June 2016

XCEL ENERGY, INC.

TUCO to Yoakum 345-kV Transmission Line Project

Environmental Assessment and Alternative Routing Analysis
Hale, Hockley, Lubbock, Lynn, Terry, and Yoakum Counties, Texas

Docket No. 46042

PROJECT NUMBER:
135321
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POWER ENGINEERS

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TUCO TO YOAKUM 345-kV TRANSMISSION LINE PROJECT

PREPARED FOR: XCEL ENERGY, INC.

PREPARED BY: POWER ENGINEERS, INC.

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ACRONYMS AND ABBREVIATIONS

AM	amplitude modulation
amsl	above mean sea level
ANWR	Aransas National Wildlife Refuge
ASR	Antenna Structure Registration
ATLAS	Texas Archeological Sites Atlas
BEG	Bureau of Economic Geology
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practices
CCN	Certificate of Convenience and Necessity
CFR	Code of Federal Regulations
CHAT	Crucial Habitat Assessment Tool
CLF	civilian labor force
CLS	Contract Land Staff, LLC
CR	County Road
CWA	Clean Water Act
EA	Environmental Assessment and Alternative Route Analysis
EOR	estimated occupied range
ERCOT	Electric Reliability Council of Texas
ESA	Endangered Species Act
ESRI	Environmental Systems Research Institute
ESSS	Ecologically Significant Stream Segments
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FM road	farm-to-market road
FM	frequency modulation
GIS	Geographic Information Systems
GLO	Texas General Land Office
HPA	high probability area
HPILS	High Priority Incremental Load Study
HPWD	High Plains Water District
HTC	Historic Texas Cemeteries
IH	Interstate Highway
IP	Individual Permit
IPaC	Information for Planning and Conservation
ISD	Independent School District
kV	kilovolt
L	Lacustrine
LPC	Lesser prairie-chicken
MBTA	Migratory Bird Treaty Act
MVA	Megavolt-amperes
NAIP	National Aerial Imagery Program
NEPA	National Environmental Policy Act
NESC	National Electrical Safety Code
NHD	National Hydrography Database
NHPA	National Historic Preservation Act

NFHL	National Flood Hazard Layer
NOI	Notice of Intent
NOT	Notice of Termination
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NTC	Notice to Construct
NWI	National Wetland Inventory
NWP	Nationwide Permit
NWSRS	National Wild and Scenic Rivers System
OTHM	Official Texas Historical Marker
PEM	palustrine emergent
Pf	palustrine farmed
PFO	palustrine forested
POWER	POWER Engineers, Inc.
Project	A new single-circuit 345 kilovolt (kV) transmission line in Hale, Hockley, Lubbock, Lynn, Terry, and Yoakum Counties, Texas, depending on which route is selected.
PSS	palustrine shrub/scrub
PU	palustrine open water ponds with unconsolidated bottoms
PUC	Public Utility Commission of Texas
PURA	Public Utility Regulatory Act
ROW	right-of-way
RRC	Railroad Commission of Texas
RTHL	Recorded Texas Historic Landmarks
RWP	Range-wide Conservation Plan
SAL	State Antiquities Landmark
SH	State Highway
SHPO	State Historic Preservation Office
SPP	Southwest Power Pool
SPS	Southwestern Public Service Company
SPUWD	South Plains Underground Water Conservation District
SWPPP	Stormwater Pollution Prevention Plan
TAC	Texas Administrative Code
TARL	Texas Archeological Research Laboratory
TASA	Texas Archeological Sites Atlas
TCEQ	Texas Commission on Environmental Quality
THC	Texas Historical Commission
THSA	Texas Historical Site Atlas
TLTC	Texas Land Trust Council
TNRIS	Texas Natural Resource Information System
TPWD	Texas Parks and Wildlife Department
TPWC	Texas Parks and Wildlife Code
TSS	Texas Speleological Society
TWDB	Texas Water Development Board
TXR150000	Texas Pollution Discharge Elimination System General Construction Permit
TxDOT	Texas Department of Transportation
TXNDD	Texas Natural Diversity Database
US	United States

USACE	United States Army Corps of Engineers
USBOC	United States Bureau of the Census
U.S.C.	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
US Hwy	United States Highway
WAFWA	Western Association of Fish and Wildlife Agencies
Xcel Energy	Xcel Energy, Inc.

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1.0 DESCRIPTION OF THE PROJECT

1.1 SCOPE OF THE PROJECT

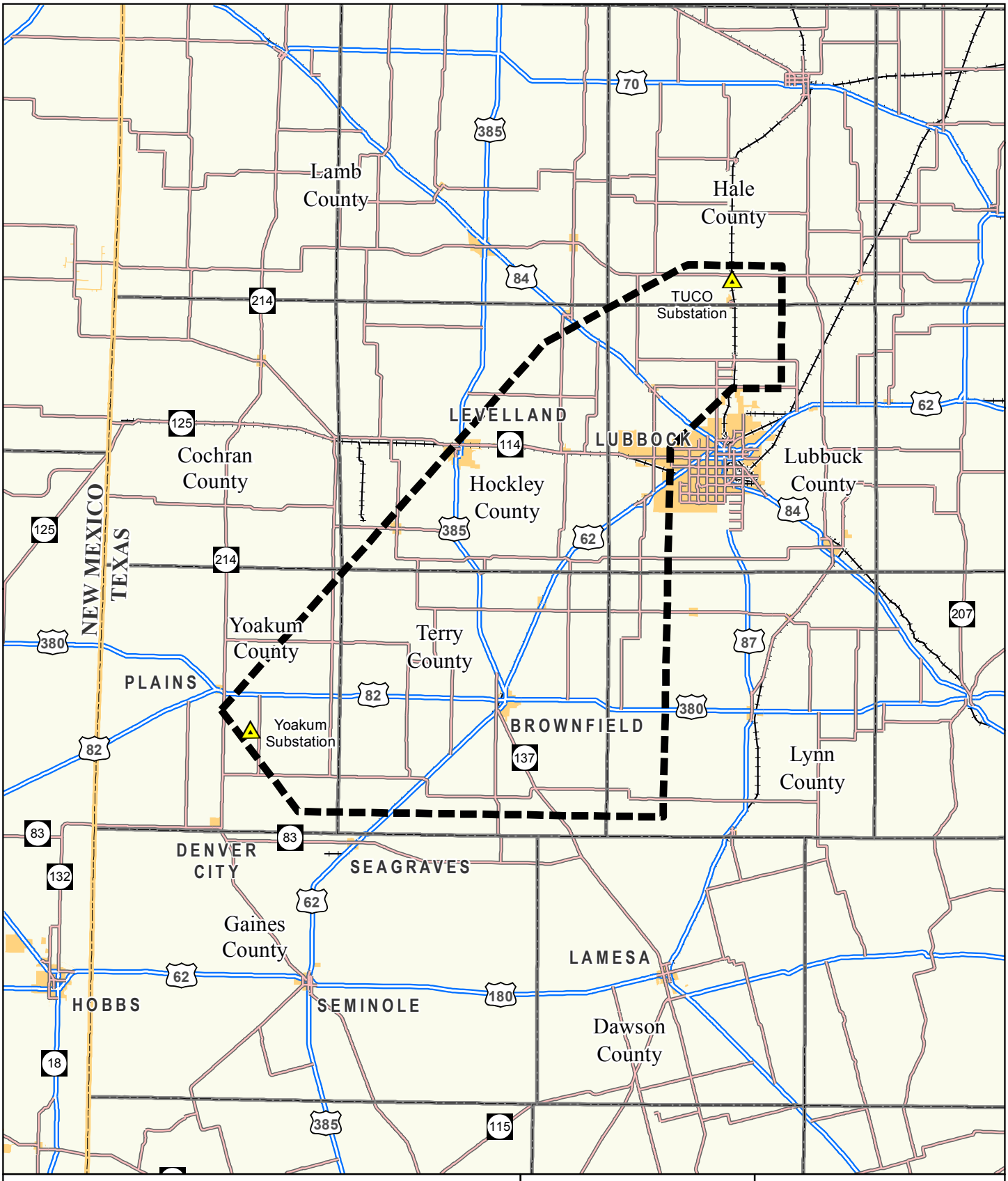
Southwestern Public Service Company (SPS), a subsidiary Xcel Energy, Inc. (Xcel Energy) proposes to construct a new single-circuit 345-kilovolt (kV) transmission line in Hale, Hockley, Lubbock, Terry, and Yoakum Counties, Texas, depending on which route is selected (Project) (refer to Figure 1-1 for the Project area location).[1] The Project will be constructed starting at the existing TUCO Substation located in Hale County, approximately two miles north of the city of Abernathy, and will extend generally southwest until it reaches the existing Yoakum Substation located in Yoakum County, approximately six miles southeast of the city of Plains. Depending on the route selected the Project ranges in length from approximately 99 to 111 miles. The Project will require a typical right-of-way (ROW) width of approximately 150 feet. In some circumstances, a wider easement may be necessary, but these locations and easement widths cannot be determined until the selected route is surveyed. SPS plans to obtain additional temporary easements for construction purposes in these areas.

SPS contracted with POWER Engineers, Inc. (POWER) to prepare this Environmental Assessment and Alternative Route Analysis (EA). This EA will support SPS's application to the Public Utility Commission of Texas (PUC) to amend its Certificate of Convenience and Necessity (CCN). This EA may also be used to support any additional federal, state, or local permitting activities that might be required prior to construction of the Project.

This EA discusses the environmental and land use constraints identified within the Project study area, documents routing methodologies, documents public involvement, and provides an evaluation of alternative routes from an environmental and land use perspective. The EA also identifies and provides the basis for SPS to identify an alternative route that best addresses requirements of the Public Utility Regulatory Act (PURA) and PUC Substantive Rule 25.101 (16 TEXAS ADMINISTRATIVE CODE § 25.101 [TAC]).

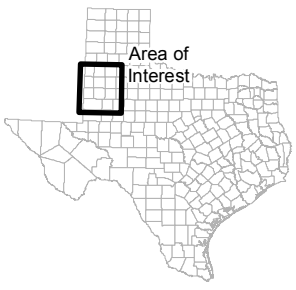
To assist POWER in its evaluation of the Project, SPS provided POWER with the Project endpoints and information regarding the purpose and need for the Project, proposed construction practices, preliminary transmission line design, clearing methods, ROW requirements and maintenance procedures for the Project.

[1] The study area for the Proposed Project also includes Lynn County, however, the final set of proposed links and routes do not travel through Lynn County.



Legend

- Substation
- Study Area
- County Boundary
- State Line
- 83 US Highway
- 152 State Highway
- Railroad
- City Limits
- River or Stream



TUCO - Yoakum 345-kV Project

Figure 1-1
Project Area Location

0 5 10
Miles

Date: 3/8/2016

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Path: N:\Projects\135321_Tuco\DD\GIS\apps\EA_TY\Fig_1-1_TY_Project_Area_Location.mxd

1.2 PURPOSE AND NEED

SPS is a member of, and its entire transmission system is located within, the Southwest Power Pool (SPP). The SPP is an organization that meets the requirements of PURA § 39.151 as an independent system operator. SPS does not operate in the Electric Reliability Council of Texas (ERCOT) region, and ERCOT takes no position on SPS's transmission projects.

The SPP conducted the High Priority Incremental Load Study (HPILS) to develop a transmission plan to address the needs associated with network load additions in the SPP footprint that had not been accounted for in previous planning efforts or in models being used in planning efforts underway at the time. As a result of the study, the SPP identified the Project as needed for reliability to alleviate loading violations on the underlying network and voltage violations due to insufficient power supply to network load additions.

Based on the need analysis in the HPILS, SPP issued a Notification to Construct (NTC) letter to SPS. The SPP NTC letter sent to SPS under Project ID 30376 and Network Upgrade ID number 50447, directs SPS to build a 345-kV transmission line from the TUCO Substation in Hale County, Texas to the Yoakum Substation in Yoakum County, Texas and Network Upgrade ID number 50451, which directs SPS to install a new 345/230-kV 644 Megavolt-amperes (MVA) transformer at Yoakum Substation. Other projects within the NTC include Network Upgrade 50457, i.e., the Yoakum-Stateline (Hobbs) 345-kV segment of the TYH Project, which was filed on June 25, 2015 and approved by the PUCT on March 22, 2016 in Docket No. 44726. The need addressed in this CCN filing is the same identified for the first related CCN filing in Docket No. 44726. The original need date specified by the NTC was June 1, 2020. However, SPS received a new NTC from the SPP on May 17, 2016 with an updated in-service need date of June 1, 2017 under Project ID 31068. The accelerated need date was based on the SPP's analysis in the 2016 Integrated Transmission Planning Near-Term Assessment.

1.3 DESCRIPTION OF PROPOSED DESIGN AND CONSTRUCTION

1.3.1 Design Criteria

SPS proposes to construct the 345-kV transmission line using single-circuit, self-supporting steel H-frame and three-pole structures within new ROW areas. SPS proposes to use direct burial H-frames for tangent and light angle structures, and proposes three-pole steel structures on drilled pier foundations for structures at high angle and dead-end locations. Monopole structures and/or improved structure foundations may be used where necessary. The typical height of the H-frame and three-pole structures is between 90 and 180 feet (refer to Figures 1-2 through 1-7). All design criteria would comply with applicable statutes and codes, including the appropriate edition of the National Electrical Safety Code (NESC) and SPS's standard design practices.

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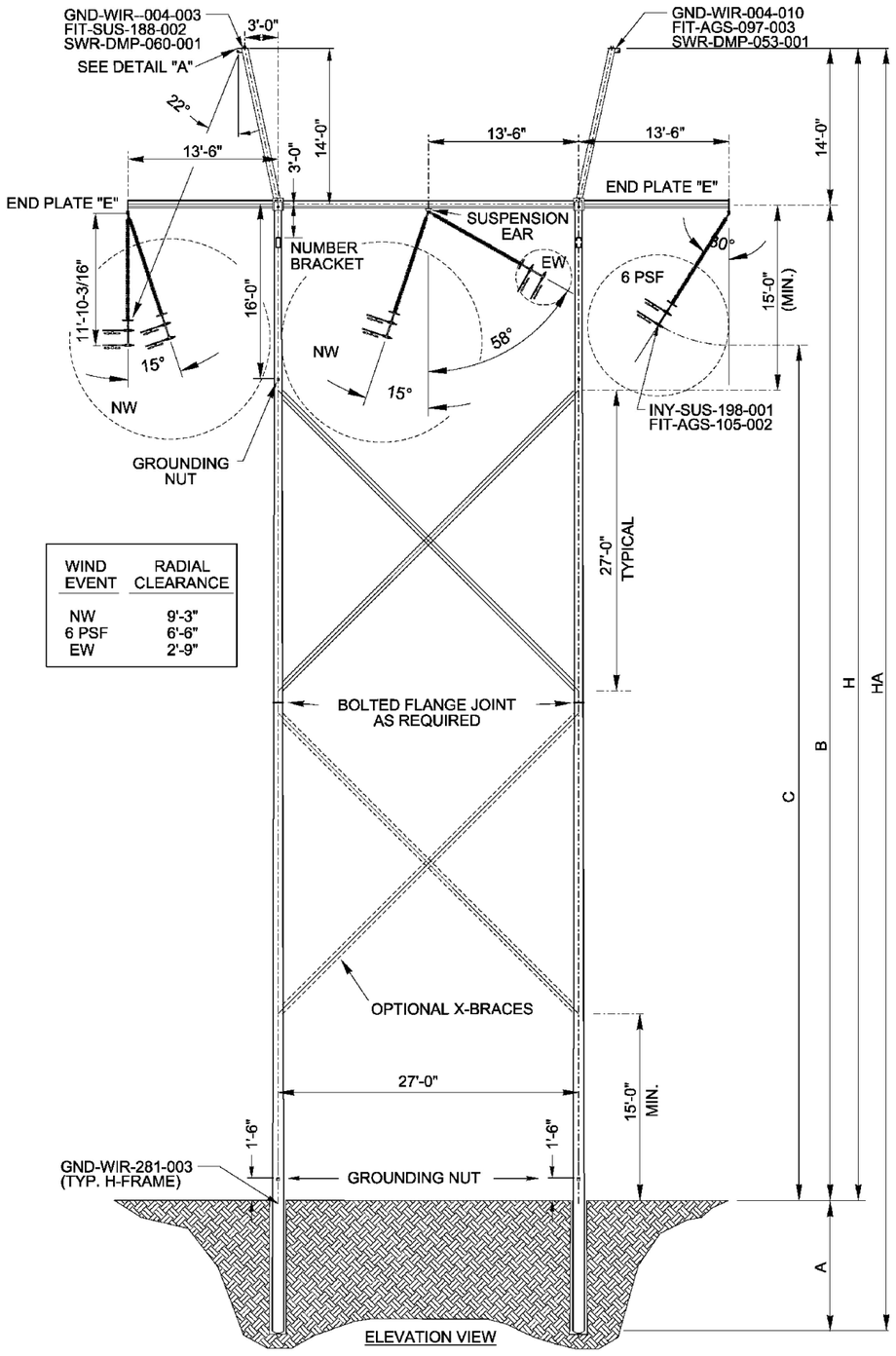
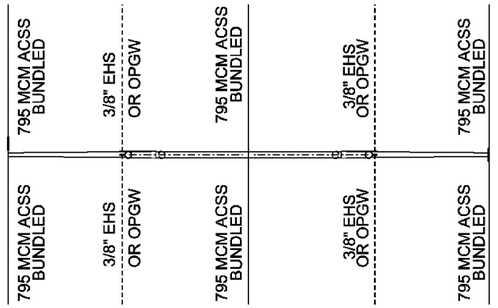


ELEVATION VIEW

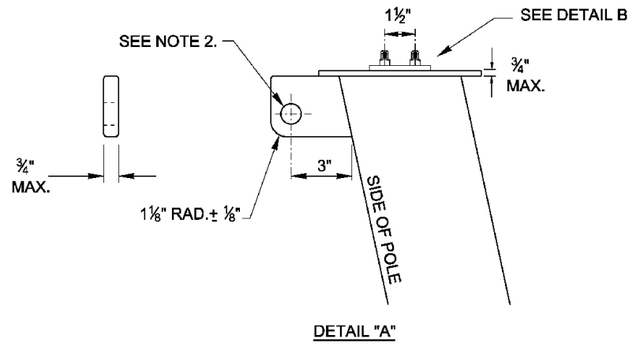
WIND EVENT	RADIAL CLEARANCE
NW	9'-3"
6 PSF	6'-6"
EW	2'-9"



PLAN VIEW

GENERAL NOTES

1. (2) 1/2" ALL THREAD STUDS, 1-1/2" APART, 1" MINIMUM PROTRUSION. INSTALL 3" X 1-1/4" COVER PLATE WITH NUTS. FOR PAINTED POLES PRIME, BUT DO NOT PAINT AREA UNDER COVER PLATE. COVER PLATE SHALL BE INSTALLED WHEN WEATHERING STEEL IS SPECIFIED.
2. 1" DIAMETER HOLE WITH 1/8" CHAMFER BOTH SIDES.
3. INSTALL STEP LUGS FROM 85' ABOVE GROUND LINE TO TOP OF POLE.
4. POLE HOLE DEPTH SHALL BE ACCURATE. WHEN HOLES DO NOT ALLOW STRUCTURE TO BE EVEN AND LEVEL, THE DEEP HOLE SHALL BE BACKFILLED AND THOROUGHLY TAMPED TO PROPER DEPTH.
5. POLE NUMBER SHALL BE INSTALLED ON EACH POLE AS REQUIRED.
6. SEE SHEET T-0-400 FOR GENERAL DETIALS.
7. SEE SHEET T-0-400A FOR ARM AND END PLATE DETAILS.
8. SUSPENSION INSULATORS TO BE 345kV POLYMER INSULATORS.
9. STRUCTURE DESIGN SHOWN IS FOR CONFIGURATION ONLY. ENGINEERING STRENGTH CALCULATIONS AND STRUCTURE DESIGN DETAILS MUST BE PERFORMED FOR EACH PROJECT.
10. BEARING PLATES TO BE MINIMUM 12" LARGER THAN POLE DIAMTER. PLATE THICKNESS IS TO BE 3/4".



