will have *no effect* on Texas ayenia.

6.2.9 Walker's Manioc

Potential to Occur in the Action Area: The Action Area beyond the STEC property has possible marginal, habitat suitable for Walker's manioc, that is, native thornshrub vegetation on shallow (ca. 12 inches in depth), gravelly-sandy loam soils in close association with indurate outcroppings of caliche in the Goliad formation that extend to the LRGV in Hidalgo and Starr counties. Walker's manioc was not observed during pedestrian surveys of the Action Area.

Potential Effect: Walker's manioc does not appear to occur in the Action Area. Modeled worst-case levels for air pollutants in the Action Area are below EPA screening levels for adverse effects on sensitive plants (**Table 5**). The proposed project would not be expected to result in any adverse impact to Walker's manioc.

Recommended Determination of Effect: Because no impacts to Walker's manioc are expected, the recommended determination of effect is that the proposed action will have *no effect* on Walker's manioc.

6.2.10 Zapata Bladderpod

Potential to Occur in the Action Area: Zapata bladderpod occurs within the Zapata-Maverick soil association in Zapata County, and the Jimenez-Quemado soil association in Starr County (Poole et al. 2007, USFWS 1999). These soil types do not occur within the Action Area. It is therefore extremely unlikely that Zapata bladderpod occurs in the Action Area. TNDD has no elements of occurrence for Zapata bladderpod in the Action Area. The nearest documented extant population is believed to be about 20 miles from the Action Area in southwestern Starr County (USFWS 1999). Zapata bladderpod was not observed during pedestrian surveys of the Action Area.

Potential Effect: Zapata bladderpod does not appear to occur in the Action Area. Modeled worst-case levels for air pollutants in the Action Area are below EPA screening levels for adverse effects on sensitive plants (**Table 5**). The proposed project would not be expected to result in any adverse impact to Zapata bladderpod.

Recommended Determination of Effect: Because no impacts to Zapata bladderpod are expected, the recommended determination of effect is that the proposed action will have *no effect* on Zapata bladderpod.

6.3 Designated Critical Habitat

DCH has been established for Zapata bladderpod in Starr County at least 16 miles from the Action Area (USFWS 2000). No direct or indirect adverse impacts to DCH are expected from the proposed action. Therefore, the recommended determination of effect is that the proposed action will have *no effect* on DCH.

6.4 Summary of the Recommended Determinations of Effect

In summary, the BA recommends the following determinations of effect for species with potential for occurrence in the Action Area:

Table 8. Recommended Determinations of Effect for Federally Listed Species with Potential for Occurrence in Hidalgo or Starr Counties and Designated Critical Habitat

Listed Species		County Where Listed	Federal Status	Determination of Effect
Common Name	***Scientific Name***		**DCH**	
Mammalian Carnivores				
Gulf Coast Jaguarundi	*Herpailurus yagouaroundi cacomitli*	Hidalgo, Starr	Endangered	No Effect
			none	NA
Ocelot	*Leopardus pardalis*	Hidalgo, Starr	Endangered	No Effect
			none	NA
Birds				
Interior Least Tern	*Sterna antillarum*	Starr	Endangered	No Effect
			none	NA
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	Hidalgo, Starr	Endangered	No Effect
			none	NA
Flowering Plants				
Ashy Dogweed	*Thymnophylla tephroleuca*	Starr	Endangered	No Effect
			none	NA
Johnston's Frankenia	*Frankenia johnstonii*	Starr	Endangered	No Effect
			none	NA
Star Cactus	*Astrophytum asterias*	Hidalgo, Starr	Endangered	No Effect
			none	NA
Texas Ayenia	*Ayenia limitaris*	Hidalgo	Endangered	No Effect
			none	NA

Table 8. Recommended Determinations of Effect for Federally Listed Species with Potential for Occurrence in Hidalgo or Starr Counties and Designated Critical Habitat

Listed Species		County Where Listed	Federal Status	Determination of Effect
Common Name	***Scientific Name***		**DCH**	
Walker's Manioc	*Manihot walkerae*	Hidalgo, Starr	Endangered	No Effect
			none	NA
Zapata Bladderpod	*Lesquerella thamnophila*	Starr	Endangered	No Effect
			yes	No Effect

Source: USFWS 2014

7.0 REFERENCES

Baskin, J. A. and R. C. Hulbert. 2008. Joint Meeting of The Geological Society of America, Soil Science Society of America, American Society of Agronomy, Crop Science Society of America, Gulf Coast Association of Geological Societies with the Gulf Coast Section SEPM. Paper No. 811-4. URL = https://gsa.confex.com/ gsa/2008AM/finalprogram/abstract_140398.htm.