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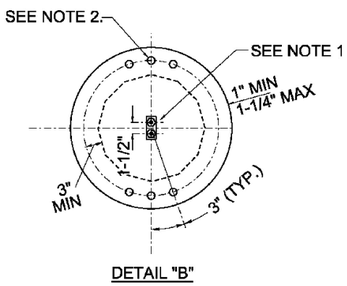
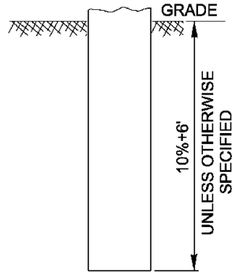


DETAIL "B"

DIMENSIONS				
HA	H	A	B	C
110'0"	93'0"	17'0"	79'0"	66'6"
115'0"	97'6"	17'6"	83'6"	71'0"
120'0"	102'0"	18'0"	88'0"	75'6"
125'0"	106'6"	18'6"	92'6"	80'0"
130'0"	111'0"	19'0"	97'0"	84'6"
135'0"	115'6"	19'6"	101'6"	89'0"
140'0"	120'0"	20'0"	106'0"	93'6"
145'0"	124'6"	20'6"	110'6"	98'0"
150'0"	129'0"	21'0"	115'0"	102'6"
155'0"	133'6"	21'6"	119'6"	107'0"
160'0"	138'0"	22'0"	124'0"	111'6"
165'0"	142'6"	22'6"	128'6"	116'0"
170'0"	147'0"	23'0"	133'0"	120'6"
175'0"	151'6"	23'6"	137'6"	125'0"
180'0"	156'0"	24'0"	142'0"	129'6"
185'0"	160'6"	24'6"	146'6"	134'0"
190'0"	165'0"	25'0"	151'0"	138'6"
195'0"	169'6"	25'6"	155'6"	143'0"
200'0"	174'0"	26'0"	160'0"	147'5"
205'0"	178'6"	26'6"	164'6"	152'0"



DIRECT BURIAL DETAIL

TUCO - Yoakum
345-kV Transmission Line Project

Figure 1-2

TYPICAL 345-KV H-FRAME TANGENT STRUCTURE

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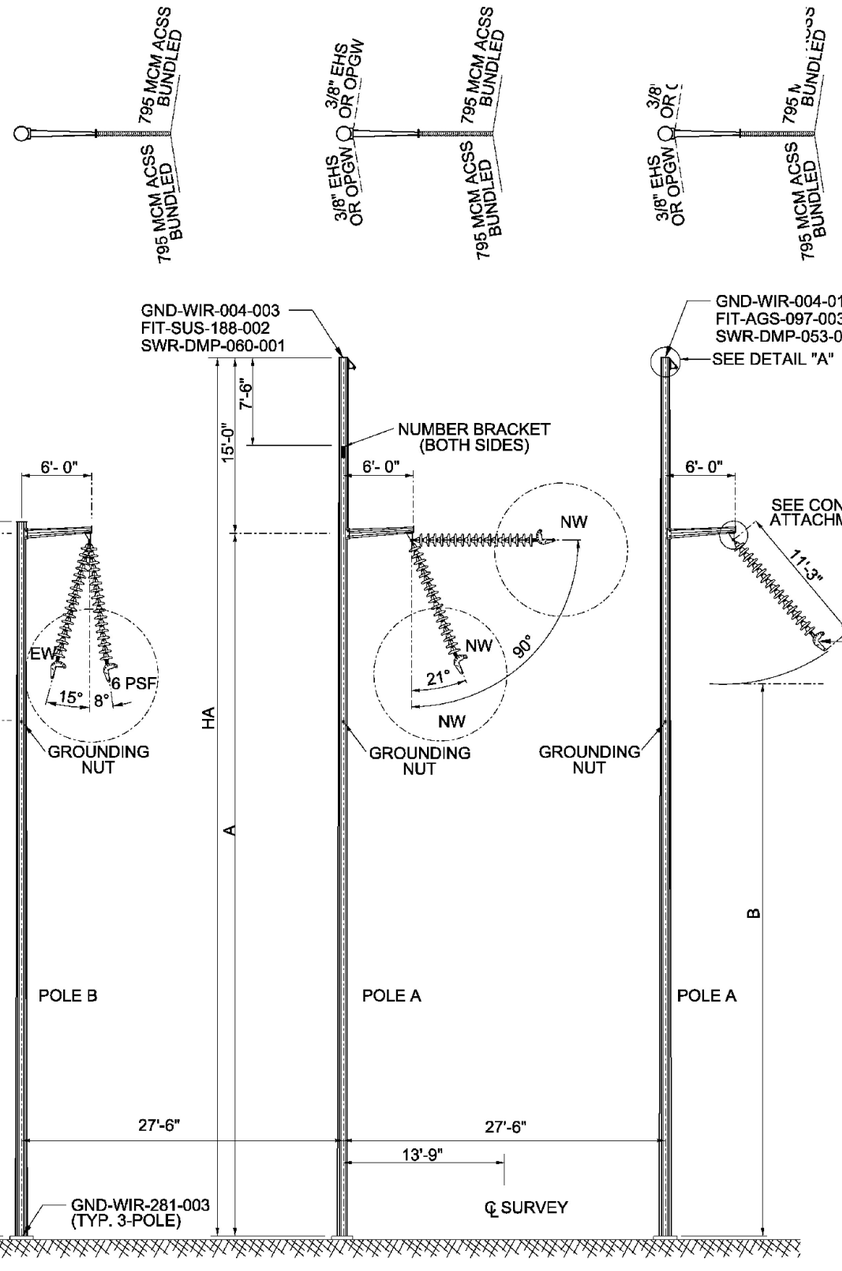
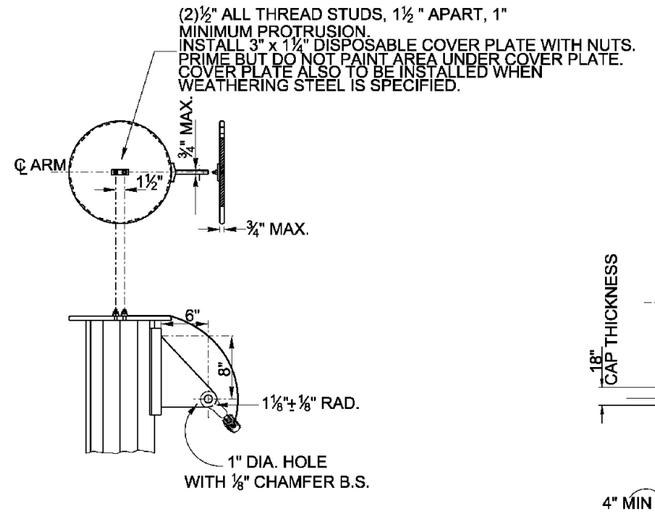


WIND EVENT	RADIAL CLEARANCE
NW	9'-3"
6 PSF	6'-6"
EW	2'-9"

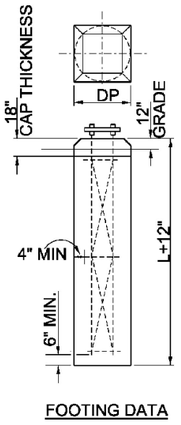
DIMENSIONS			
HA	HB	A	B
90'0"	76'0"	75'0"	61'0"
95'0"	81'0"	80'0"	66'0"
100'0"	86'0"	85'0"	71'0"
105'0"	91'0"	90'0"	76'0"
110'0"	96'0"	95'0"	81'0"
115'0"	101'0"	100'0"	86'0"
120'0"	106'0"	105'0"	91'0"
125'0"	106'0"	110'0"	96'0"
130'0"	116'0"	115'0"	101'0"
135'0"	121'0"	120'0"	106'0"
140'0"	126'0"	125'0"	111'0"
145'0"	106'0"	130'0"	116'0"
150'0"	116'0"	135'0"	111'0"
155'0"	121'0"	140'0"	126'0"
160'0"	126'0"	145'0"	131'0"
165'0"	126'0"	150'0"	136'0"
170'0"	126'0"	155'0"	141'0"
175'0"	126'0"	160'0"	146'0"
180'0"	126'0"	165'0"	151'0"

GENERAL NOTES

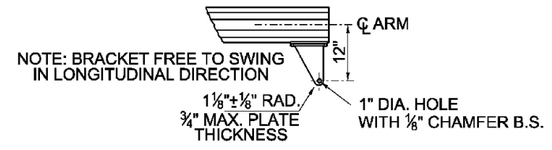
1. 1" DIAMETER HOLE WITH 1/8" CHAMFER BOTH SIDES, TYPICAL.
2. (2) 1/2" ALL THREAD STUDS, 1-1/2" APART, 1" MINIMUM PROTRUSION. INSTALL 3" X 1-1/4" COVER PLATE WITH NUTS. FOR PAINTED POLES PRIME, BUT DO NOT PAINT AREA UNDER COVER PLATE. COVER PLATE SHALL BE INSTALLED WHEN WEATHERING STEEL IS SPECIFIED.
3. INSTALL STEP LUGS FROM 85' ABOVE BASE PLATE TO TOP OF POLE.
4. POLE NUMBER SHALL BE INSTALLED ON EACH POLE AS REQUIRED.
5. SEE SHEET T-0-400 FOR GENERAL DETAILS.
6. SEE SHEET T-0-400A FOR END PLATE DETAILS.
7. SEE SHEET T-0-400C FOR ANCHOR BOLT CAGE DETAILS.
8. SUSPENSION INSULATORS ARE TO BE 345KV TOUGHENED GLASS INSULATORS.
9. RUCTURE DESIGN SHOWN IS FOR CONFIGURATION ONLY. ENGINEERING STRENGTH CALCULATIONS AND STRUCTURE DESIGN DETAILS MUST BE PERFORMED FOR EACH PROJECT.



STATIC CONNECTION
DETAIL "A"



FOOTING DATA



CONDUCTOR ATTACHMENT

TUCO to Yoakum
345-kV Transmission Line Project

Figure 1-3

TYPICAL 345-KV THREE POLE SWINGING ANGLE STRUCTURE

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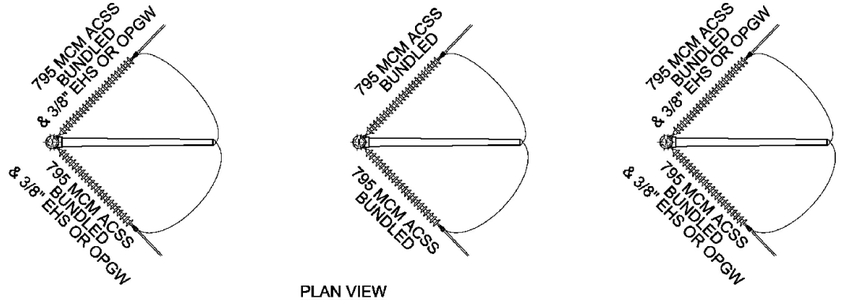
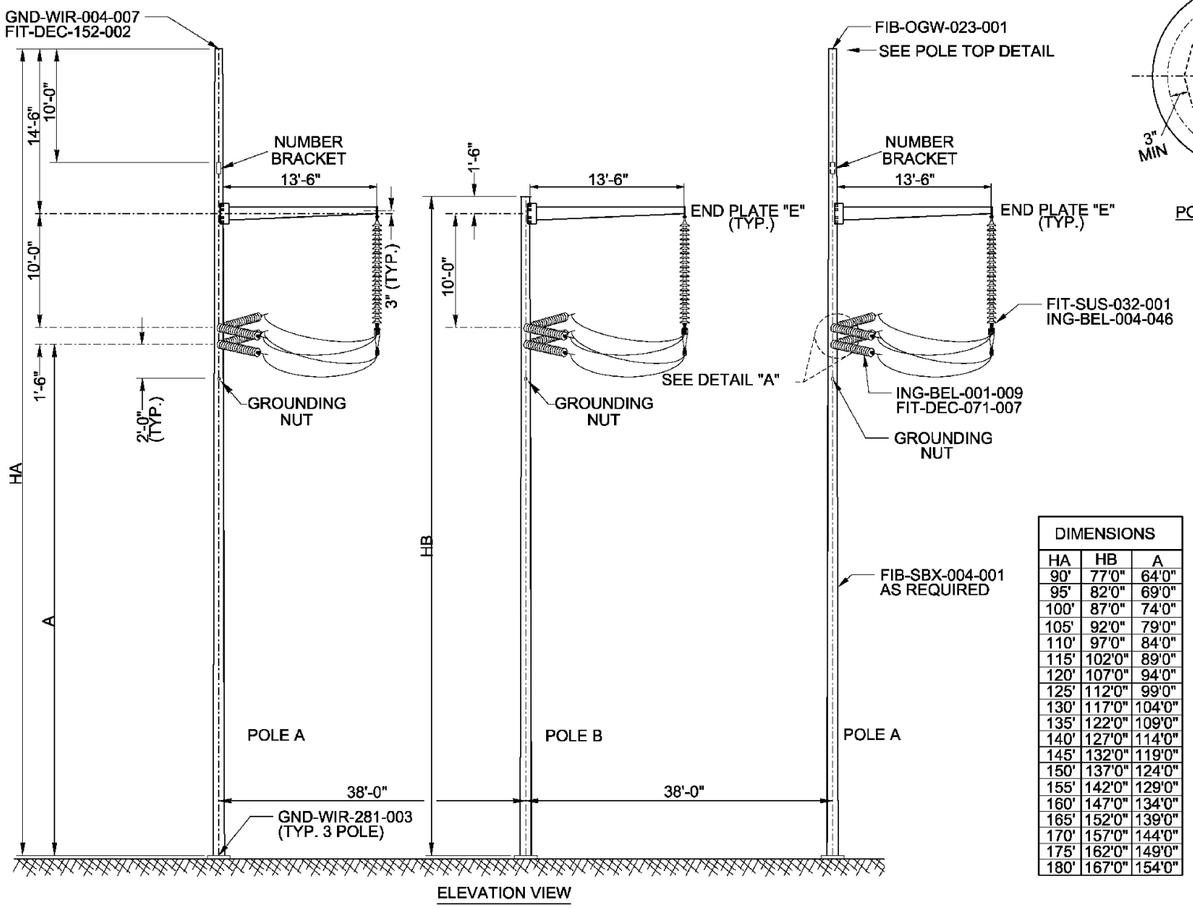
GENERAL NOTES

1. 1" DIAMETER HOLE WITH 1/8" CHAMFER BOTH SIDES, TYPICAL.
2. (2) 1/2" ALL THREAD STUDS, 1-1/2" APART, 1" MINIMUM PROTRUSION. INSTALL 3" X 1-1/4" COVER PLATE WITH NUTS. FOR PAINTED POLES PRIME, BUT DO NOT PAINT AREA UNDER COVER PLATE. COVER PLATE SHALL BE INSTALLED WHEN WEATHERING STEEL IS SPECIFIED.
3. INSTALL STEP LUGS FROM 85' ABOVE BASE PLATE TO TOP OF POLE.
4. POLE NUMBER SHALL BE INSTALLED ON EACH POLE AS REQUIRED.
5. SEE SHEET T-0-400 FOR GENERAL DETAILS.
6. SEE SHEET T-0-400A FOR END PLATE DETAILS.
7. SEE SHEET T-0-400C FOR ANCHOR BOLT CAGE DETAILS.
8. SEE SHEET T-0-400D FOR FIBER OPTIC SPLICE DETAILS.
9. STRAIN INSULATORS ARE TO BE 345KV TOUGHENED GLASS INSULATORS. SUSPENSION INSULATORS ARE TO BE 345KV TOUGHENED GLASS INSULATORS.
10. STRUCTURE DESIGN SHOWN IS FOR CONFIGURATION ONLY. ENGINEERING STRENGTH CALCULATIONS AND STRUCTURE DESIGN DETAILS MUST BE PERFORMED FOR EACH PROJECT.

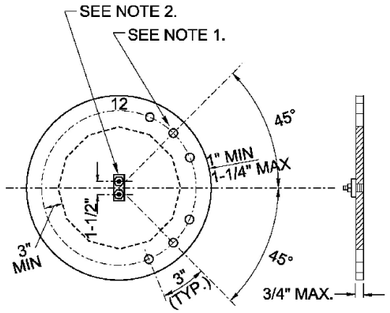


PLAN VIEW

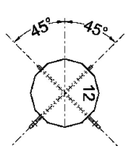


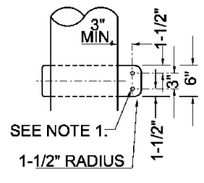
ELEVATION VIEW

DIMENSIONS		
HA	HB	A
90'	77'0"	64'0"
95'	82'0"	69'0"
100'	87'0"	74'0"
105'	92'0"	79'0"
110'	97'0"	84'0"
115'	102'0"	89'0"
120'	107'0"	94'0"
125'	112'0"	99'0"
130'	117'0"	104'0"
135'	122'0"	109'0"
140'	127'0"	114'0"
145'	132'0"	119'0"
150'	137'0"	124'0"
155'	142'0"	129'0"
160'	147'0"	134'0"
165'	152'0"	139'0"
170'	157'0"	144'0"
175'	162'0"	149'0"
180'	167'0"	154'0"

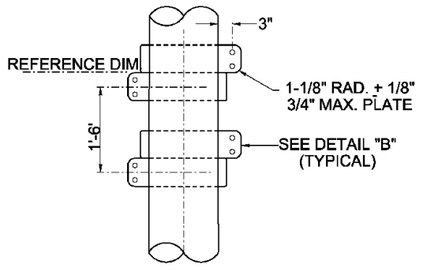


POLE TOP DETAIL





DETAIL "B"



DETAIL "A"

CONDUCTOR ATTACHMENT & INSULATOR ATTACHMENT BRACKET

TUCO - Yoakum
345-kV Transmission Line Project

Figure 1-4

TYPICAL 345-KV THREE POLE CORNER STRUCTURE

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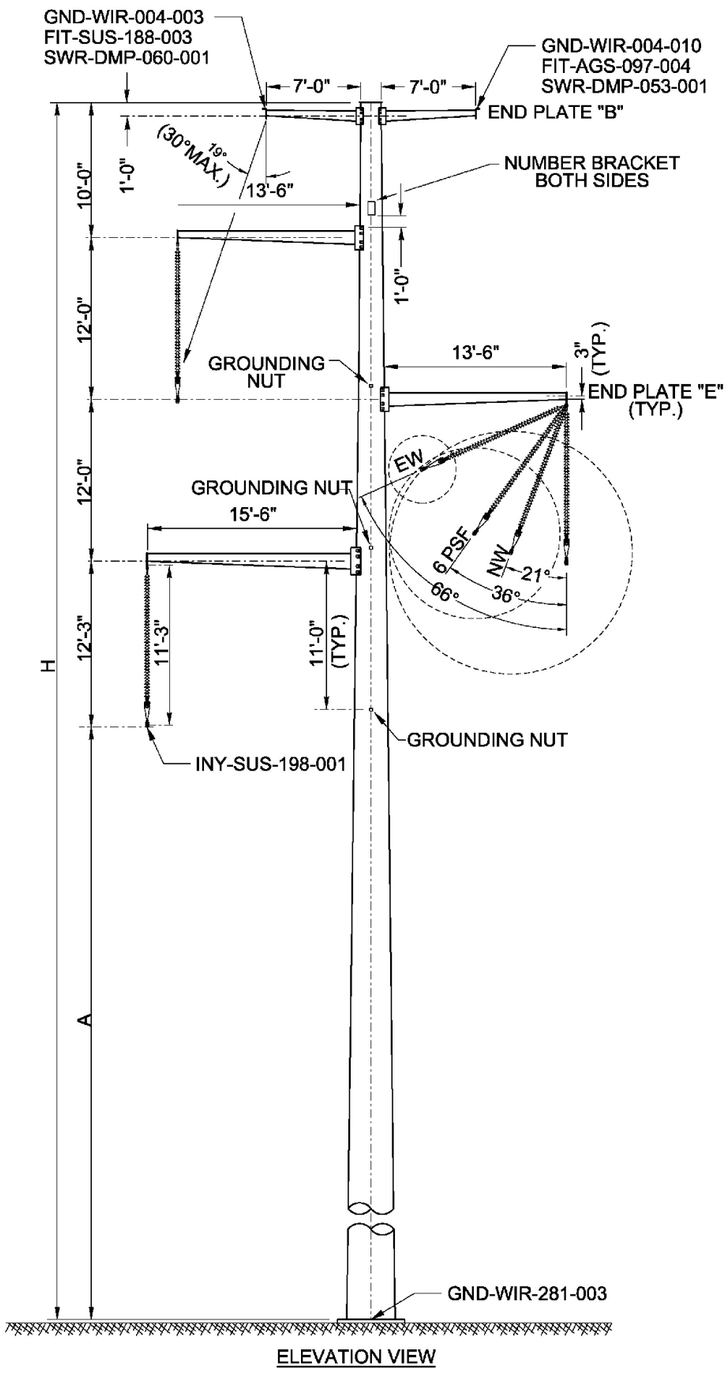


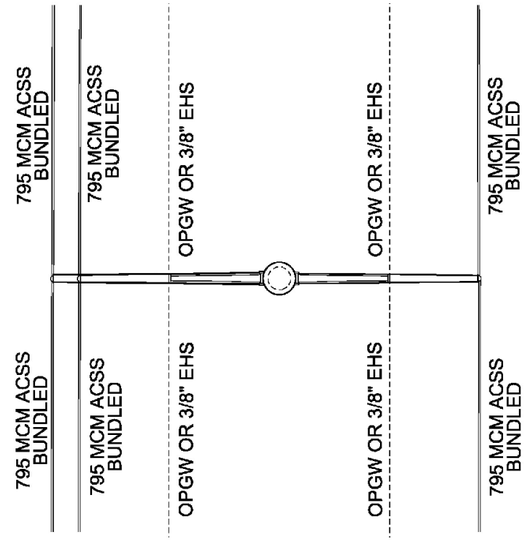
ELEVATION VIEW

WIND EVENT	RADIAL CLEARANCE
NW	9'-3"
6 PSF	6'-6"
EW	2'-9"

DIMENSIONS	
H	A
90'0"	43'3"
95'0"	48'3"
100'0"	53'3"
105'0"	58'3"
110'0"	63'3"
115'0"	68'3"
120'0"	73'3"
125'0"	78'3"
130'0"	83'3"
135'0"	88'3"
140'0"	93'3"
145'0"	98'3"
150'0"	103'3"
155'0"	108'3"
160'0"	113'3"
165'0"	118'3"
170'0"	123'3"
175'0"	128'3"
180'0"	133'3"

GENERAL NOTES

1. INSTALL STEP LUGS FROM 85' ABOVE BASE PLATE TO TOP OF POLE.
2. POLE NUMBER SHALL BE INSTALLED ON EACH POLE AS REQUIRED.
3. SEE SHEET T-0-400 FOR GENERAL DETAILS.
4. SEE SHEET T-0-400A FOR ARM END PLATE AND DEADEND EAR DETAILS.
5. SEE SHEET T-0-400C FOR ANCHOR BOLT CAGE DETAILS.
6. SUSPENSION INSULATORS ARE TO BE 345KV POLYMER INSULATORS.
7. STRUCTURE DESIGN SHOWN IS FOR CONFIGURATION ONLY. ENGINEERING STRENGTH CALCULATIONS AND STRUCTURE DESIGN DETAILS MUST BE PERFORMED FOR EACH PROJECT.