Blair W. F. 1950. The biotic provinces of Texas. Texas Journal of Science 2: 93-117.

Bureau of Economic Geology. 1996. Physiographic Map of Texas. The University of Texas at Austin. Austin, Texas. USA. URL = http://www.beg.utexas.edu/UTopia/images/pagesizemaps/ physiography.pdf. Accessed June 2014.

Burnham, W., J. P. Jenny, W. R. Heinrich, G. Hunt, A. B. Montoya, B. D. Mutch, and C. E. Sandfort. 2002. Proposal: Restoration of the Northern Aplomado Falcon in New Mexico. The Peregrine Fund. Boise, Idaho.

Campbell, L. 2003. Endangered and Threatened Animals of Texas, Their Life History and Management. Texas Parks and Wildlife Division. Austin.

Caso, A. 2007. Research Associate. Texas A&M University-Kingsville. Personal communication to Rick Phillips (B&A).

Diamond, D. D., D. H. Riskind, and S. L. Orzell. 1987. A framework for plant community classification and conservation in Texas USA. Tex. J. Sci. 39: 203– 222.

eBird. 2014. Range and Point Maps. URL = http://ebird.org/ebird/map.

Environmental Protection Agency (EPA). 1971. Effects of Noise on Wildlife and Other Animals. EPA Office of Noise Abatement and Control. EPA Document NTID300.5.

_____. 1974. Information on the Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. EPA Office of Noise Abatement and Control. EPA Document 550/9-74-004.

Experiment Station MP-585. Texas A&M University. College Station, Texas.

Global Raptor Information Network (GRIN). 2014. Species Account: Aplomado Falcon Falco femoralis. URL = http://www.globalraptors.org.

Gould, F. W. 1975. Texas Plants – A checklist and Ecological Summary. MP-585/Revised. Tx. Agri Exp. Sta., College Station, Texas

Grassman, L. I. 2006. Wild Cats of Texas. Wildlife. Houston Zoo, Fall, p. 6.

Haines, A. M., Janecka, J. E., Tewes, M. E., Grassman, L. I., and Morton, P. 2006a. The importance of private lands for ocelot *Leopardus pardalis* conservation in the United States. Oryx. 40: (1) 90-94.

Haines, A. M., M. E. Tewes, L. L. Laack, J. S. Horne, and J. H. Young. 2006b. *Habitat Based Population Viability Analysis of Ocelots in Southern Texas*. Biological Conservation 132:424-436.

Harveson, P. M., M. E. Tewes, G. L. Anderson, and L. L. Laack. 2004. Habitat use by ocelots in south Texas: implications for restoration. Wildlife Society Bulletin. 32: 948-954.

Hatch, S. L., K. N. Gandhi, and L. E. Brown. 1990. Checklist of the vascular plants of Texas. MP-1655. Texas A&M University, Texas Agricultural Experiment Station, College Station, Texas. 158 pp.

Hoel, H. D. and W. E. Galloway. 1983. Two depositional models for Pliocene coastal plain fluvial systems, Goliad Formation, South Texas Gulf Coastal Plain (abs.): American Association of Petroleum Geologists Bulletin, v. 67, no. 3, p. 484. URL = http://archives.datapages.com/ data/bulletns/ 1982-83/data/pg/0067/0003/0450/0484a.htm ?doi=10.1306%2F03B5B141-16D1-11D7-8645000102C1865D.

Horne, J. S. 1998. Habitat partioning of sympatric ocelot and bobcat in southern Texas. MSc Thesis, Texas A&M University-Kingsville, Kingsville, TX.

International Finance Corporation (IFC). 2007. Environmental, Health, and Safety (EHS) Guidelines: Environmental Noise Management. URL = www.ifc.org.

Jackson, V. L., L. L. Laack, and E. G. Zimmerman. 2005. Landscape metrics associated with habitat use by ocelots in south Texas. Journal of Wildlife Management. 69: 733-738.

Janssen, G. K. 1999. Site Characteristics and Management of Johnston's frankenia (*Frankenia johnstonii*). Final Report. Endangered Species Program. Texas Parks and Wildlife Department.

Janssen, G. K. and P. S. Williamson. 1996. Encouraging conservation of endangered plants on private lands: A case study of *Frankenia johnstonii,* an endangered south Texas subshrub. *In*: Southwestern Rare and Endangered Plants: Proceedings of the Second Conference. USDA Forest Service General Technical Report RM-GTR-283: 1-7.