PLAN VIEW

TUCO - Yoakum
345-kV Transmission Line Project

Figure 1-5

TYPICAL 345-KV MONOPOLE TANGENT STRUCTURE

POWER ENGINEERS

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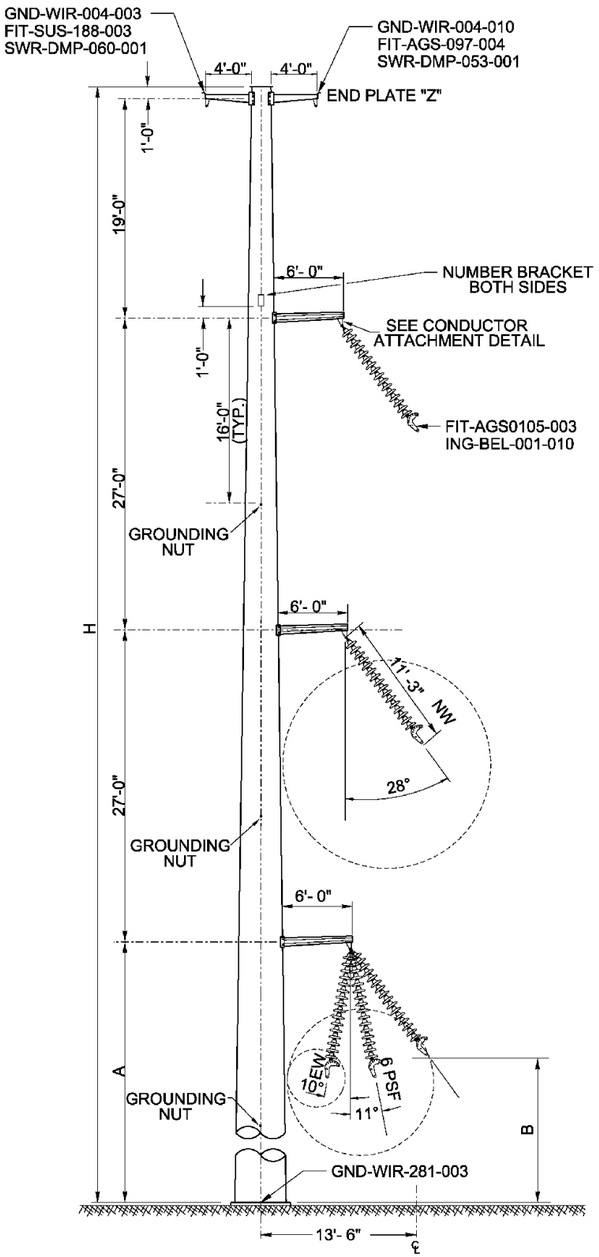
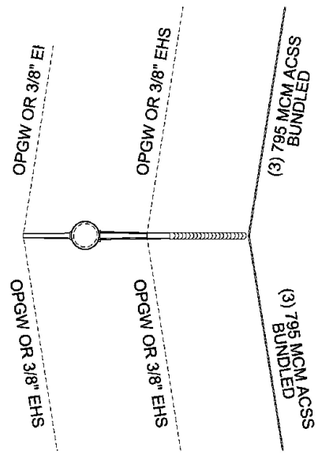


ELEVATION VIEW



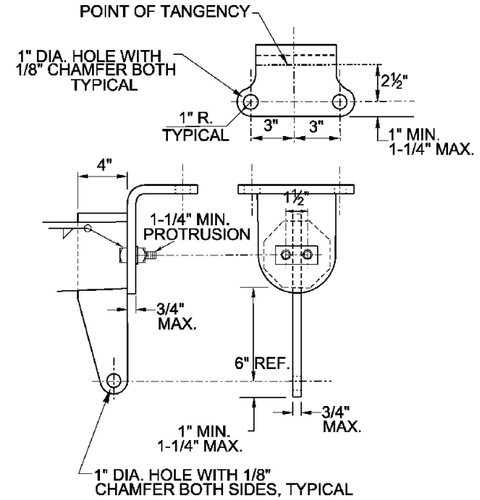
PLAN VIEW

WIND EVENT	RADIAL CLEARANCE
NW	9'-3"
6 PSF	6'-6"
EW	2'-9"

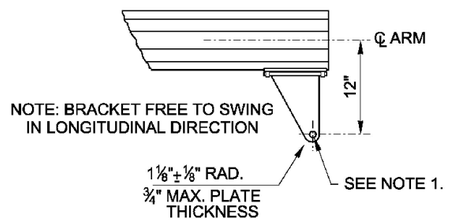
DIMENSIONS		
H	A	B
115'	41'0"	30'9"
120'	46'0"	35'9"
125'	51'0"	40'9"
130'	56'0"	45'9"
135'	61'0"	50'9"
140'	66'0"	55'9"
145'	71'0"	60'9"
150'	76'0"	65'9"
155'	81'0"	70'9"
160'	86'0"	75'9"
165'	91'0"	80'9"
170'	96'0"	85'9"
175'	101'-0"	90'9"
180'	106'-0"	95'9"

GENERAL NOTES

1. INSTALL STEP LUGS FROM 85' ABOVE BASE PLATE TO TOP OF POLE.
2. POLE NUMBER SHALL BE INSTALLED ON EACH POLE AS REQUIRED.
3. SEE SHEET T-0-400 FOR GENERAL DETAILS.
4. SEE SHEET T-0-400A FOR ARM END PLATE AND DEADEND EAR DETAILS.
5. SEE SHEET T-0-400C FOR ANCHOR BOLT CAGE DETAILS.
6. SUSPENSION INSULATORS ARE TO BE 345KV TOUGHENED GLASS INSULATORS.
7. STRUCTURE DESIGN SHOWN IS FOR CONFIGURATION ONLY. ENGINEERING STRENGTH CALCULATIONS AND STRUCTURE DESIGN DETAILS MUST BE PERFORMED FOR EACH PROJECT.



END PLATE "Z"



CONDUCTOR ATTACHMENT

TUCO - Yoakum
345-kV Transmission Line Project

Figure 1-6

TYPICAL 345-KV MONOPOLE SWINGING ANGLE STRUCTURE

POWER ENGINEERS

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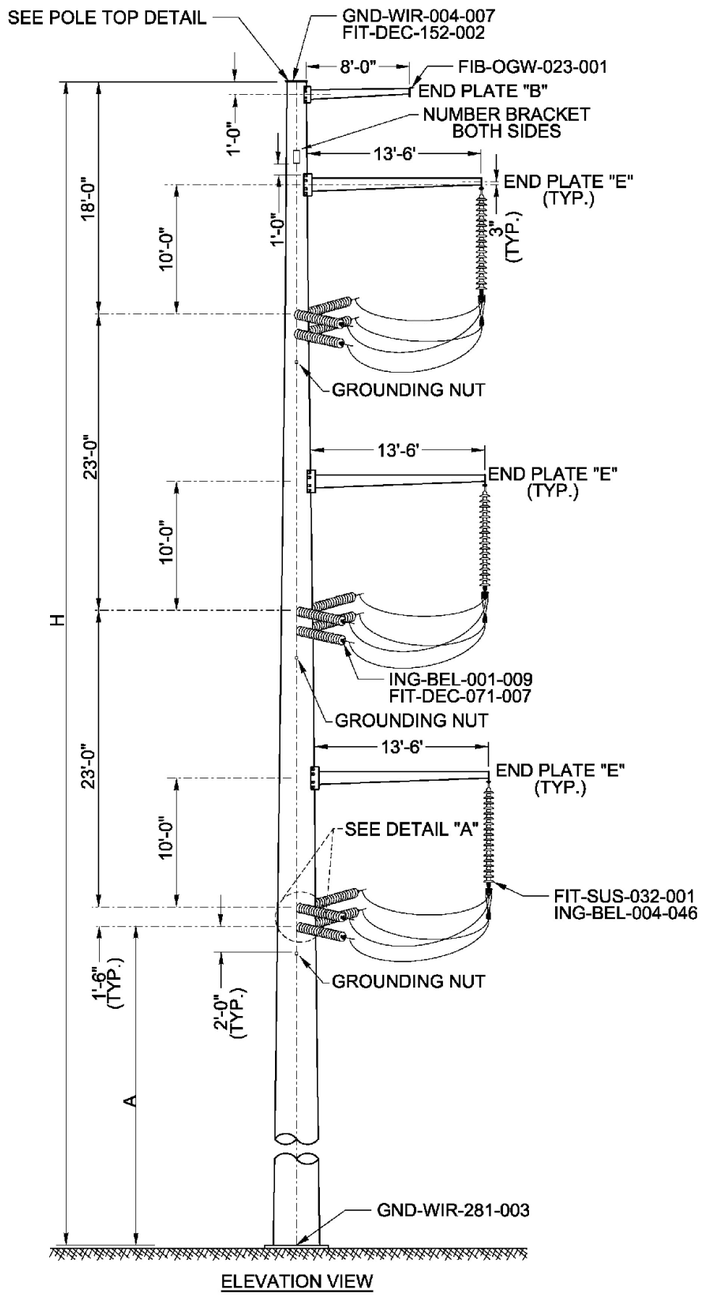
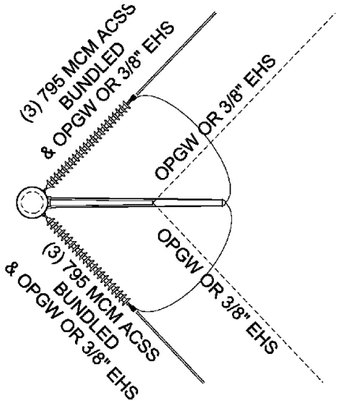


ELEVATION VIEW

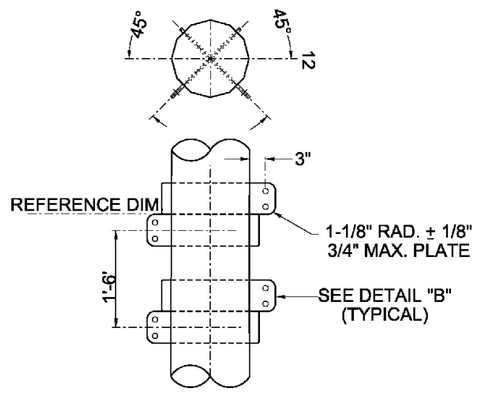


PLAN VIEW

DIM.	
H	A
100'	34'0"
105'	39'6"
110'	44'6"
115'	49'6"
120'	54'6"
125'	59'6"
130'	64'6"
135'	69'6"
140'	74'6"
145'	79'6"
150'	84'6"
155'	89'6"
160'	94'6"
165'	99'6"
170'	104'6"
175'	109'6"
180'	114'6"

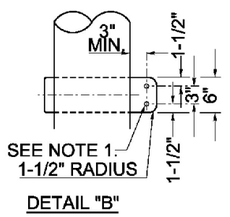
GENERAL NOTES

1. 1" DIAMETER HOLE WITH 1/8" CHAMFER BOTH SIDES, TYPICAL.
2. (2) 1/2" ALL THREAD STUDS, 1-1/2" APART, 1" MINIMUM PROTRUSION. INSTALL 3" X 1-1/4" COVER PLATE WITH NUTS. FOR PAINTED POLES PRIME, BUT DO NOT PAINT AREA UNDER COVER PLATE. COVER PLATE SHALL BE INSTALLED WHEN WEATHERING STEEL IS SPECIFIED.
3. INSTALL STEP LUGS FROM 85' ABOVE BASE PLATE TO TOP OF POLE.
4. POLE NUMBER SHALL BE INSTALLED ON EACH POLE AS REQUIRED.
5. SEE SHEET T-0-400 FOR GENERAL DETAILS.
6. SEE SHEET T-0-400A FOR END PLATE DETAILS.
7. SEE SHEET T-0-400C FOR ANCHOR BOLT CAGE DETAILS.
8. STRAIN INSULATORS ARE TO BE 345KV TOUGHENED GLASS INSULATORS. SUSPENSION INSULATORS ARE TO BE 345KV TOUGHENED GLASS INSULATORS.
9. STRUCTURE DESIGN SHOWN IS FOR CONFIGURATION ONLY. ENGINEERING STRENGTH CALCULATIONS AND STRUCTURE DESIGN DETAILS MUST BE PERFORMED FOR EACH PROJECT.

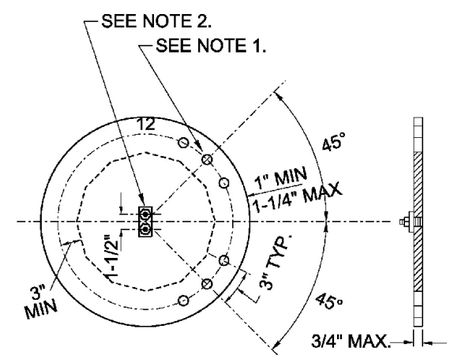


DETAIL "A"

CONDUCTOR ATTACHMENT & INSULATOR ATTACHMENT BRACKET



DETAIL "B"



POLE TOP DETAIL

TUCO - Yoakum
345-kV Transmission Line Project

Figure 1-7

TYPICAL 345-KV MONOPOLE CORNER STRUCTURE

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1.4 CONSTRUCTION CONSIDERATIONS

Projects of this type require surveying, ROW clearing, foundation installation, structure assembly and erection, conductor and shield wire installation, and cleanup when construction is completed. The following information regarding these activities was provided to POWER by SPS.

1.4.1 Clearing and Construction Access

Removal of woody vegetation within the ROW would be limited to establishing the required conductor to ground clearances and facilitating construction and future maintenance operations. Mowing and/or shredding of herbaceous vegetation may be required within grasslands or pasturelands. Major grading activities are not anticipated within the ROW due to the relatively flat terrain within the study area. Grading activities will be limited to the minimum required to facilitate construction activities and future maintenance access. Future ROW maintenance activities may include periodic mowing and/or herbicide applications to maintain an herbaceous vegetation layer within the ROW. SPS will minimize amount of herbicide maintenance and will coordinate with landowners as needed.

ROW clearing activities would be completed while minimizing the impacts to existing groundcover vegetation when practical. All the alternative routes primarily cross areas of pastureland, cropland, or grassland which are currently maintained in an herbaceous vegetation stratum. Where at all possible, SPS plans to span all surface waters and playa lake wetlands. Ingress and egress to the ROW would be afforded from adjacent public roads, or where necessary, through additional temporary easements across private property.

1.4.2 Construction

After each structure location has been surveyed and the ROW cleared, a hole will be augured into the ground at each pole location. The depth of each hole will be determined by the geotechnical profile, terrain, and structure height for each location. Each steel structure will be assembled on the ground near its designated location and then lifted by crane and aligned with structure arms oriented perpendicular to the transmission line centerline. For angle structures, poles will be set with structure arms oriented on the angle bisector. The structure holes will be backfilled with natural soil to provide stability. Excavated material will be spread onsite or disposed offsite in accordance with any federal, state, and local regulations.

Concrete anchor bolt foundations will be required at dead-ends and high angle structure locations. After the hole is augured, a rebar reinforced concrete foundation is poured. The monopoles are then attached to the foundation. After the structures are erected, the insulators and hardware assemblies are then attached. After a series of structures are constructed, the conductor and shield wire is strung and tensioned.

Guard structures are proposed during the line stringing phase where the transmission line crosses existing transmission and distribution lines, telephone lines, and roadways. Once the transmission line is permanently attached, the guards are removed.

1.4.3 Cleanup

ROW cleanup activities include restoration and will be conducted concurrently with the completion of each series of structures as ROW access requirements allow. All equipment, debris, culverts, and temporary environmental controls will be removed. ROW restoration will be completed and includes revegetation with native grass species, in consultation with landowner preference, as necessary to stabilize the soil, and the construction of any necessary permanent environmental controls. The timeliness of these restoration activities is expected to prevent soil erosion.

1.5 MAINTENANCE CONSIDERATIONS

Maintenance of the ROW is typically completed on an interval of five years depending on the rate of vegetation regrowth. Maintenance activities include mowing the entire ROW and the application of herbicides to stumps. The application of herbicides will be conducted within federal, state, and local guidelines.

1.6 AGENCY ACTIONS

Numerous federal, state, and local regulatory agencies and organizations have developed rules and regulations regarding the routing and potential impacts associated with the construction of the Project. This section describes the major regulatory agencies and additional issues that are involved in project planning and permitting of transmission lines in Texas. POWER solicited comments from various regulatory entities during the development of this document. Records of correspondence and additional discussions with these agencies and organizations are provided in Appendix A.

1.6.1 Public Utility Commission of Texas

The PUC regulates the routing of transmission lines in Texas under PURA Chapter 37, with specific consideration for the criteria set forth in § 37.056(c). The PUC regulatory guidelines for routing transmission lines in Texas include:

- 16 TAC § 25.101(b)(3)(B), including the policy of prudent avoidance;
- 16 TAC § 22.52(a)(4); and
- CCN application requirements.

This EA has been prepared by POWER in support of SPS's CCN application for PUC approval of the Project.

1.6.2 United States Army Corps of Engineers

Under Section 10 of the Rivers and Harbors Act of 1899, 33 United States Code (U.S.C.) § 403, the United States Army Corp of Engineers (USACE) regulates all work or structures in or affecting the course, condition or capacity of navigable waters of the United States (U.S.). Under Section 404 of the Clean Water Act (CWA), 33 U.S.C. § 1344, the USACE regulates the discharge of dredged and fill material into all Waters of the U.S., including associated wetlands.

The Project is located within the jurisdiction of the USACE – Fort Worth District. No navigable waters were identified within the study area that if crossed would necessitate a Section 10 Permit for this Project. If construction of the Project impacts waters of the U.S., or associated jurisdictional

wetlands as defined in Section 404 of the CWA, then the Project will likely meet the criteria of the Nationwide Permit (NWP) No. 12 - Utility Line Activities, which applies to activities associated with any cable, line, or wire for the transmission of electrical energy. In the unlikely event the proposed impacts of the Project exceed the criteria established under the regional and general NWP conditions, then an Individual Permit (IP) may be required.