Juergens, P. W. (2014). Personal communication to AWL, Blanton& Associates, Inc.

Laack, L. L. 1991. Ecology of the ocelot (*Felis pardalis*) in south Texas. MSc Thesis, Texas A&I University, Kingsville, TX.

Larkin, T. J. and G. W. Bomar. 1983. Climatic Atlas of Texas. Texas Department of Water Resources. Publication LP-192.

Lott, C. A. 2006. Distribution and abundance of the interior population of the least tern (*Sternula antillarum*), 2005. U. S. Army Corps of Engineers. Washington, D.C., USA.

Mora, M. A., C. Baxter, J. L. Sericano, A. B. Montoya, J. C. Gallardo, and J. R. Rodriguez-Salazar. PBDEs, PCSs, and DDE in Eggs and Their Impacts on Aplomado Falcons (Falco femoralis) from Chihuahua and Veracruz, Mexico. Environmental Pollution 159:3422-3438.

NatureServe (2014). Explorer. URL = http://explorer.natureserve.org/index.htm.

Navarro-Lopez, D. 1985. Status and distribution of the ocelot (*Felis pardalis*) in south Texas. MSc Thesis, Texas A&I University, Kingsville, TX.

Nico, Jean-Philippe, B. R. Scanlon, C. Yang, and J. B. Gates. 2010. Geological and Geographical Attributes of the South Texas Uranium Province. Bureau of Economic Geology. TCEQ Contract No. 582-4-69718.

Oberholser, H. C. 1974*. The Bird Life of Texas. 2 Volumes. University of Texas Pr*ess. Austin.

Peregrine Fund. 2012a. Aplomado falcon restoration. URL = http://www.peregrinefund.org/ projects/aplomado-falcon. Accessed May 2012.

Peregrine Fund. 2012b. 2011 Aplomado falcon territory occupancy survey summary - South Texas. URL = http://blogs.peregrinefund.org/article/711. Accessed May 2012.

Poole, J. M., W. R. Carr, D. M. Price, and J. R. Singhurst. 2007. Rare Plants of Texas. Texas A&M University Press. College Station, Texas.

Schmidly, D. J. 2004. The Mammals of Texas. Revised edition. Texas Parks and Wildlife Department. University of Texas Press, Austin, Texas.

Smith, A. E. and J. B. Levenson. 1980. *A Screening Procedure for the Impacts of Air Pollution on Plants, Soils, and Animals*. EPA 450/2-81-078. Argonne National Laboratory, Argonne, Illinois, USA.

Terry, M., D. Price, and J. Poole. 2007. A Tale of Two Cacti-The Complex Relationship between Peyote (Lophophora williamsii) and Endangered Star Cactus (Astrophytum asterias). In: Barlow-Irick, P., J. Anderson, and C. McDonald, tech eds. Southwestern rare and endangered plants: Proceedings of the Fourth Conference; March 22-26, 2004; Las Cruces, New Mexico. Proceedings. RMRS-P-48CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. p. 115-121

Tewes, M. E. 2001. Ghost cat of south Texas. Texas Parks and Wildlife. September, 21-25.

Tewes, M. E. 2011. Frank Daniel Yturria Endowed Chair for Wild Cat Studies. Texas A&M University-Kingsville. Personal communication to Rick Phillips (B&A).

Tewes, M. E. 2012. East Wildlife Foundation committed to ocelot research. Texas Wildlife. February 36-37.

Tewes, M. E., and D. D. Everett. 1986. Status and Distribution of the Endangered Ocelot and Jaguarundi in Texas. In Cats of the World: Biology, Conservation, and Management. National Wildlife Federation. Washington, D.C.

Tewes, M. E. and L. I. Grassman, Jr. 2005. Jaguarundi: mysterious valley cat. Caesar Kleberg News. p 7.

Texas Commission on Environmental Quality (TCEQ). 2013. URL = http://www.tceq.texas.gov/toxicology/esl/list_main.html

Texas Parks and Wildlife Department (TPWD). 2013. Jaguarundi. URL = http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_bk_w7000_0013_jaguarundi.pdf.

TPWD and Texas Vegetation Classification Project: Phases 1, 2, and 3. Texas Natural Resources Information System (TNRIS).

TPWD. 2014b. Texas Natural Diversity Database (TNDD). 2014. Element of Occurrence Records.