1.6.3 United States Fish and Wildlife Service

The United States Fish and Wildlife Service (USFWS) enforces federal wildlife laws and provides comments on proposed construction projects with a federal nexus under the National Environmental Policy Act (NEPA) and within the framework of several federal laws including the Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), and Bald and Golden Eagle Protection Act (BGEPA).

POWER reviewed the current county listings in the USFWS Information for Planning and Conservation (IPaC) (Reference No. 02ETAR00-2015-SLI-0816) and the Texas Natural Diversity Database (TXNDD) records of federal and state listed species occurrences and/or designated critical habitats and considered these during the route development process. The absence of recorded occurrences for individual listed species is not an indication that the species or potential suitable habitat for the species is not present along the approved route. Upon PUC approval of a route and prior to construction, pedestrian surveys will be completed to identify any suitable habitat for federally listed species as necessary. If suitable habitat is noted, then informal consultation with the USFWS – Arlington Ecological Services Field Office may be completed to determine the need for any required species-specific surveys and/or permitting under Section 7 of the ESA.

1.6.4 Federal Aviation Administration

According to Federal Aviation Administration (FAA) regulations, Part 77, the construction of a transmission line requires FAA notification if tower structure height exceeds 200 feet or the height of an theoretical surface extending outward and upward at one of the following slopes:

- A 100:1 slope for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of a public or military airport having at least one runway longer than 3,200 feet;
- A 50:1 slope for a horizontal distance of 10,000 feet from the nearest runway of a public or military airport where no runway is longer than 3,200 feet in length; or
- A 25:1 slope for a horizontal distance of 5,000 feet for heliports.

The PUC CCN application also requires listing private airports within 10,000 feet of any alternative route centerline. After PUC route approval, and if any of the FAA notification criteria are met for the approved route, a Notice of Proposed Construction or Alteration, FAA Form 7460-1, will be completed and submitted to the FAA Southwest Regional Office in Fort Worth, Texas at least 30 days prior to construction.

1.6.5 Texas Parks and Wildlife Department

The Texas Parks and Wildlife Department (TPWD) is the state agency with primary responsibility for protecting the state's fish and wildlife resources in accordance with Texas Parks and Wildlife Code

(TPWC) § 12.0011(b). POWER solicited comments from TPWD during the scoping phase of the Project, and a copy of this EA will be submitted to TPWD when the CCN application is filed with the PUC.

1.6.6 Floodplain Management

Flood Insurance Rate Maps, published by the Federal Emergency Management Agency (FEMA), were not available for review to determine the floodplain boundaries within the study area. The proposed Project is not anticipated to create any significant permanent changes in the existing topographical grades and is not likely to significantly increase the storm water runoff within the study area.

1.6.7 Texas Commission on Environmental Quality

The construction of the Project may require a Texas Pollution Discharge Elimination System General Construction Permit (TX150000) as implemented by the Texas Commission on Environmental Quality (TCEQ) under the provisions of Section 402 of the CWA and Chapter 26 of the Texas Water Code. The TCEQ has developed a three-tiered approach for implementing this permit that is dependent on the acreage of ground disturbance. No permitting is required for ground disturbances of less than one acre (Tier I). If more than one acre, but less than five acres are disturbed, then a Stormwater Pollution Prevention Plan (SWPPP) must be developed and implemented during construction activities accompanied with posting a site notice and sending a notification to any Municipal Separate Sewer System Operator (Tier II) within the Project area. If more than five acres of land are disturbed, then the requirements mentioned above for Tier II are necessary and the submittal of a Notice of Intent (NOI) and Notice of Termination (NOT) to the TCEQ is also required (Tier III). Once a route is approved by the PUC, the proposed acreage of ground disturbance will be determined and the appropriate Tier and conditions of the TXR150000 permit will be evaluated.

A Section 401 Water Quality Certificate from the TCEQ may also be required if the Project requires a USACE IP. States have the authority to review federally permitted or licensed activities that may result in a discharge of pollutants into the waters of the U.S. As previously discussed, a USACE IP is not anticipated for this Project.

1.6.8 Texas Historical Commission

Cultural resources are protected by federal and state laws if they have some level of significance under the criteria of the National Register of Historic Places (NRHP) (36 Code of Federal Regulations [CFR] Part 60) or under state guidance (13 TAC Part 2 § 26.7-8). The Texas Historical Commission (THC) was contacted by POWER to identify known cultural resource sites within the study area boundary. POWER also reviewed Texas Archeological Research Laboratory (TARL) records for known locations of cultural resource sites. Once a route is approved by the PUC, additional coordination with the THC may determine the need for archeological surveys or additional permitting requirements. Even if no additional surveys are required, SPS proposes to implement an unanticipated discovery procedure during construction activities. If artifacts are discovered during construction, activities in the area will cease and SPS will notify the State Historic Preservation Office (SHPO) for additional consultation.

1.6.9 Texas Department of Transportation

The Texas Department of Transportation (TxDOT) has been notified of the Project. If the route approved by the PUC crosses or occupies TxDOT ROW, it will be constructed in accordance with the rules, regulations, and policies of TxDOT. Best management practices (BMP) will be used, as required, to minimize erosion and sedimentation resulting from the construction. Revegetation will occur as required under the "Revegetation Special Provisions" contained in TxDOT form 1023 (Rev. 9-93). Traffic control measures will comply with applicable portions of the Texas Manual of Uniform Traffic Control Devices.

1.6.10 Texas General Land Office

The Texas General Land Office (GLO) requires a Miscellaneous Easement for ROW within any state owned riverbeds or navigable streams or tidally influenced waters. Coordination with the GLO will be completed after PUC approval of a route; however, no GLO easement is anticipated for this Project because no rivers or navigable streams are crossed by any of the alternative routes.

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2.0 ROUTE SELECTION METHODOLOGY AND DESCRIPTION OF THE STUDY AREA

2.1 ROUTING STUDY METHODOLOGY

The objective of this EA was to develop and evaluate an adequate number of geographically diverse alternative transmission line routes that comply with PURA § 37.056(c)(4)(A)-(D), 16 TAC § 22.52(a)(4), and 16 TAC § 25.101(b)(3)(B), including the PUC's policy of prudent avoidance. The study approach utilized by POWER for this EA included study area delineation based on the Project endpoints; identification and characterization of existing land use and environmental constraints; and identification of areas of potential routing possibilities located within the study area. POWER identified potentially affected resources including the location of habitable structures and considered each resource during the route development process. Regulatory agency, local official, and public meeting comments were also incorporated into the alternative route development process. Modifications, additions, or deletions of preliminary alternative links were made while considering resource sensitivities, governmental agency guidance, and public input and comments. Feasible and geographically diverse alternative routes were then selected for analysis and comparison using evaluation criteria to determine potential impacts to existing land use and environmental resources. The EA development process culminated with the ranking of 22 alternative routes by POWER from an environmental and land use perspective using a consensus process to select the alternative route that has the least potential impacts and best meets the criteria of PURA and PUC Substantive Rules. With this recommendation from POWER, SPS also considered factors including engineering and construction constraints and estimated costs to identify one alternative route that it believes best addresses the requirements of PURA and PUC Substantive Rules. This alternative route, as well as other alternative routes that provide geographic diversity and sufficient routing options, will be submitted to the PUC in the CCN application.

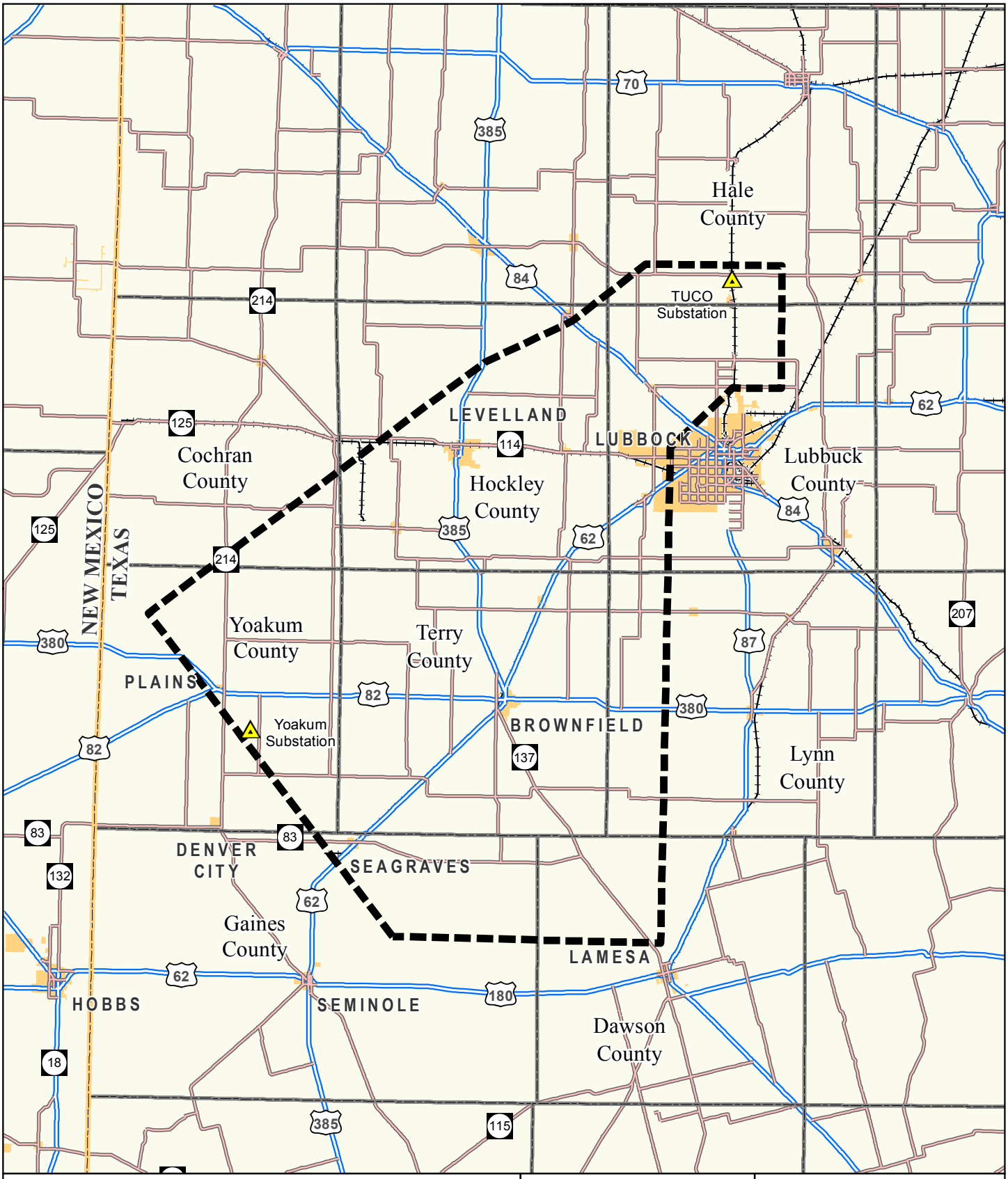
2.1.1 Study Area Boundary Delineation

The first step in the development of alternative routes was to select a study area. This area needs to encompass the Project endpoints and include a sufficiently large area within which feasible, geographically diverse alternative routes could be located. The initial study area, which set boundaries for the data collection process, is located in the southwest portion of the Texas Panhandle in the High Plains region. Major physiographic features, jurisdictional boundaries, sensitive land uses and existing utility corridors helped to define the initial study area boundaries (refer to Figure 2-1).

The study area was further refined once the initial data collection was completed (refer to Figure 2-2). The southern study area boundary was moved north of the Gaines and Dawson County lines to exclude the city limits of Seagraves, Loop, and Welch and also exclude Cedar Lake. The northern boundary was moved southwest of Lamb County. The western boundary was moved east of Cochran County to exclude areas of mapped higher quality lesser prairie-chicken (LPC) habitat. These changes resulted in a reduction of the overall study area from 3,043 square miles to 2,100 square miles.

The Project endpoints and the final study area are described below and illustrated in Figure 2-2. The final study area encompasses portions of six counties, Hale, Hockley, Lynn, Lubbock, Terry, and Yoakum Counties. The final study area is oriented in a northeast to southwest direction with the TUCO Substation located in the northeast corner of the study area and the Yoakum Substation located in the southwest portion of the study area. More specifically, the TUCO Substation is located in Hale County approximately 15.5 miles north of the City of Lubbock and 0.5 mile east of Interstate

Highway 27. The Yoakum Substation is located in Yoakum County approximately six miles southeast of the town of Plains, Texas and is approximately 10 miles northeast of Denver City, Texas. The length of the study area boundary extends north to south for approximately 62 miles, depending on the location of the measurement, and the width of the study area boundary extends west to east for approximately 50 miles, encompassing a total area of approximately 2,100 square miles.



Legend

- Substation
- Study Area
- County Boundary
- State Line
- US Highway
- State Highway
- Railroad
- City Limits
- River or Stream

TUCO - Yoakum
345-kV Project

Figure 2-1
Original Study Area

0 5 10
Miles

Date: 3/8/2016

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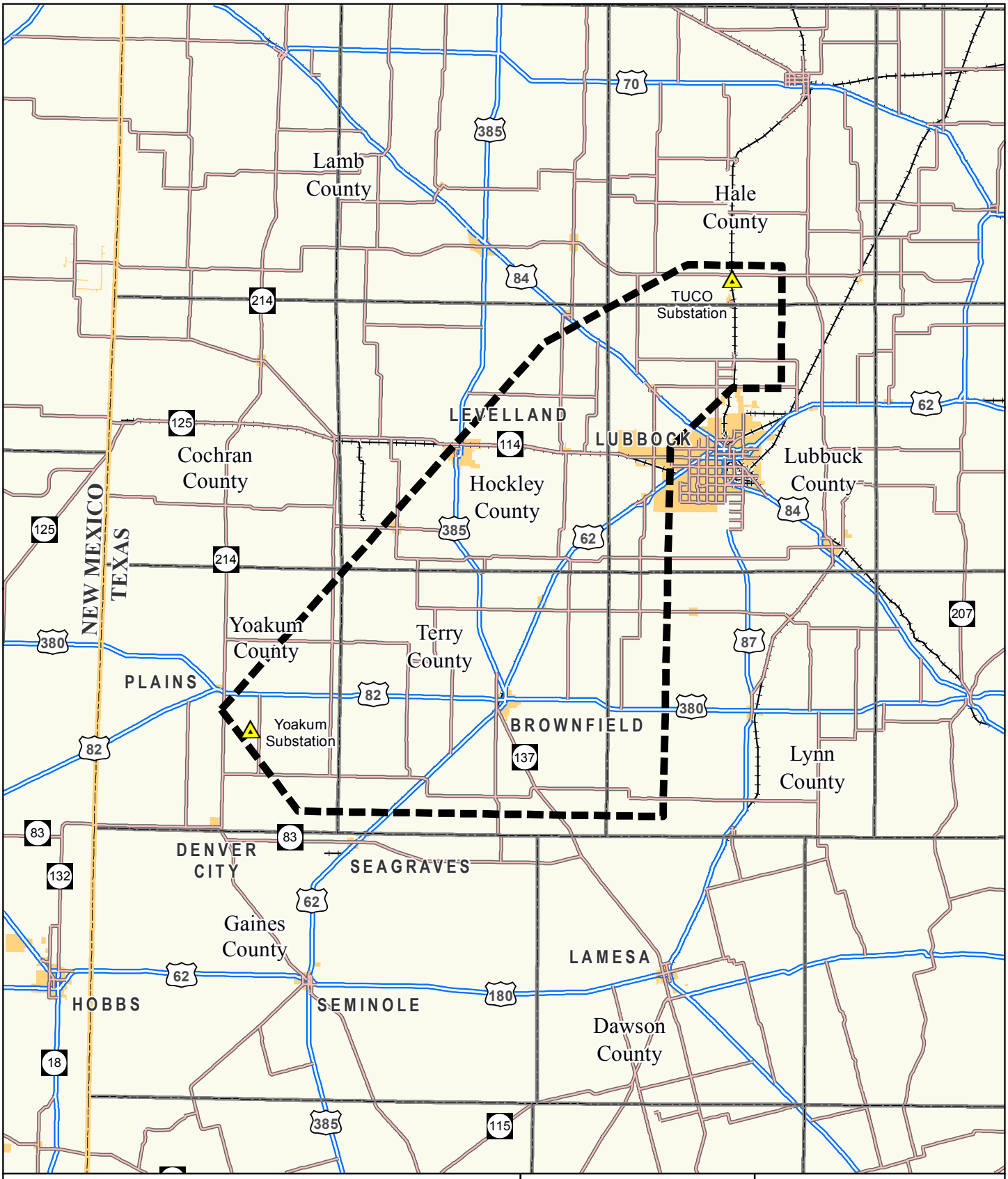
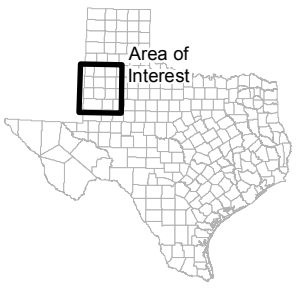
Path: N:\Projects\135321_Tuco\DD\GIS\apps\EA_TY\Fig_2-1_TY_Study_Area.mxd



Legend

- Substation
- Study Area
- County Boundary
- State Line
- 83 US Highway
- 152 State Highway
- Railroad
- City Limits
- River or Stream



TUCO - Yoakum 345-kV Project

Figure 2-2
Refined Study Area

0 5 10
Miles

Date: 3/9/2016

Xcel Energy®

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2.1.2 Base Map Development

After delineation of the study area, a Project base map, overlain on United States Geological Survey (USGS) 7.5 minute topographic maps and aerial photography, was prepared and used to initially display resource data for the Project area. Resource data categories and factors that were determined appropriate for interpretation and analysis were selected and mapped. The base map provides a broad overview of various resource locations indicating obvious routing constraints and areas of potential routing opportunities.

Data typically displayed on the base map includes:

- Major land jurisdictions and uses.
- Major roads (including county roads [CR], farm-to-market [FM] roads, United States Highways [US Hwy], State Highways [SH], and Interstate Highways [IH]).
- Existing transmission line and pipeline corridors.
- Parks and wildlife management areas.
- Major political subdivision boundaries.
- Lakes, reservoirs, rivers and ponds.

2.1.3 Evaluation Criteria

Land use and environmental evaluation criteria were developed to reflect accepted practices for routing electric transmission lines in the state of Texas (refer to Table 2-1). Emphasis was placed on acquiring information identified in PURA § 37.056(c)(4)(A)-(D), the PUC's standard CCN application and 16 TAC § 25.101, including the PUC's policy of prudent avoidance. Evaluation criteria were further refined based on data collection, reconnaissance surveys, and public input. The alternative route development process was conducted with consideration and incorporation of the evaluation criteria. Evaluation criteria data were reviewed, tabulated, and compared (refer to Section 4.0) for each resulting primary alternative route and, with other factors, were ultimately used for the recommendation of the best alternative routes from an environmental and land use perspective (refer to Section 5.0), and identification of the alternative route that best addresses the requirements under PURA and PUC Substantive Rules.