Texas Water Development Board. 2014. Geologic Atlas of Texas, McAllen – Brownsville Sheet. URL = http://www.twdb.state.tx.us/groundwater/aquifer/GAT/index.asp.

U. S. Department of Agriculture (USDA). 1981. Soil Conservation Service and Texas Agricultural Experiment Station (TAES). 1981. Soil Survey of Hidalgo County, Texas. Washington, D. C., USA.

U.S. Fish and Wildlife Service (USFWS). 1976. Endangered and Threatened Wildlife and Plants. Endangered Status for 159 Taxa of Animals. Federal Register 41(115): 21062-21067.

_____. 1982. Endangered and Threatened Wildlife and Plants: Endangered Status for U.S. Population of the Ocelot. Federal Register 47(140): 31670-2.

_____. 1984a. Endangered and Threatened Wildlife and Plants: Final Rule to Determine Dyssodia tephroleuca (Ashy Dogweed) To Be an Endangered Species. Federal Register 49(140): 29232-29234.

_____. 1984b. Endangered and Threatened Wildlife and Plants: Final Rule to Determine Frankenia Johnstonii (Johnston's Frankenia) To Be an Endangered Species. Federal Register 49(153): 31418-31421.

_____. 1985. Endangered and Threatened Wildlife and Plants: Interior Populations of the Least Tern Determined to be Endangered. Federal Register 50(102): 21784-21792.

_____. 1986. Endangered and Threatened Wildlife and Plants: Determination of the Northern Aplomado Falcon to be an Endangered Species. Federal Register 51(37):6686-6690.

_____. 1987. Ashy Dogweed (*Thymophylla tephroleuca*) Recovery Plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

_____. 1990a. Listed Cats of Texas and Arizona Recovery Plan (With Emphasis on the Ocelot). Albuquerque, New Mexico.

_____. 1990b. Northern Aplomado Falcon Recovery Plan. Albuquerque, New Mexico.

_____. 1990c. Interior Population of the Least Tern (*Sterna antillarum*). Recovery Plan. U.S. Fish and Wildlife Service, Twin Cities, Minnesota.

_____. 1991. Endangered and Threatened Wildlife and Plants: Determination of Endangered Status for the Plant *Manihot walkerae* (Walker's Manioc). Federal Register. 56(191): 49850-49854.

_____. 1993. Endangered and Threatened Wildlife and Plants: Determination of Endangered Status for the Plant *Astrophytum asterias (Star Cactus)*. Federal Register 58(199): 53804-53807.

_____. 1994. Endangered and Threatened Wildlife and Plants: Determination of Endangered Status for the Plants *Ayenia limitaris* (Texas Ayenia) and *Ambrosia cheiranthifolia* (South Texas Ambrosia). Federal Register 59(163): 43648-43652.

_____. 1999. Endangered and Threatened Wildlife and Plants: Determination of Endangered Status for the Plant *Lesquerella thamnophila* (Zapata Bladderpod). Federal Register 64(224): 63745-63752.

_____. 2000. Final designation of critical habitat for the plant *Lesquerella thamnophila*. Federal Register (65)(247): 44717-44753.

_____. 2008. Walker's Manioc (*Manihot walkerae*) 5-year Review: Summary and Evaluation. U.S. Fish and Wildlife Service. Corpus Christi Ecological Services Field Office. Corpus Christi, Texas.

_____. 2010a. Draft Ocelot (*Leopardis paradisis*) Recovery Plan, First Revision. U.S. Fish and Wildlife Service, Southwest Region, Albuquerque, New Mexico.

_____. 2010b. Texas Ayenia (Tamaulipan Kidneypetal) *Ayenia limitaris* Cristóbal. 5-year Review: Summary and Evaluation. U.S. Fish and Wildlife Service. Corpus Christi Ecological Services Field Office. Corpus Christi, Texas.

_____. 2011. Endangered and Threatened Wildlife and Plants: Delisting of the Plant *Frankenia johnstonii* (Johnston's frankenia). Federal Register 76(2060): 66018-66021.

_____. 2014a. Species List for Texas by County. URL = http://www.fws.gov/southwest/es/ EndangeredSpecies/ EndangeredSpecies_Lists/EndangeredSpecies_ListSpecies.cfm.

U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). 1998. Endangered Species Consultation Handbook. Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act.

U. S. Geological Survey (USGS). 2014. Texas Geology. URL = http://mrdata.usgs.gov/sgmc/tx.html . Accessed June 2014.