TABLE 2-1 LAND USE AND ENVIRONMENTAL EVALUATION CRITERIA

LAND USE
Length of alternative route
Number of habitable structures[1] within 500 feet of ROW centerline
Length of ROW using existing transmission line ROW
Length of ROW parallel to existing transmission line ROW
Length of ROW parallel to other compatible existing ROW (highways, public roadways, railways, etc. - excluding pipelines)
Length of ROW parallel to apparent property lines[2]
Length of ROW parallel to pipelines[3]
Percentage of ROW parallel to existing compatible corridors and apparent property boundaries (excluding pipelines)
Length of ROW through parks/recreational areas[4]
Number of parks/recreational areas[4] crossed by ROW centerline
Number of additional parks/recreational areas[4] within 1,000 feet of ROW centerline
Length of ROW through cropland
Length of ROW through pasture/rangeland
Length of ROW through land irrigated by traveling systems (rolling or pivot type)
Number of transmission pipeline crossings
Number of transmission line crossings
Number of US and State highway crossings
Number of farm-to-market road crossings
Number of cemeteries within 1,000 feet of the ROW centerline
Number of FAA registered airports with at least one runway more than 3,200 feet in length located within 20,000 feet of the ROW centerline
Number of FAA registered airports having no runway more than 3,200 feet in length located within 10,000 feet of the ROW centerline
Number of private airstrips within 10,000 feet of the ROW centerline
Number of heliports within 5,000 feet of the ROW centerline
Number of commercial AM radio transmitters within 10,000 feet of the ROW centerline
Number of FM radio transmitters, microwave towers, and other electronic installations within 2,000 feet of the ROW centerline
Number of recorded water wells within 200 feet of the ROW centerline
Number of recorded oil and gas wells within 200 feet of the ROW centerline
AESTHETICS
Estimated length of ROW within the foreground visual zone[5] of US and State highways
Estimated length of ROW within the foreground visual zone[5] of farm-to-market roads
Estimated length of ROW within the foreground visual zone[5] of parks/recreational areas[4]
ECOLOGY
Length of ROW through upland woodlands
Length of ROW through bottomland/riparian woodlands
Length of ROW across mapped National Wetland Inventory wetlands and playa lakes
Length of ROW across known habitat of federally listed endangered or threatened species
Western Association of Fish and Wildlife Agencies Estimated LPC Habitat Mitigation Cost ($)

TABLE 2-1 LAND USE AND ENVIRONMENTAL EVALUATION CRITERIA

Length of ROW across open water (lakes, ponds)
Number of stream crossings
Number of river crossings
Length of ROW parallel (within 100 feet) to streams or rivers
Length of ROW across 100-year floodplains[6]
CULTURAL RESOURCES
Number of archeological or historical sites crossed by ROW
Number of additional archeological or historical sites within 1,000 feet of ROW centerline
Number of National Register of Historic Places listed properties crossed by ROW
Number of additional National Register of Historic Places listed properties within 1,000 feet of ROW centerline
Length of ROW across areas of high archeological site potential

Notes:
[1] Single-family and multi-family dwellings, mobile homes, apartment buildings, commercial structures, industrial structures, business structures, churches, hospitals, nursing homes, and schools, or other structures normally inhabited by humans or intended to be inhabited by humans on a daily or regular basis within 500 feet of the centerline of a transmission project of 230-kV or more.
[2] Apparent property lines created by existing roads, highways, or railroad ROWs are not "double-counted" in the length of ROW parallel to property lines criteria.
[3] This data is for informational purposes only. Pipelines were not considered compatible ROW.
[4] Defined as parks and recreational areas owned by a governmental body or an organized group, club, or church.
[5] One-half mile, unobstructed.
[6] Floodplain data not available for Hockley, Lynn, Terry, and Yoakum Counties.

2.1.4 Data Collection and Constraints Mapping

Environmental and land use data used by POWER in the delineation and evaluation of alternative routes were obtained from a variety of sources, including readily available Geographic Information System (GIS) coverage with associated metadata; maps and published literature; information files and records from numerous federal, state, and local regulatory agencies; meetings with stakeholders; and multiple reconnaissance surveys of the study area. Data collected for each resource area was mapped within the study area utilizing GIS layers.

Maps and data layers reviewed include USGS 7.5 minute topographic maps (Environmental Systems Research Institute [ESRI] 2014a), National Wetland Inventory (NWI) maps, and TxDOT county highway maps. Appraisal district land parcel boundary data layers were provided by Contract Land Staff, LLC (CLS) and used to identify apparent property boundaries as paralleling possibilities. USGS 7.5 minute topographic maps and aerial photography (ESRI 2014a; National Aerial Imagery Program [NAIP] 2014) were used as the background for several of the Project maps, including the initial base map, field maps, the public involvement display boards, and the environmental and land use constraints map.

In an effort to minimize potential impacts to sensitive environmental and land use features, a constraints mapping process was used in developing and refining possible alternative routes. The geographic locations of environmentally sensitive and other restrictive areas within the study area were identified and considered during alternative route development. These constraints were mapped on topographic base maps. The alternative routes presented in this report have been selected in a manner to reduce the potential impact to land use and environmentally sensitive areas including: individual residences, congested urban areas, community facilities, subdivisions, airports, mobile

irrigation systems, cemeteries, historic sites, archeological sites, wetlands and playa lakes, parks, churches, schools, and known occupied federally listed threatened and endangered species habitat.

2.1.5 Agency Consultation

A list was developed of federal, state, and local regulatory agencies, elected officials, and organizations to receive a consultation letter regarding the Project. The purpose of the letter was to inform the various agencies and officials of the Project and provide them with an opportunity to provide feedback regarding resources, regulatory permitting requirements and other potential issues within the study area. POWER utilized websites from Hale, Hockley, Lubbock, Lynn, Terry, and Yoakum Counties and telephone confirmations to identify local officials. Consultation letters were sent in August 2014. Copies of each letter are included in Appendix A. Agencies/officials contacted include:

FEDERAL

- Federal Aviation Administration
- Federal Emergency Management Agency
- National Park Service
- Natural Resources Conservation Service
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service

STATE

- Railroad Commission of Texas
- Texas Commission on Environmental Quality
- Texas Department of Transportation (Environmental Affairs Division, Planning and Programming)
- Texas General Land Office
- Texas Historical Commission
- Texas Land Conservancy
- Texas Parks and Wildlife Department
- Texas Water Development Board

LOCAL and OTHER ORGANIZATIONS

- City Officials
- County Officials
- Ducks Unlimited - Texas
- Native Prairies Association of Texas
- Permian Basin Regional Planning Commission
- South Plains Association of Governments
- Texas Agricultural Land Trust
- Texas Cave Management Association
- The Nature Conservancy
- The Nature Conservancy – North Texas
- Independent School Districts

2.1.6 Reconnaissance Surveys

Reconnaissance surveys of parts of the study area were conducted from publicly accessible areas by POWER personnel to confirm the findings of the research and data collection activities, identify changes in land use occurring after the date of aerial photography, and identify potential unknown constraints that might not have been previously noted in the data. Reconnaissance surveys of the study area were conducted by POWER from September 30 - October 6, 2014.

2.2 COMMUNITY VALUES, LAND USE AND SOCIOECONOMICS

Under PURA § 37.056(c)(4)(A)-(D), "community values" is a factor for consideration in siting a transmission line route; however, the statute does not specifically define the term. The PUC's standard CCN application form requires information concerning the following items related to community values:

- Public open-house meeting(s).
- Approval or permits required from other governmental agencies.
- Brief description of the study area traversed.
- Habitable structures within 500 feet of the centerline for the 345-kV transmission line alternative routes.
- Amplitude modulation (AM) and frequency modulation (FM) radio, microwave, and other electronic installations in the study area.
- FAA-registered airstrips, private airstrips, and heliports located in the area.
- Irrigated pasture or croplands utilizing center-pivot or other traveling irrigation systems in the study area.
- Parks and recreation areas in the study area.
- Historical and archeological sites in the study area.

In addition to evaluating these items, POWER also evaluated the proposed Project for community values and resources that may not be specified by the PUC, but that might be of importance to a particular community as a whole. In several dockets the PUC and Staff have used the following as a working definition: the term "community values" is defined as "a shared appreciation of an area or other natural resource by a national, regional, or local community." Examples of such a community resource could include a park or recreational area, historical or archeological sites, or a scenic vista (aesthetics). POWER mailed consultation letters to various local elected and appointed officials and hosted public open-house meetings to identify and collect information regarding community values and community resources.

2.2.1 Land Jurisdiction

Government jurisdiction does not necessarily correlate to land ownership. Potential conflicts could arise from crossing jurisdictional boundaries, which were evaluated in this study area. The study area is located within the jurisdictional boundaries of Hale, Hockley, Lubbock, Lynn, Terry, and Yoakum Counties. The study area encompasses the city or town limits of Abernathy, New Deal, Opdyke West, Shallowater, Levelland, Smyer, Wolfforth, Sundown, Ropesville, Meadow, Brownfield, Lubbock, and Wellman Reese Center.

2.2.2 Land Use

Existing land uses within the study area were identified and placed into the following categories: urban/developed, planned land use, agriculture, oil and gas facilities, transportation/aviation/utility features, and communication towers. Parks and recreation areas are discussed in Section 2.3. Land use information was primarily obtained through interpretation of aerial photographs, USGS topographical maps, and vehicular reconnaissance surveys from accessible public viewpoints. Planned land use features were limited to known features obtained from governmental entities and mobility authorities.

2.2.2.1 Urban/Developed

The urban/developed category represents concentrations of surface-disturbing land uses, which include habitable structures and other developed areas characterized with low, medium and high intensities. The various levels of development include a mix of residential, institutional, commercial, and/or industrial land uses. Developed low-, medium- and high-intensity areas were identified using aerial photograph interpretation and reconnaissance surveys. These classifications are defined below:

- **Developed Low-Intensity** areas typically include rural settings with single-family housing units.
- **Developed Medium-Intensity** areas typically include single-family housing units that are grouped in residential subdivisions and might include peripheral commercial structures.
- **Developed High-Intensity** areas typically include highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial parks. Areas with the highest concentration of development are typically located within or near the towns and communities in the study area.

The study area encompasses several counties including Hale, Hockley, Lubbock, Lynn, Terry, and Yoakum Counties. The study area predominantly consists of low-intensity development. However, the study area also contains areas with medium-intensity to high-intensity developed areas. The more developed areas within the study area counties are located within cities (e.g., Levelland, Brownfield). The areas outside of the cities are primarily rural, with a mixture of rangeland/pastureland, irrigated cropland, oil and gas development, and where most of the habitable structures are associated with scattered rural properties consisting of single-family housing units.

Habitable structures were identified using aerial photographs and field reconnaissance surveys. The PUC definition of a habitable structure was used for this routing study. Commission Rule 16 TAC § 25.101(a)(3) defines habitable structures as "[s]tructures normally inhabited by humans or intended to be inhabited by humans on a daily or regular basis. Habitable structures include, but are not limited to, single-family and multi-family dwellings, mobile homes, apartment buildings, commercial structures, industrial structures, business structures, churches, hospitals, nursing homes, and schools." POWER minimized the Project's potential impact to sensitive resources, including habitable structures, to the extent practicable. The route development process considered the proximity of habitable structures to the line and reasonable and cost-effective routing adjustments to avoid habitable structures.

The study area encompasses 21 Independent School Districts (ISDs). Table 2-2 identifies the ISDs and schools located within the study area counties (TEA 2015).

TABLE 2-2 SCHOOL DISTRICTS AND SCHOOLS WITHIN THE STUDY AREA

COUNTY	SCHOOL DISTRICT/SCHOOLS
Hale County	Abernathy ISD 1 School Pre-K through 12
Hockley County	Anton ISD 1 Pre-K through 5 1 Junior High/High School 6 through 12 Levelland ISD Campuses: Capitol Elementary, South Elementary, Levelland Academic Beginnings Center, Levelland Middle, Levelland Intermediate, Levelland High School, Cactus Academic Center, Carver Learning Center Ropes ISD 1 School Pre-K through 12 Smyer ISD 1 Pre-K through 6 1 High School 7 through 12 Sundown ISD Sundown Elementary Sundown Middle Sundown High School Whitharral ISD 1 School Pre-K through 12
Lubbock County	Frenship ISD Will Bend Elementary Bennett Elementary Oakridge Elementary Frenship Middle School Terra Vista Middle School Frenship High School Reese Education Center (Pre-K -12) Idalou ISD Idalou Elementary Idalou Middle School Idalou High School Lubbock-Cooper ISD South Elementary West Elementary Laura Bush Middle School Lubbock Cooper Middle School Lubbock Cooper High School New Deal ISD New Deal Elementary/Middle School New Deal High School Shallowater ISD Shallowater Elementary Shallowater Intermediate Shallowater Middle Shallowater High School Shallowater Early College High School

COUNTY	SCHOOL DISTRICT/SCHOOLS
Lynn County	New Home ISD New Home Elementary New Home Junior High/High School O'Donnell ISD O'Donnell Elementary O'Donnell Junior High/High School Tahoka ISD Tahoka Elementary Tahoka Middle School Tahoka High School
Terry County	Brownfield ISD Oak Grove Elementary Colonial Heights Elementary Brownfield Middle Brownfield High School Brownfield Education Center Bright Beginnings Academic Center Meadow ISD 1 School Pre-K through 12 Seagraves ISD Seagraves Elementary Seagraves Middle School Seagraves High School Wellman-Union ISD 1 School Pre-K through 12
Yoakum County	Denver City ISD Kelly Dodson Elementary William G. Gravitt Junior High Denver City High School Excalibur Alternative Education Yoakum County Family Literacy Center Plains ISD 1 Pre-K through High School

Source: Texas Education Agency 2015.

2.2.2.2 Planned Land Use

The planned land use category identifies objectives and/or policies regarding land use goals and plans, including conservation easements, managed lands, and planned developments. Cities and counties typically prepare comprehensive land use plans to provide strategic direction for the individual city or county. The study area county websites were reviewed and correspondence was submitted to county officials to identify any planned land use conflicts.

Conservation Easements

A conservation easement is a restriction property owners voluntarily place on specified uses of their property to protect natural, productive or cultural features. The property owner retains legal title to the property and determines the types of uses to allow and which to restrict. The property can still be bought, sold and inherited, but the conservation easement is tied to the land and binds all present and future owners to its terms and restrictions. Conservation easement language will vary as to the

individual property owners' allowances for additional developments on the land. The land trusts facilitate the easements and ensure compliance with the specified terms and conditions.

The Texas Land Trust Council (TLTC) identifies several non-governmental groups that are land trusts for conservation easements within the Panhandle Plains Region. Specifically, the Colorado River Land Trust, Nature Conservancy, Native Prairies Association of Texas, Texas Agricultural Land Trust, Texas Land Conservancy, and Texas Cave Management Association serve as land trusts within the study area Counties (TLTC 2015). A review of these and other non-governmental land trust groups did identify one mapped conservation easement within Hale County. The Wetlands Reserve Program, Easement #963330, is located in Hale County, northwest of Plainview, Texas. However, this easement is not located within the study area boundary (NCED 2015). No mapped conservation easements were identified within the study area.

The TLTC, Natural Resource Conservation Service (NRCS), and Western Association of Fish and Wildlife Agencies (WAFWA) are actively working with Yoakum County to implement voluntary conservation measures on private lands related to the LPC.

2.2.2.3 Agriculture

Agriculture is a significant segment of the economy throughout Texas, and the study area has active agricultural sectors. Table 2-3 compares the 2012 data from the United States Department of Agriculture's (USDA) National Agricultural Statistics Service's Census of Agriculture against 2007 data. Table 2-3 illustrates the total market value of agricultural products sold, the 2012 distribution of products, as well as compares the number of farms in the study area counties (Hale, Hockley, Lubbock, Lynn, Terry, and Yoakum).

TABLE 2-3 AGRICULTURE

COUNTY	TOTAL MARKET VALUE OF AGRICULTURAL PRODUCTS			DISTRIBUTION OF PRODUCTS (2012)		NUMBER OF FARMS		
	2007	2012	Change	Crop Sales	Livestock Sales	2007	2012	Change
Hale	$364,436,000	$409,930,000	12%	32%	68%	957	899	-6%
Hockley	$107,717,000	$78,717,000	-27%	89%	11%	842	781	-7%
Lynn	$98,866,000	$67,595,000	-32%	97%	3%	506	455	-10%
Lubbock	$209,010,000	$174,800,000	-16%	55%	45%	1,205	1,116	-7%
Terry	$124,795,000	$125,803,000	1%	70%	30%	624	630	1%
Yoakum	$90,130,000	$80,008,000	-11%	92%	8%	348	339	-3%

Source: USDA 2012.

2.2.2.4 Oil and Gas Facilities

The study area is located in an area with numerous active oil and gas fields. A GIS layer was obtained from the Railroad Commission of Texas (RRC) (RRC 2015) which provided locations for existing oil and gas wells, pipelines and supporting facilities within the study area. Data point categories were reviewed and the following types were mapped as constraints: permitted locations; oil, gas, injection/disposal, core test, shut-in, brine mining, water supply wells; observed oil wells; horizontal drain holes; and sidetrack well surface locations. The 2015 RRC dataset along with aerial photograph

interpretation and field reconnaissance were used to identify and map existing oil and gas related facilities.

2.2.2.5 Transportation/Aviation/Utility Features

Transportation Features

Federal, state, and local roadways were identified using TxDOT county transportation maps, Texas Natural Resource Information System (TNRIS) data, and field reconnaissance surveys. The roadway transportation system within the study area counties are as follows:

- Hale County includes the following major roadways: I-27 and US Hwy 87.
- Hockley County includes the following major roadways: US Hwy 385, US Hwy 62, and SH 114.
- Lubbock County includes the following major roadways: US Hwy 82, US Hwy 62, US Hwy 84, and SH 114.
- Lynn County includes the following major roadway: US Hwy 380.
- Terry County includes the following major roadways: US Hwy 380, US Hwy 385, US Hwy 82, US Hwy 62, and SH 137.
- Yoakum County includes the following major roadways: US Hwy 380, US Hwy 82, US Hwy 62, and SH 214.

The study area counties include numerous other county and local roads (paved and unpaved) including farm-to-market roads (TxDOT 2016a).

The TxDOT's "Project Tracker," which contains detailed information by county for every project which is or could be scheduled for construction, was reviewed to identify any state roadway projects planned within the study area. All counties plan to have upcoming roadway projects (TxDOT 2016b).

There are several roadway projects funded for development within Hale County; however, none are located within the study area.

In Hockley County there are 11 roadway projects funded for development within the study area, these include:

- Repair approximately 6.5 miles of roadway on FM 301 from FM 303 to US 385.
- Repair approximately 4.0 miles of roadway along FM 597 from FM 168 to Lubbock County Line.
- Install rumble strips along approximately 11.7 miles of roadway on SH 114 from the Cochran County Line to FM 1490.
- Repair approximately 13.8 miles of roadway on US 385 from Lamb County Line to Brazil Road.
- Repair approximately 2.5 miles of roadway along US 385 from Brazil Road to SH 114.

- Repair approximately 1.8 miles of roadway on US 385 from FM 300 to 1.86 miles south of FM 300.
- Seal coat approximately 11.9 miles of roadway on US 385 from Grubstake Road to the Terry County Line.
- Repair approximately 13.5 miles of roadway on US 385 from FM 300 to the Terry County Line.
- Repair approximately 1.3 miles of roadway on US 385 from Houston Street to FM 300.
- Repair approximately 0.46 mile of roadway on SH 114 to Houston Street.
- Seal coat approximately 7.8 miles of roadway along US 84 from the Lamb County Line to Lubbock County Line (TxDOT 2016b).

In Lubbock County, including the following 15 located within the study area:

- Seal coat approximately 5.4 miles of roadway along FM 1294 from the Hockley County Line to Avenue N in Shallowater, Texas.
- Seal coat approximately 10.6 miles of roadway on FM 1729 from FM 179 to IH 27.
- Repair approximately 12.7 miles of roadway on FM 179 from 4th Street to FM 41.
- Install pedestrian signals along FM 179 from Donald Preston Street to Loop 193.
- Widen non-freeway for approximately 4.1 miles on FM 179 from 800 feet north of SH 114 to Donald Preston Street.
- Repair approximately 1.2 miles of roadway on FM 597 from the Lubbock County Line to 1.29 miles east of the Lubbock County Line.
- Seal coat approximately 8.3 miles of roadway on FM 597 from the Hockley County Line to north FM 2528.
- Repair approximately 10.1 miles of roadway on FM 597 from IH 27 to FM 400.
- Seal coat approximately 3.2 miles of roadway on SH 114 from the Hockley County Line to Research Boulevard.
- Convert approximately 2.4 miles of non-freeway to freeway on US 62 from 1750 feet south of 82nd Street to Milwaukee Avenue.
- Add a new interchange for approximately 1.2 miles on US 62 from 2,000 feet west of LP 193 in Wolfforth, TX to 1,000 feet west of FM 179.
- Repair approximately 2.3 miles of roadway on US 84 from Loop 388 in Shallowater, TX to 0.64 mile northwest of FM 2528.
- Repair approximately 2.5 miles of existing roadway on US 84 from 0.82 mile southeast of FM 2528 to northwest Loop 289.
- Construction of a new interchange for approximately 1.4 miles on US 84 from 0.64 mile northwest of FM 2528 to 0.82 miles southeast of FM 2528.

- Repair approximately 8.1 miles of existing roadway on US 84 from Hockley County line to south loop 388 in Shallowater, TX (TxDOT 2016b).

In Lynn County, five projects are funded for development within the study area including:

- Seal coat approximately 5.2 miles of roadway on FM 1730 from the Lubbock County Line to FM 211.
- Repair approximately 16.4 miles of roadway on FM 2053 from the Lubbock County Line to US 87.
- Seal coat approximately 9.5 miles of roadway on FM 400 from US 87 to FM 1054.
- Repair approximately 16.8 miles of roadway on US 87 from Lubbock County Line to South Tahoka City Limits.
- Repair approximately 1.2 miles of roadway on US 87 from South Tahoka City Limits to the south.

In Terry County, six roadway projects are funded for development within the study area including:

- Repair approximately 13.9 miles of roadway on US 385 from the Hockley County Line to the Railroad Crossing in Brownfield.
- Install rumble strips along roadway for approximately 11.7 miles on US 385 from the Hockley County Line to SH 137.
- Repair approximately 1.3 miles of roadway on US 62 from 0.3 mile north of US 385 to the intersection of US 82.
- Repair 1.7 miles of roadway on US 62 from the intersection of US 82 to 0.1 mile south of the Brownfield city limit.
- Repair approximately 10.6 miles of roadway on US 62 from FM 213 in Wellman to the beginning of the four-lane divide south of Brownfield.
- Repair approximately 17.5 miles of roadway on US 82 from the Yoakum County Line to Brownfield city limits (TxDOT 2016b).

In Yoakum County, two roadway repair projects are funded for development:

- Repair roadway US 380 between the Texas New Mexico State Line and the West Plains City limits (approximately 14 miles in length).
- Repair roadway US 82 between the Plains City limits and the Terry County line (approximately 13 miles in length) (TxDOT 2016b).

Aviation Features

Aviation facilities reviewed include public and private airports, airstrips, airfields and heliports. Review of the Dallas-Fort Worth Sectional Aeronautical Chart and the FAA database were used to identify FAA registered facilities.

One FAA registered public airport was identified within the study area in Hale County. The Abernathy Municipal Airport is located approximately four miles east of the City of Abernathy and east of I-27 and US Hwy 87. The Abernathy Municipal Airport features a 4,000-foot long asphalt runway (FAA 2016).

One FAA registered public airport was identified within the study area in Hockley County. The Levelland Municipal Airport is located approximately two miles south of the City of Levelland and east of US 385. The Levelland Municipal Airport features two runways, a 6,110-foot long asphalt runway and a 2,072-foot long asphalt runway (FAA 2016).

One FAA registered public airport was identified within the study area in Terry County. The Terry County Airport is located approximately four miles east of Brownfield and south of I-380. The Terry County Airport features two asphalt runways, a 5,218-foot long runway and a 2,765-foot long runway (FAA 2016).

No FAA registered public airports were identified within the study area in Lynn or Lubbock counties. The Lubbock Preston Smith International Airport is located five miles north of the City of Lubbock, in Lubbock County just outside of the study area. The northern most end of runway 17R/35L is located approximately 3,395 feet outside of the study area boundary. The Lubbock Preston Smith International Airport consists of three runways: an 11,500-foot long concrete/grooved runway; an 8,003 foot concrete/grooved runway; and a 2,891-foot long asphalt runway (FAA 2016).

No FAA registered public airports were identified within the study area in Yoakum County. However, the Yoakum County Airport is located approximately seven miles west of study area. The Yoakum County Airport features two runways: a 5,001-foot long asphalt runway; and a 3,924-foot long asphalt runway. The Denver City Airport is located over 10 miles southwest of the study area. The Denver City Airport features two runways: a 5,780-foot runway; and a 3,960-foot runway (FAA 2016).

The Brownfield Regional Medical Center Heliport was identified within the study area in Terry County approximately one mile north of Brownfield and east of I-82. This facility is private use and features a concrete 30 x 30 foot helipad (FAA 2016).

In addition, review of USGS topographic maps, aerial photograph interpretation, and field reconnaissance surveys were used in an attempt to identify private airstrips within the study area. One private use airport was identified within the study area in Hockley County. The McNabb Farm Airport is located approximately four miles east of Ropesville. This private use airport consists of two turf runways: one 2,750-foot long; and one 1,500-foot long. There are two private use airports within the study area in Lubbock County. The Biggin Hill Airport is located approximately five miles northwest of the City of Shallowater and east of SH 385. The Biggin Hill Airport features a turf 3,000-foot long runway. The Reese Airpark is located approximately 10 miles west of the City of Lubbock and north of SH 114. This airport features three asphalt runways: two 10,500-foot long runways; and a 6,500-foot long runway (FAA 2016).

Utility Features

Utility features inventoried include existing electrical transmission lines, pipelines, water wells, and water tanks. Data sources used to identify existing electrical transmission and distribution lines include utility company and Xcel regional system maps, aerial imagery, USGS topographic maps,

additional available planning documents, and field reconnaissance surveys. Transmission lines identified include: 10 230-kV transmission lines; 22 115-kV transmission lines; 16 69-kV transmission lines; and four other transmission lines. The data for these "other" lines indicates that the line names are unknown and the voltage is indicated as NULL. Distribution lines are prevalent throughout the developed portions of the study area; however, these features were not mapped.

In addition, numerous water wells are located throughout the study area (High Plains Water District [HPWD] 2015; South Plains Underground Water Conservation District [SPUWD] 2015; Texas Water Development Board [TWDB] 2016a).

2.2.2.6 Communication Towers

Review of the Federal Communications Commission (FCC) database indicated that there are two AM radio transmitters within the study area boundary: 1) an AM radio tower is located the City of Brownfield south of I-80 and west of I-62; and 2) an AM tower is located in Levelland north of SH 215 and west of I-385 (FCC 2015).

A review of the FCC databases also indicated that there are numerous Antenna Structure Registration (ASR) facilities, including FM radio transmitters/microwave towers/cell towers/other electronic installations, within the study area boundary (FCC 2015).

2.2.3 Socioeconomics

This section presents a summary of economic and demographic characteristics for each study area county and describes the socioeconomic environment of the study area. Literature sources reviewed include publications of the United States Bureau of the Census (USBOC) and the TWDB.

2.2.3.1 Population Trends

Hale County experienced a population decline of one percent between 2000 and 2010 (USBOC 2000 and 2010). According to TWDB projections, Hale County is projected to experience an overall population increase over the next 40 years. Between 2010 and 2020, 2020 and 2030, 2030 and 2040, and 2040 and 2050, population changes in Hale County are projected to be at six percent, 4.3 percent, 1.7 percent, and -0.8 percent, respectively (TWDB 2016b).

Hockley County experienced a population growth of one percent between 2000 and 2010 (USBOC 2000 and 2010). According to TWDB projections, Hockley County is projected to experience an overall population increase over the next 40 years. Between 2010 and 2020, 2020 and 2030, 2030 and 2040, and 2040 and 2050, population changes in Hockley County are projected to be at 10 percent, six percent, four percent, and one percent, respectively (TWDB 2016b).

Lubbock County experienced a population growth of 15 percent between 2000 and 2010 (USBOC 2000 and 2010). According to TWDB projections, Lubbock County is projected to experience an overall population increase over the next 40 years. Between 2010 and 2020, 2020 and 2030, 2030 and 2040, and 2040 and 2050, population changes in Lubbock County are projected to be at 11 percent, 11 percent, 10 percent, and 10 percent, respectively (TWDB 2016b).

Lynn County experienced a population decline of 10 percent between 2000 and 2010 (USBOC 2000 and 2010). According to TWDB projections, Lynn County is projected to experience an overall population increase over the next 40 years. Between 2010 and 2020, 2020 and 2030, 2030 and 2040,

and 2040 and 2050, population changes in Lynn County are projected to be at six percent, five percent, 0.3 percent, and -0.5 percent, respectively (TWDB 2016b).

Terry County experienced a population decline of one percent between 2000 and 2010 (USBOC 2000 and 2010). According to TWDB projections, Terry County is projected to experience an overall population increase over the next 40 years. Between 2010 and 2020, 2020 and 2030, 2030 and 2040, and 2040 and 2050, population changes in Terry County are projected to be at seven percent, six percent, six percent, and five percent, respectively (TWDB 2016b).

Yoakum County experienced a population growth of eight percent between 2000 and 2010 (USBOC 2000 and 2010). According to TWDB projections, Yoakum County is projected to experience an overall population increase over the next 40 years. Between 2010 and 2020, 2020 and 2030, and 2030 and 2040, and 2040 and 2050, population changes in Yoakum County are projected to be at 13 percent, 13 percent, 10 percent, and 10 percent, respectively (TWDB 2016b).

By comparison, the population at the state level grew by 21 percent between 2000 and 2010 (USBOC 2000 and 2010). Texas is expected to experience population increases of 17 percent, 14 percent, 12 percent, and 11 percent, over the next four decades, respectively (TWDB 2016b). Table 2-4 presents past population trends and projections for Hale, Hockley, Lubbock, Lynn, Terry and Yoakum Counties and for the State of Texas.

TABLE 2-4 POPULATION TRENDS

STATE/COUNTY	PAST		PROJECTED			
	2000	2010	2020	2030	2040	2050
Texas	20,851,820	25,145,561	29,510,184	33,628,653	37,736,338	41,928,264
Hale	36,602	36,273	38,314	39,965	40,647	40,307
Hockley	22,716	22,935	25,130	26,734	27,707	27,888
Lubbock	242,628	278,831	309,769	343,977	378,320	414,938
Lynn	6,550	5,915	6,279	6,605	6,624	6,594
Terry	12,761	12,651	13,599	14,457	15,321	16,108
Yoakum	7,322	7,879	8,920	10,089	11,128	12,232

Sources: USBOC 2000 and 2010; TWDB 2016b.

2.2.3.2 Employment

The civilian labor force (CLF) in Hale County increased by one percent (167 people) between 2000 and 2013. The CLF in Hockley County increased by nine percent (916 people) between 2000 and 2013. The CLF in Lubbock County increased by 21 percent (25,164 people) between 2000 and 2013. The CLF in Lynn County increased by five percent (132 people) between 2000 and 2013. The CLF in Terry County increased by three percent (128 people) between 2000 and 2013. The CLF in Yoakum County increased by 20 percent (640 people) between 2000 and 2013. By comparison, the CLF at the state level grew by 28 percent (2,758,614 people) from 2000 to 2013 (USBOC 2000 and 2013). Table 2-5 presents the CLF for the study area counties and the state of Texas for the years 2000 and 2013.

Between 2000 and 2013, Hale County experienced an increase in the unemployment rate from 6.7 percent to 7.4 percent. Hockley County experienced a slight decrease in the unemployment rate from

6.9 percent to 6.8 percent. Lubbock County experienced an increase in the unemployment rate from 5.8 percent to 7.0 percent. Lynn County experienced no change in the unemployment rate from 6.1 percent to 6.1 percent. Terry County experienced an increase in the unemployment rate from 5.7 percent to 7.1 percent. Yoakum County experienced a decrease in the unemployment rate from 9.2 percent to 8.1 percent. By comparison, the state of Texas experienced an increase in the unemployment rate from 2000 to 2013 from 6.1 percent to 8.1 percent (USBOC 2000 and 2013). Table 2-5 presents employment and unemployment data for the study area counties and the state of Texas for the years 2000 and 2013.

TABLE 2-5 LABOR FORCE AND EMPLOYMENT

STATE/COUNTY	2000	2013
Texas		
Labor Force	9,830,559	12,589,173
Employment	9,234,372	11,569,041
Unemployment	596,187	1,020,132
Unemployment Rate	6.1%	8.1%
Hale		
Labor Force	15,704	15,871
Employment	14,646	14,704
Unemployment	1,058	1,167
Unemployment Rate	6.7%	7.4%
Hockley		
Labor Force	10,278	11,194
Employment	9,572	10,435
Unemployment	706	759
Unemployment Rate	6.9%	6.8%
Lubbock		
Labor Force	121,816	146,980
Employment	114,711	136,680
Unemployment	7,105	10,300
Unemployment Rate	5.8%	7.0%
Lynn		
Labor Force	2,692	2,824
Employment	2,652	2,652
Unemployment	164	172
Unemployment Rate	6.1%	6.1%
Terry		
Labor Force	5,047	5,175
Employment	4,759	4,809
Unemployment	288	366
Unemployment Rate	5.7%	7.1%
Yoakum		
Labor Force	3,152	3,792
Employment	2,861	3,486
Unemployment	291	306
Unemployment Rate	9.2%	8.1%

Sources: USBOC 2000 and 2013.

2.2.3.3 Leading Economic Sectors

The major occupations in the study area counties in 2013 include the category of management, business, science, and arts occupations. Table 2-6 presents the number of people employed in each occupation category during 2013 in each of the study area counties.

TABLE 2-6 OCCUPATIONS IN THE COUNTY WITHIN THE STUDY AREA

OCCUPATION	TOTAL NUMBER OF PEOPLE					
	Hale	Hockley	Lubbock	Lynn	Terry	Yoakum
Management, business, science, and arts occupations	3,489	2,795	45,367	740	1,741	840
Service occupations	2,890	1,886	27,976	469	1,049	510
Sales and office occupations	3,359	2,429	36,341	618	743	531
Natural resources, construction, and maintenance occupations	2,293	1,773	13,838	496	711	1,060
Production, transportation, and material moving occupations	2,773	1,552	13,158	329	565	545

Source: USBOC 2013.

In 2000 and 2013, the industry that employed the most people in Hale County was educational services, and health care and social assistance. In 2000 and 2013, the industries that employed the most people in Hockley County were educational services, and health care and social assistance. In 2000 and 2013, the industries that employed the most people in Lubbock County were educational services, and health care and social assistance. In 2000 and 2013, the industries that employed the most people in Lynn County were educational services, and health care and social assistance. In 2000, the industries that employed the most people in Terry County were agriculture, forestry, fishing and hunting, and mining. In 2013, the industries that employed the most people in Terry County were educational services, and health care and social assistance. In 2000 and 2013, the industries that employed the most people in Yoakum County were agriculture, forestry, fishing and hunting, and mining. Table 2-7 presents the number of people employed in each of the industries in the study area counties for the years 2000 and 2013.

TABLE 2-7 INDUSTRIES WITHIN THE STUDY AREA

INDUSTRY GROUP	TOTAL NUMBER OF PEOPLE											
	Hale		Hockley		Lubbock		Lynn		Terry		Yoakum	
	2000	2013	2000	2013	2000	2013	2000	2013	2000	2013	2000	2013
Agriculture, forestry, fishing, and hunting, and mining	1,287	1,297	1,882	1,804	2,136	3,588	582	472	1,085	905	999	1,190
Construction	824	911	538	737	7,098	8,885	100	194	255	305	95	167
Manufacturing	1,897	2,064	402	427	6,874	7,316	92	138	239	240	123	92
Wholesale trade	593	408	313	339	5,656	4,575	54	93	198	118	68	80
Retail trade	271	1,780	1,050	1,091	15,072	17,491	215	229	669	591	268	323
Transportation, warehousing, and utilities	714	885	459	461	4,759	5,100	168	213	187	106	116	225
Information	187	87	189	191	4,236	2,507	78	17	66	119	10	4
Finance and insurance, real estate, rental, and leasing	587	681	442	451	6,909	7,756	143	187	193	143	90	88
Professional, scientific and management, administrative, and waste management services	578	546	408	598	7,786	10,832	71	106	166	159	60	99
Educational services, and health care and social assistance	3,104	3,113	2,417	2,426	32,352	39,480	607	487	857	1,244	579	615
Arts, entertainment, recreation, accommodation, and food services	793	1,112	556	774	10,328	15,560	118	146	322	253	169	181
Other services, except public administration	973	928	531	762	6,492	8,063	110	138	211	296	136	227
Public administration	938	892	385	374	5,013	5,527	190	232	311	330	148	195

Source: USBOC 2000 and 2013.

2.3 PARKS AND RECREATION AREAS

The PUC recognizes parks and recreational areas as those owned by a governmental body or an organized group, club, or church. Federal and state databases and county/local maps were reviewed to identify any parks and/or recreational areas within the study area. Field reconnaissance surveys were also conducted to identify any additional park or recreational areas.

2.3.1 National/State/County/Local Parks

No national parks or monuments or state parks were identified within the study area counties (National Park Service [NPS] 2016; TPWD 2016a). Numerous city parks were identified within the study area. These are briefly summarized below.

Abernathy City Park is located within the City of Abernathy. This park consists of 42 acres and offers playgrounds, a public events pavilion, picnic areas, a five acre fishing pond, a walking trail, basketball, disc golf, and baseball and softball fields (City Data 2015a).

The city parks located within the City of Lubbock include: Lt. Col. George Davis Park provides individuals the opportunity to fly radio-controlled model airplanes at the Radio-Controlled Model Airplane Field and also offers a picnic area (City of Lubbock 2015); Hinojosa Park has a paved multipurpose court for basketball and volleyball and a children's playground (City of Lubbock 2015).

The City of Brownfield has numerous city parks covering approximately 141 acres. These parks include: Hamilton Park, Coleman Park, Terry County Park, Gillham Park & Howell Lake, Family Fitness Fun Park, Kiddie Park, Judge Rhyne Trails Park, Jake Geron Park, and a skate park. Also included are the Franco softball field, girls softball fields, little league baseball fields and the Brownfield Family Aquatic Center (City of Brownfield 2015 and Brownfield Chamber and Visitor Center 2015). Enoch Stuart Park is located northwest of Brownfield (City Data 2015b).

The City of Levelland operates 10 recreation facilities with a diverse range of outdoor activities including basketball courts, tennis courts, pavilions, an amphitheater, sand volleyball courts, horse shoe pits, swings, slides, walking tracks, picnic tables, grills, baseball/softball fields, soccer fields, disc golf course, an activities building, and a civic center (City of Levelland 2015).

Additional recreational activities such as hunting and fishing might occur on private properties throughout the study area, but are not considered to be open to the general public.

2.3.2 Wildlife Viewing Trails

Review of the TPWD Panhandle Plains Wildlife Trail indicates that there are no wildlife viewing sites/driving loops located within the study area (TPWD 2016b).

2.4 HISTORICAL AND AESTHETIC VALUES

Section 37.056(c)(4)(A-D) of PURA incorporates historical and aesthetic values as a consideration when evaluating proposed electric transmission facilities. The PUC's Standard Application for a CCN further stipulates that known historical sites within 1,000 feet of an alternative route will be listed, mapped, and their distance from the centerline of the route documented in the application filed for consideration. Archeological sites within 1,000 feet of a route will be listed and their distance from the centerline documented, but they need not be shown on maps for the protection of the site. Sources consulted to identify known sites (national, state, or local commission) shall also be listed.

The THC is the state agency responsible for historic preservation. The THC, working in conjunction with the TARL maintains records of previously recorded cultural resources (archeological, architectural, and cemeteries) as well as records of previous field investigations. Information from the THC's Restricted Access Texas Archeological Sites Atlas (ATLAS) was reviewed and GIS shapefiles

were acquired from the ATLAS and TARL to identify and map locations of previously recorded cultural resource sites within the study area.

Together archeological and historical sites are often referred to as cultural resources. Under the NPS's standardized definitions, cultural resources include districts, sites, buildings, structures, or objects important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. For this study, cultural resources have been divided into three major categories: archeological resources, architectural resources, and historic cemeteries. These three categories correlate to the organization of cultural resource records maintained by the THC and TARL.

- **Archeological resources** are locations on the ground surface or buried within the earth where human activity has measurably altered or left deposits of physical remains (e.g., burnt rock middens, stone tools, petroglyphs, house foundations, bottles). Archeological resources can date to either prehistoric times or the historic era.

- **Architectural Resources** typically include standing buildings (e.g., houses, barns, outbuildings), but can also include structures (dams, canals, bridges, roads, silos), and districts that are non-archeological in nature.

- **Cemeteries** are places of intentional human interment and may include large public burial grounds with multiple burials, small family plots with only a few burials, or individual grave sites. In some instances cemeteries may be designated as Historic Texas Cemeteries (HTC) by the THC and may be recognized with an Official Texas Historical Marker (OTHM). Other cemeteries may also be documented as part of the THC's Record, Investigate, and Protect program.

2.4.1 Cultural Background

The study area is located within the Plains Cultural Resource Planning Region as delineated by the THC (Mercado-Allinger et al. 1996) and shown in Figure 2-3. Geographically, the study area is located on the southern reaches of the Southern High Plains, along the southern edge of the Llano Estacado. This region is largely devoid of topographic relief, and what slight relief exists occurs primarily as small lake and playa basins, dunes, and dry valleys. The majority of *in situ* Native American archeological deposits have been recorded in association with these features. Archeologists have divided the prehistoric occupation of the region into three main periods: the Paleoindian, Archaic, and Late Prehistoric or Ceramic periods (Johnson and Holliday 2004).

N

0 30 60 120 180 240

Miles

Source: Mercado- Allinger et. al., 1996

Legend

Cultural Resource Planning Region Boundary

County Boundary

TUCO - Yoakum
345-kV Project

Figure 2-3
Location of Study Area In Relation to the Cultural Resource Planning Regions of Texas

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2.4.1.1 Prehistory

Paleoindian (ca. 11,500 to ca. 8,600 years ago). Evidence of human occupation in the Southern High Plains of northwestern Texas and eastern New Mexico spans the last 11,500 years (Johnson and Holliday 2004). The archaeological complexes of the Paleoindian period are represented by the Clovis and Folsom complexes, and Late Paleoindian period, each recognizably based on distinctive lithic technology.

The Clovis subperiod extended from approximately 11,500 years ago to 11,000 years ago during the terminal Late Pleistocene. Clovis occupation sites have been identified on the Llano Estacado, however, only three have *in situ* Clovis deposits; the Blackwater Draw #1 (Clovis type-site) in New Mexico, the Miami site northeast of Amarillo, and the Lubbock Lake occupation west of Lubbock (Johnson and Holliday 2004). Each of these sites contained Clovis-type spear points found in association with mammoth remains indicating that the Clovis population was relying on the animals as an important food base. At the Lubbock Lake site, at least six species of extinct megafauna were found exhibiting evidence that the sites were used as butchering or primary kill sites (Johnson and Holliday 2004). Despite the popular misconception that these early populations were primarily hunters, evidence from the Gault Site in central Texas suggests that their diet was more generalized (Collins 2002). Clovis cultures hunted big game out of base camps for short periods of time, but were highly mobile and rarely stayed for long periods at any one location.

The transition from the Clovis to Folsom Period was marked by a significant climatic and environmental change which continued into Late Paleoindian times (Johnson and Holliday 2004). Average summer temperatures warmed from the earlier period while the average winter temperatures dipped below those during the Clovis Period with sustained freezing periods. Perennial streams persisted in the lower reaches of most draws. Ponds and marshes surrounded by lush vegetation began to form in the upper end of the draws. Many of the large animals hunted by Clovis populations died off as a result of the temperature fluctuation; however, large bison thrived and congregated around the ponds where food was plentiful. Folsom people took advantage of the localized food base and large bison became the mainstay of the Folsom diet (Johnson and Holliday 2004).

A consistent and plentiful food base led to an increased Folsom population as suggested by the sharp rise in the number of archeological sites dating to this period (ca. 10,800 to 10,300 years ago). It also appears from archeological assemblages at sites such as Lipscomb, Lake Theo, Lubbock Lake, and the Midland/Scharbauer that Folsom people were occupying established camp sites for longer periods of time. Many of these campsites were in close proximity to the water sources frequented by bison (Johnson and Holliday 2004).

The Midland/Scharbauer site is an archeological site dating to the Folsom era located southwest of the study area along Monahans Draw south of Midland. In 1953, human bone and teeth were found eroding out of the dry channel of Monahans Draw. Subsequent archeological investigations in the draw and adjacent deflation basins from 1953 to 1955 uncovered numerous artifacts that dated to the Folsom period. Many projectile points recovered from the excavations closely resembled the traditional Folsom point, but without the characteristic fluting. This projectile point was named "Midland" after the site. Early dating methods determined that the artifacts date to around 10,000 years ago. Skeletal remains of a woman unearthed at the site were initially thought to date up to 20,000 years before present. More recent investigations at the site have determined that the age of skeletal remains is most likely closer to that of the artifacts – somewhere between 11,000 and 10,000 years ago (Holliday and Meltzer 1996). Within the study area, a Clovis point was recovered from site

41HQ1, in association with mammoth remains, suggesting the site might be the location of a kill/butchering site.

The Late Paleoindian period (ca. 10,000 to 8,500 years ago) is characterized by a warming and drying trend that began during the Folsom period. Seasonal temperature changes were more pronounced and periodic droughts led to disappearing surface water. What water was available tended to collect in playa basins and salinas (Johnson and Holliday 2004). Despite the warming trend, subsistence strategies remained much as they were during the earlier Paleoindian periods. Big game animals still made up a large part of the diet; however, smaller mammals such as deer, rabbit, and gophers as well as fish and reptiles were also part of the diet. Archeological faunal remains dating to the Late Paleoindian vary by geography throughout Texas and represent locally available food resources (Bousman et al. 2004).

Archaic Period (ca. 8,500 to 2,000 years ago). The Archaic Period in the southern plains spans the greatest length of time of any of the Native American occupational periods. This 6,500 year period is divided into Early, Middle, and Late sub-periods based on variations in the style of stone tools. Comparatively little is known about the Early Archaic (ca. 8,000 to 6,000 years ago). Only two sites with Early Archaic components have been excavated in the Llano Estacado region; Lubbock Lake, and San Jon in New Mexico. These sites indicate an increased reliance on plant foods and smaller game, although bison continued to be a major part of the diet (Johnson and Holliday 2004, Dillehay 1974).

In the Middle Archaic, environmental conditions were significantly drier and hotter than during the Early Archaic. Many of the ponds and marshes dried up and the range vegetation was deteriorating. Water wells discovered at three sites dating to the Middle Archaic (Blackwater Draw Locality #1, Mustang Springs, and Marks Beach) indicate that Middle Archaic populations were finding alternate means of procuring and storing water (Meltzer and Collins 1987). Despite the harsh conditions, archeological evidence indicates that Lubbock Lake had a relatively intensive occupation throughout the Middle Archaic. Multiple activity areas representing camping, bison kill/butchering locales, and ovens likely used for plant processing are found around the lake (Johnson and Holliday 2004).

By around 4,500 years ago the climate began to shift back to relatively cooler and wetter conditions marking a transition to the Late Archaic period. Range conditions improved and mixed grass prairie replaced the desert plains grasslands. Localized marshlands returned and springs once again dotted the landscape. Playas and salinas held seasonal to year around water. The more hospitable environment supported a growing population as evidenced by the thousands of archeological sites dating to this period, in sharp contrast to the few sites dating to the Early and Middle periods (Johnson and Holliday 2004, Hughes 1991). During the Late Archaic the primary mode of subsistence was bison hunting, although there is evidence for smaller game and wild plants in the diet. Site types dating to the Late Archaic include campsites, rockshelters, and bison kill and butchering sites. Projectile points consisted primarily of barbed dart points which were significantly smaller than the large spear points used during the Paleoindian period (Hughes 1991).

Late Prehistoric or Ceramic Period (ca. 2,000 to 500 years ago). The Late Prehistoric is marked by increased sedentism. Although hunting and gathering remained the primary mode of subsistence in the region, a hospitable environment and secure resource base allowed for a transition towards a village-gardener lifestyle. One of the hallmarks of the period was the introduction of Mogollon brownware and Woodland cordmarked pottery around 1,800 years ago. The bow and arrow was also

introduced during this period along with small barbed arrow points and later side-notched triangular arrow points. Pit houses were common on the southern edge of the Llano Estacado early in the period, followed by a transition to surface residential structures around 800 years ago. There is also some evidence for limited agriculture in the Woodland Period. Similar to the Late Archaic, active and abandoned stream channels continued to be preferred locations for campsites (Hughes 1991).

Four Late Prehistoric culture complexes have been recognized on the Llano Estacado: Lake Creek/Plains Woodland on the northern edge, Palo Duro on the eastern edge, Eastern Jornada on the southwest margins, and Blow Out Mountain on the southeastern edge. The study area falls between three of the complexes on a portion of the southern Llano Estacado for which little has been documented relating to the Late Prehistoric. During the Late Prehistoric the region was used as a north-south thoroughfare along southeasterly flowing drainages. Semi-permanent residential base camps were established at large playa and pluvial lakes along the thoroughfare. The only well-documented Late Prehistoric playa lake site in the southern Llano Estacado is the Salt Cedar site in the extreme southeastern corner of Andrews County. Based on pottery sherds found in the archeological assemblage, the Salt Cedar site been categorized as belonging to the Eastern Jornada Mogollon culture complex (Boyd 2004).

By the second part of the Late Prehistoric (ca. 1,000 to 800 years ago), most of the Southern Plains were occupied by permanent semi-sedentary villages and a mixed economy based on hunting and gathering as well as horticulture (Drass 1998). Intermingling of Puebloan trade pottery and Plains lithic tool types during this time indicate that trade networks had been developed throughout the region. Sites were also exhibiting a much greater variety in the species of animal bones and number of grinding implements, indicating a broadened resource base with a dependency on both wild and domesticated processed plant foods. Intentional human burials were also common by this time (Boyd 2004).

2.4.1.2 Historic Period

Historic Period (ca. 300 to 50 years ago). Archeologically, the historic period on the Southern High Plains is subdivided into the aboriginal and Euro-American-historic eras. The historic period is marked by the arrival of the Spanish, as they conducted the earliest European explorations of the American Southwest, establishing the first European claim to Texas. The introduction of the horse by Spain changed the lifeways of many Native American cultures, as they were used as beasts of burden, food, and in war. Historic-period aboriginal animal processing sites are similar to those during the Late Prehistoric period; however, the sites are distinguished from the earlier period by the presence of European trade goods and remains of modern horses processed as a food source. Several historic rock art sites have been documented in Garza County east of the study area, and many Comanche sites with glass trade beads dating from the 1700s to the early to mid-1800s have been found throughout the Texas Panhandle (Johnson and Holliday 2004).

Early American scouts viewed much of the land as dry and arid; incapable of supporting life (Hämäläinen 2003). It was this misconception coupled with the large aboriginal populations that hindered settlement in the area. Euro-American occupation of the Southern High Plains did not begin until the middle to late 1800s. Among the first Europeans to arrive were the Pastores, or sheep men, typically of Hispanic descent from New Mexico. Numerous groups of Pastores moved onto the Llano Estacado and established small settlements consisting of local plazas surrounded by adobe houses. For several decades until the late 1800s, sheep production would dominate the industry in the area. The U.S. government dispatched professional buffalo hunters and military troops to the Plains states

to exterminate the buffalo, a primary food source of the aboriginal population, and drive the Native Americans to reservations.

Within the study area, an expedition led by Captain Nicholas Nolan was sent out in 1877 in an attempt to quell raids organized by Comanche Chief Old Black Horse against early settlers (Abbe 2015). Captain Nicholas Nolan's expedition consisted of 60 African American troops and 22 buffalo hunters. The expedition followed a Comanche who served as a guide and tracker who intentionally mislead the group, purposely following trails left by the Comanche raiding party. As the expedition wandered it became increasingly harder to find water. Once thoroughly lost, the Comanche guide abandoned the expedition while they slept, leaving the others to their own devices. After two days without water, the buffalo hunters opted to separate from the troops after disagreeing with the commander's decision to head back 55 miles to the nearest known water source at Double Lakes. The long march back took three days, and the troops relied on drinking urine and horse blood to stay alive. They ultimately made it back to camp, having lost four men (Nunn 1940).

Following the Red River War, a series of military engagements between the United States Army and Kiowa, Comanche, Southern Cheyenne, and Southern Arapaho tribes in the mid-1870s, the threat of aboriginal raids on Euro-American settlers diminished, and the region was opened to Spanish and Anglo settlement (Johnson and Holliday 2004). The cattle industry was the first to take hold in the region's economy as millions of acres once occupied by Native Americans became available. Large ranches such as the XIT ranch which held 3,000,000 acres, and C.C. Slaughter's, Lazy S Ranch eventually reaching a size of over a million acres were established (Leffler 2015a).

By the 1890s, large ranch holdings began to diminish as their leases expired and the promotion and sale of Permanent School Fund lands took hold (Lang and Haigh 2015). Thousands of acres of land were improved for agriculture by white settlers. Spurred by the coming of the Texas and Pacific Railroad in 1881 and the Santa Fe Railroad in 1907, the populations of the counties within the study area, with the exception of Hockley County, doubled between 1900 and 1910 (Leffler 2015b; Hunt and Leffler 2015). Farming became the dominant economy in the region, supplemented by ranching, which also continued to prosper. The railroads that allowed ranchers and farmers to connect to markets abroad did not reach Hockley County until expansions in the 1920s (Leffler 2015c).

During the beginning of the twentieth century, the Southern High Plains saw a period of substantial real estate investment. The Texas Land Development Company, which worked as an investor for several other companies, sought to purchase 61,360 acres of land within Hale County (Leffler 2015b). Located primarily around the town of Plainview, the company improved land for agriculture by installing irrigation systems, housing and parks, and by planting fruit and shade trees. Regardless of the growing economy, the large investment was not an immediate pay off and World War I effectively suspended the sales of developed farms due to shortages of operating capital (Brunson 2015).

The cattle business continued to grow during this time, although its overall importance in the local economy declined (Abbe 2015; Graves 2015). Hockley County did not see significant population growth until the 1920's (Leffler 2015c), and ranching continued to be the economic mainstay until the expansion of the railroads in the late 1920's. Large portions of ranch land were sold for farm land to settlers in following the arrival of the railroad. Yoakum County, however, never experienced a significant agricultural boom like its neighbors, lacking major roads or trails (Leffler 2014d).

Extended droughts and infestations occurred intermittently but had a significant impact in Lynn County, driving many settlers out (Abbe 2015). The economy of the region remained strong, especially during the 1920s cotton boom, which lured many settlers back into the area. In 1925, Texas Technological College or what is now known as Texas Tech University opened its doors in Lubbock County, further boosting the area's economy and population (Graves 2015).

The Great Depression and Dust Bowl threw much of the region's and nation's economic growth into reverse, affecting the local farmers differently. Some farmers were able to hold on by finding local jobs in a flourishing dairy industry, but many more had to turn to tenant farming or selling their lands (Gelin and Odintz 2015). From 1929-1935, the number of farms in Lynn County dropped by 50 percent (Abbe 2015). The effects of the Depression were felt nationwide, but intensified in the study area by the environmental cost of the Dust Bowl. Drought and sand storms that suffocated livestock and produced dunes up to 30 feet high and 50 feet wide, plaguing the local economy (Worster 2004).

Regardless of the rough times, a growing dairy and poultry industry helped to create jobs. More importantly for the regional economy, oil was discovered in the area in the mid-1930s. The first oil well in Hockley County, at its zenith, produced over five hundred barrels of oil every day, creating a small boom town (Leffler 2015c). Much of the economy today in the Southern High Plains region is strongly tied to the oil and gas industry, which pumps hundreds of thousands of barrels of oil each year (Graves 2015).

By World War II, many of the farmers were now working as tenants on larger farms. Mechanization and improved irrigations systems and pumps increased crop yields. Irrigation systems that once flooded whole areas were replaced by large sprinkler systems, helping to reduce dust. Long gone were the days of pushing a horse drawn plow one row at a time (Colaizzii et al. 2008). Although farms benefitted from the new technologies, many farmers found themselves replaced by modern machinery. Through these new adoptions, the Southern High Plains was better able to diversify its crops to include wheat, peanuts, peaches, pecans, potatoes, and soybeans (Hunt 2015).

2.4.2 Records Review

The THC, working in conjunction with TARL, maintains records of previously recorded cultural resources as well as records of previous field investigations. On September 22, 2014, GIS shapefiles were acquired from TARL to identify and map the locations of previously recorded archeological and historical resources within the study area. Information on archeological sites and surveys were obtained from the THC's restricted-access Texas Archeological Sites Atlas (TASA) on several occasions in September through October 2014, and April and May 2015. The locations of and information pertaining to State Antiquities Landmarks, NRHP properties, cemeteries, HTC, and OTHM within the study area were obtained from the THC's online Texas Historical Sites Atlas (THSA) in September and October 2014. TxDOT's historic bridges database was reviewed for bridges that are listed or determined eligible for listing on the NRHP within the study area. At the national level, the NRHP Focus database (NPS 2015a) and NPS websites for National Historic Landmarks (NPS 2015b), and National Historic Trails (NPS 2015c) were reviewed as well. The results of the review are summarized in Table 2-8.

TABLE 2-8 CULTURAL RESOURCES RECORDED WITHIN THE STUDY AREA

COUNTY	RECORDED ARCHEOLOGICAL SITES	PROPERTIES DETERMINED ELIGIBLE FOR NRHP	CEMETERIES	HTC	OTHM
Hale	5	0	1	1	3
Hockley	1	0	3	2	8
Lubbock	17	0	1	1	1
Lynn	0	0	0	0	0
Terry	8	1	8	1	23
Yoakum	0	0	0	0	0

Source: THC 2015a, 2015b.

The review of the TASA and TARL data indicated that 31 archeological sites have been previously recorded within the study area. Of these, 20 are prehistoric in age, six are historic, and four sites have historic and prehistoric components. Each site is summarized in Table 2-9. There is no site form describing site 41HA24 on the TASA. According to the TASA, 12 sites are determined by the SHPO to be ineligible for listing on the NRHP. One site, 41TY113, has been determined by the SHPO to be eligible for listing in the NRHP. Site 41TY113 is a protohistoric campsite, few of which have been studied on the Southern High Plains. Sites 41HQ1, 41LU60, 41LU72, and 41LU75 are recommended by their recorders on the TASA site forms as potentially NRHP- and State Antiquities Landmark (SAL)-eligible, but they have not been formally evaluated.

As shown in Table 2-9, a majority of the sites within the study area are prehistoric open campsites along playa margins with burned rock, burned caliche, flakes, and stone tools. A few sites contain late Pleistocene material such as mammoth bone and early to late Paleoindian stone tools (e.g., 41HQ1, 41LU60, 41LU61, 41LU72, and 41TY1). Prehistoric activities are most commonly represented by surficial artifact surface scatters of debitage and burned rock. Site 41HQ1, for instance, has been recorded on the site form as a kill or butchering locale, consisting of scattered mammoth tusk and bone, a Clovis point, bifacial and unifacial tools, cores, flakes, and burned caliche. The site is eroding out of a dune alongside a playa. Three sites (41LU6, 41TY3, 41TY112) are recorded as caches, reserves or small stockpiles of bifaces and cores. Historic sites within the study area are limited and primarily represent domestic home sites of the early to mid-twentieth century. Scatters of historic artifacts generally include glass, ceramics, and construction material such as brick, nails, and lumber.

TABLE 2-9 ARCHEOLOGICAL SITES RECORDED WITHIN THE STUDY AREA

TRINOMIAL	ELIGIBILITY	SITE DESCRIPTION	COMMENTS
41HA9		Late Archaic to Late Prehistoric open campsite and lithic scatter; flakes, bone, burned rock, burnt caliche	
41HA10		Prehistoric open campsite and lithic scatter; flakes and burned animal bone	
41HA24		No information available on TASA	
41HA62		Historic artifact scatter (ca.1943-1964); glass, metal, ceramic, and construction material	
41HA63		Historic artifact scatter possible house site or dump (ca. 1930); glass metal, ceramic, construction material, and animal bones	
41HQ1		Paleoindian open campsite, possible kill/butchering locale; scattered mammoth tusk and bone; Clovis point, bifacial and unifacial tools, cores, flakes, and burned caliche	Site form recommends site as having SAL potential and NRHP eligible
41LU100	Ineligible	Prehistoric	No other information available on TASA
41LU111	Ineligible	Aboriginal historic campsite; flakes, ground stone, bone, modern metal, and Washita point fragment	
41LU140	Ineligible	Prehistoric lithic scatter; flake, possible core, and cobbles	
41LU33		Prehistoric campsite; hearths, burned caliche, flakes, tooth fragment, and possible mano	
41LU34		Prehistoric campsite; hearths, burned caliche, flakes, tooth fragment, possible mano, and point fragment	
41LU6		Archaic cache pit; flakes, utilized flakes, and Marshall point	
41LU60		Paleoindian to Late Prehistoric campsite; hearths, bone, lithic tools, flakes, groundstone, Folsom point, and ceramic sherds	Site form recommends site as having SAL potential
41LU61		Paleoindian to Archaic campsite; Plainview point, Folsom points, mammoth bone, and metate	Site form recommends site as having SAL potential
41LU72		Paleoindian lithic scatter; Plainview points, bifaces, blanks, scrapers, and utilized flakes	Site form recommends site as having SAL potential and NRHP eligible

TRINOMIAL	ELIGIBILITY	SITE DESCRIPTION	COMMENTS
41LU75		Protohistoric and possible Late Archaic campsite; projectile points (e.g., Harrell, Washita, Fresno, and Deadman), scrapers, manos, metates, hearthstones, hammerstones, bone, bone tools, flakes, anvils, burned bone, prehistoric and protohistoric ceramics, possible stone "vice" for use with wood drill	Site form recommends site as having SAL potential
41LU93	Ineligible	Prehistoric	No other information available on TASA
41LU94	Ineligible	Historic	No other information available on TASA
41LU95	Ineligible	Prehistoric	No other information available on TASA
41LU96	Ineligible	Prehistoric	No other information available on TASA
41LU97	Ineligible	Historic	No other information available on TASA
41LU98	Ineligible	Historic	No other information available on TASA
41LU99	Ineligible	Prehistoric	No other information available on TASA
41TY1		Paleoindian, Archaic, and Late Prehistoric campsite and lithic scatter; burned rock, arrow point, dart points, and scraper; historic bullets and button	No other information available on TASA
41TY111			No information available on TASA
41TY112		Prehistoric cache; bifaces and pottery sherds	
41TY113	SAL Eligible (1997)/NRHP Eligible (1997)	Late Prehistoric to aboriginal historic; flakes, projectile points	No other information available on TASA
41TY114	Ineligible	Prehistoric	No other information available on TASA
41TY115	Ineligible	Prehistoric	No other information available on TASA
41TY2		Aboriginal historic campsite and lithic scatter; debitage and burned rock	
41TY3		Prehistoric lithic scatter and cache; flakes, cores and bifaces	

Source: THC 2015b.

There are 35 OTHMs located within the study area, including Recorded Texas Historic Landmarks (RTHLs), Historical Markers, and HTC, as shown in Table 2-10. For the region of the Southern High Plains, markers commemorate a period of settlement and development by way of railroad expansion and business growth in the ranching, agriculture, and oil industries (e.g., Struve Family Businesses, Spade Ranch, and the First Oil Well in Hockley County). The Route of the Nolan Expedition represents the earliest subject matter of the OTHM in the study area, describing the harsh conditions that existed on the frontier in 1877.

TABLE 2-10 OFFICIAL TEXAS HISTORICAL MARKERS (OTHM) WITHIN THE STUDY AREA

COUNTY	NAME	DESIGNATION
Hale	Struve Family Businesses	
Hale	Town of Abernathy	
Hale	Peace Chapel-Strip Cemetery	HTC
Hockley	City of Levelland Cemetery	HTC
Hockley	First Oil Well in Hockley County	
Hockley	Ropesville Resettlement Project	
Hockley	Site of the Primrose School	
Hockley	The Spade Ranch	
Hockley	City of Levelland	
Hockley	Fifth Street Missionary Baptist Church	
Hockley	Anton, City of Sundown Cemetery	HTC
Lubbock	Carlisle Cemetery Marker	HTC
Terry	City of Brownfield	
Terry	Colonel B.F. Terry & Terry's Texas Rangers	
Terry	Gomez Baptist Church	
Terry	Gomez Cemetery	
Terry	Gomez	
Terry	M.B. Sawyer Ranch House	
Terry	Maids and Matrons Club	
Terry	Meadow Depot	
Terry	Meadow United Methodist Church	
Terry	Terry County	
Terry	Terry County's First Jail	
Terry	Oak Grove	
Terry	Tokio School	
Terry	Brooks Blacksmith Shop	
Terry	First Baptist Church of Brownfield	
Terry	Site of Joe T. and Laura Hamilton Home	

COUNTY	NAME	DESIGNATION
Terry	Brownfield Municipal Power Plant	
Terry	Old County/Brownfield Cemetery	
Terry	Foster/Forrester Cemetery	
Terry	Route of Nolan Expedition	
Terry	Meadow Cemetery	HTC
Terry	A.M. Brownfield	RTHL
Terry	Old Daugherty House	RTHL

Source: THC 2015a, 2015 b.

There are 13 cemeteries recorded within the study area, five of which are designated HTCs. Historical markers are located at an additional seven cemeteries, as shown in Table 2-11. No NRHP-listed properties, State Antiquities Landmarks, or NRHP-listed or determined-eligible bridges are recorded within the study area. To further assess potential impacts to cultural resources, high probability areas (HPA) for prehistoric archeological sites were defined using topographic and aerial photography maps, and areas of Holocene deposition with the study area were delineated using the Geologic Atlas Brownfield, Lubbock, Hobbs, and Big Spring map sheets (BEG 1974, 1993, 1994). Within the study area, the prehistoric HPAs occur along draws, their tributaries, playa lake margins, and near springs. Historic-age resources are also likely to be found near water sources. However, they will also be located in proximity to primary and secondary roads which provided access to the sites. Buildings and cemeteries are also more likely to be located within or near historic communities.

TABLE 2-11 CEMETERIES RECORDED WITHIN THE STUDY AREA

COUNTY	NAME	COMMENTS
Hale	Peace Chapel-Strip Cemetery	HTC
Hockley	Anton/City of Sundown	HTC
Hockley	Ropesville	Historical Marker
Hockley	City of Levelland	HTC
Lubbock	Carlisle	HTC
Terry	Pride	
Terry	New Mount Zion	
Terry	Old Mount Zion	
Terry	Old Country/Brownfield Cemetery	Historical Marker
Terry	Gomez Cemetery	Historical Marker
Terry	Union	
Terry	Foster/Forrester Cemetery	Historical Marker
Terry	Meadow	HTC

Source: THC 2015b.

2.4.3 Previous Investigations

Based on a review of the THSA data, numerous cultural resource surveys have been undertaken in the study area. The earliest investigations were undertaken in the 1970s by the Museum of Texas Tech University. Since the 1970s, the Museum of Texas Tech University, Texas Historical Commission, and archeological societies, such as the Texas Archeological Society and local societies have conducted surveys within the study area. Several investigations have led to site testing, such as the Museum of Texas Tech University testing of sites 41TY113, 41TY114, 41TY115 for the U.S. Air Force in 1995 and 1997. Surveys have also been undertaken in advance of oil and gas and electrical transmission projects. Projects undertaken within the study area are listed in Table 2-12.

TABLE 2-12 PREVIOUSLY CONDUCTED ARCHEOLOGICAL PROJECTS IN THE STUDY AREA

INVESTIGATOR	PROJECT NAME	SITES RECORDED IN STUDY AREA
Museum of Texas Tech University, 1974		41LU6, 41LU33, 41LU34
Museum of Texas Tech University, 1976		41HA9, 41HA10
EPA 1978, 1981, 1996		
Texas Historical Commission, 1982	Local informant request	41LU60, 41LU61
Museum of Texas Tech University, 1983		41HQ1
Federal Highway Administration, 1985		
Museum of Texas Tech University, 1986	Local informant request	41LU72
Texas Archeological Society, 1989		41TY1
Texas Archeological Society 1989		41TY2
Museum of Texas Tech University, 1990		41LU75
Federal Communications Commission		
Texas Archeological Society, 1992		41TY111, 41TY112
Texas Archeological Society 1992		41TY3
Hicks and Company	An Archeological Survey of the Proposed Site of the New Lubbock Landfill, Lubbock County, Texas (Davis and Jones 1994)	41LU93, 41LU94, 41LU95, 41LU96, 41LU97, 41LU98 41LU99, 41LU100
Museum of Texas Tech University	Archaeological Survey Along the Mobile ESTE CO2 Pipeline Corridor from Denver City to Clairemont, Garza County, Texas (Johnson 1994)	
Museum of Texas Tech University	Playa Archaeology: Archaeological Investigations at Reese Air Force Base and Terry County Auxiliary Airfield, Lubbock and Terry Counties (Johnson 1995)	41LU111
Museum of Texas Tech University	Playa Archaeology: Test excavations at Terry County Auxiliary Airfield, Southern High Plains of Texas (Johnson 1997)	41TY113, 41TY114, 41TY115

INVESTIGATOR	PROJECT NAME	SITES RECORDED IN STUDY AREA
Espey, Huston & Associates	A Cultural Resources Survey of the Proposed Brownfield Wind Farm Project; Terry County Texas (Nash 1999)	
Prewitt and Associates, Inc.	Geoarcheological Survey of the Proposed Abernathy Park, Hale County, Texas (Boyd 2003)	
AR Consultants, Inc.	Cultural Resources Survey for the City of Meadow Solid Waste Facility Expansion (Lang et al. 2008)	
TRC environmental, 2008	Roadrunner Pipeline	
Prewitt and Associates, Inc., 2013	Archeological Survey of the Proposed Bailey County Well Field Supply Pipeline, City of Lubbock, Lubbock County, Texas — Lubbock County (Hatfield 2013)	41LU140
TRC environmental, 2013	TUCO to Texas/Oklahoma Interconnect 345 kV Transmission Line	41HA62, 41HA63

Source: THC 2015b.

2.5 AESTHETIC VALUES

Section 37.056(c)(4)(C) of PURA incorporates aesthetics as a consideration when evaluating proposed electric transmission facilities. There are currently no formal guidelines provided for managing visual resources on private, state, or county owned lands. For the purposes of this study, POWER defined the term "aesthetics" to accommodate the subjective perception of natural beauty in a landscape and to assess an area's scenic qualities. The visual analysis was conducted by describing the regional setting and assessing the viewer's sensitivities. Related literature, aerial photograph interpretation, and reconnaissance surveys were used to describe the regional setting and to determine the landscape character types for the area.

Consideration of the visual environment includes a determination of aesthetic values (where the major potential effect of a project on the resource is considered visual) and recreational values (where the location of a transmission line could potentially affect the scenic enjoyment of the area). POWER used the following aesthetic criteria to determine an area's aesthetic identity:

- Topographical variation (hills, valleys, etc.);
- Prominence of water in the landscape (rivers, lakes, etc.);
- Vegetation variety (woodland, meadows);
- Diversity of scenic elements;
- Degree of human development or alteration; and
- Overall uniqueness of the scenic environment compared with the larger region.

The study area is located in the southwest portion of the Texas Panhandle. It is characterized by a nearly level landscape within a rural setting comprising agricultural cropland with prominent pivot irrigation and extensive oil and gas developments with additional sparse commercial/industrial developments. The majority of the study area has been impacted by activities associated with

agricultural operations and oil and gas exploration. The more developed areas within the study area counties are located in the larger cities. No windfarms were identified within the study area.

No known designated views or designated scenic roads or highways were identified within the study area. A review of the NPS website did not indicate any Wild and Scenic Rivers or National Monuments within the study area (National Wild and Scenic Rivers System [NWSRS] 2016; NPS 2016, 2015a, 2015b, 2015c).

Based on these criteria, the study area exhibits a moderate degree of aesthetic quality for the region. The study area maintains the feel of a typical rural agricultural community. In general, the aesthetic quality of the study area is not distinguishable from that of other adjacent areas within the region.

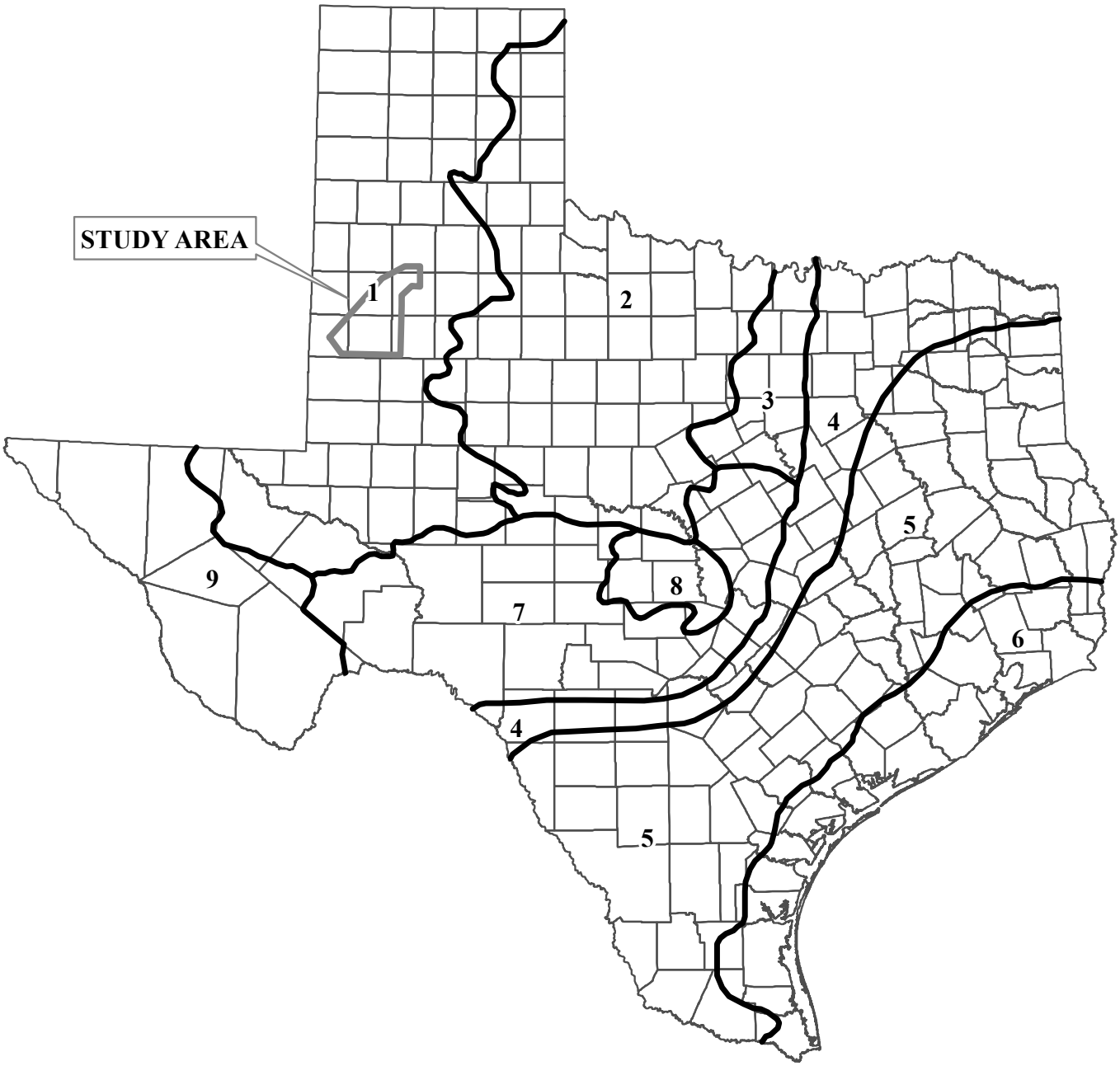
2.6 ENVIRONMENTAL INTEGRITY

Resource inventory data were collected for physiography, geology, soils, surface waters, wetlands, and ecological resources. This data was mapped within the study area utilizing GIS layers. Additional data collection activities consisted of file and record reviews conducted with the various state and federal regulatory agencies, a review of published literature, and review of various maps and aerial photographs. Maps and data layers reviewed include USGS 7.5 minute topographic maps, ESRI World Imagery, NAIP aerial imagery, Geologic Atlas maps, NWI maps, National Hydrography Database (NHD) (USGS 2015a), Playa Lakes Joint Venture (2011), FEMA national flood hazard layer, USGS, NRCS soil survey data, TCEQ, TPWD/USFWS endangered species county lists, and TXNDD.

2.6.1 Physiography and Geology

As shown in Figure 2-4, the study area is located within the Southern High Plains Physiographic Province of Texas. This province is located west of the North-Central Plains Province and is bounded to the south by the Edwards Plateau and the Trans-Pecos Basin and Range provinces. This region is described as flat with playa lakes and local dune fields. Elevations within the Southern High Plains region range from 2,200 feet to 3,800 feet above mean sea level (amsl) (BEG 1996). Within the study area, elevations range between 3,000 and 3,800 feet amsl with elevations gradually increasing to the north and west.

Geologic formations occurring within the study area include the Quaternary-Aged alluvium, windblown sands, playa/pond deposits, fluviatile terrace deposits, Blackwater Draw Formation, and the Tahoka Formation. Tertiary-Aged formations include the Ogallala Formation. Cretaceous-Aged formations include the Fort Terrett, Duck Creek, and Kiamichi Formations. A brief description of the each geologic formation within the study area is given below (BEG 1974, 1976).



0 30 60 120 180 240

Miles

Source: Texas Bureau of Economic Geology, 1996

Legend

- Physiographic Region Boundary
  - 1 High Plains
  - 2 North-Central Plains
  - 3 Grand Prairie
  - 4 Blackland Prairies
  - 5 Interior Coastal Plains
  - 6 Gulf Coastal Prairies
  - 7 Edwards Plateau
  - 8 Central Texas Uplift
  - 9 Trans-Pecos Basin and Range
- County Boundary

T U C O - Y o a k u m
3 4 5 - k V P r o j e c t

Figure 2-4
Location of Study Area In Relation to the Physiographic Regions of Texas

POWER ENGINEERS

Date: 3/9/2016

Xcel Energy®

Quaternary Formations

A majority of the study area is covered by Quaternary-Aged windblown sands and windblown cover sands, with pockets of playa/pond deposits near playa lakes and fluviatile terrace deposit and alluvium occurring near draws/streams. The Blackwater Draw and Tahoka Formations are exposed along draws and streams and are characterized as a grayish red fine to medium grained quartz, silt, and calcareous with caliche nodules, typically about 25 feet thick. The Tahoka Formation is characterized by lacustrine clay, silt, sand, and gravel getting coarser towards the margins, with a thickness of approximately 25 feet (USGS 2015b).

Tertiary Formations

The Ogallala Formation is exposed along draws and streams and is described as a fluviatile sand, silt, clay and gravel capped by caliche with a maximum thickness of 175 feet (USGS 2015b).

Cretaceous Formations

The Cretaceous-Aged Fort Terrett, Duck Creek, and Kiamichi Formations are exposed along deeper draws and drainages. The Duck Creek Formation is characterized by inter-bedded shale and limestone, with a maximum thickness of 35 feet. The Kiamichi Formation if characterized as interbedded shale, limestone and minor sandstone, with a maximum thickness of 95 feet. The Fort Terrett Formation (Edwards Group) is characterized as sandstone, claystone, and conglomerate with a maximum thickness of 200 feet (USGS 2015b).

2.6.1.1 Geological Hazards

Several potential geologic hazards that could affect the construction and operation of the transmission line were evaluated within the study area. Hazardous areas typically reviewed include potential karst areas, faults, coal mining locations, gravel quarries, and potential subsurface contamination.

No known caves were identified within the counties or within the study area (Texas Speleological Society [TSS] 1994). No known quaternary faults were identified within the study area (USGS 2015c). No current or historical coal mining activities were identified; however, several historical gravel quarries are located within the study area (RRC 2015).

Review of the TCEQ State Superfund Site database (TCEQ 2016) and United States Environmental Protection Agency (USEPA) Superfund Site database (USEPA 2016) indicated one superfund site near the study area. The State Road 114 Ground Water Plume superfund site is located on the northwest edge of the City of Levelland, Texas just outside the study area boundary.

The RRC oil/gas database was reviewed for the study area and numerous oil and gas wells, pipelines, treatment facilities and pipeline compressor stations were identified within the study area (RRC 2016).

2.6.2 Soils

2.6.2.1 Soil Associations

The published NRCS Web Soil Survey data were was used to identify and characterize mapped soil units that are within the study area, including hydric and important farmland soil series designations (NRCS 2016). Soil map units represent an area dominated by one or more major kinds of soil or

miscellaneous areas. Table 2-13 summarizes each soil association within the study area and indicates if any mapped units of the soil series within the association are considered hydric and/or prime farmlands (NRCS 2016).

TABLE 2-13 MAPPED SOIL UNITS WITHIN THE STUDY AREA

SOIL ASSOCIATION	DESCRIPTION	SOIL SERIES	LANDFORM	~PERCENT OF ASSOCIATION	HYDRIC SOIL	PRIME FARMLAND SOIL
Amarillo (s7164, s7166)	Well drained; loamy eolian deposits	Amarillo	Plains	80	N	N
		Other	-	20		
Mansker - Estacado - Bippus - Berda (s7204)	Well drained; loamy alluvium; calcareous loamy eolian deposits, or loamy colluvium and slope alluvium	Mansker	Plains, draws	25	N	Y
		Estacado	Playa slopes, plains	10	N	Y
		Bippus	Draws	15	N	Y
		Berda	Scarps, toeslopes, valley flats	30	N	N
		Other	-	20		
Olton - Amarillo - Acuff (s7511)	Well drained; clayey or loamy eolian deposits	Olton	Plains	65	N	Y
		Amarillo	Plains	10	N	N
		Acuff	Plains	15	N	Y
		Other	-	10		
Olton - Amarillo - Acuff (s7153)	Well drained; clayey or loamy eolian deposits	Olton	Plains	10	N	Y
		Amarillo	Plains, playa slopes	35	N	N
		Acuff	Plains	50	N	Y
		Other	-	5		
Patricia - Amarillo (s7539)	Well drained; loamy or sandy eolian deposits	Patricia	Plains	60	N	N
		Amarillo	Plains	35	N	N
		Other	-	5		
Patricia - Brownfield Amarillo (s7540)	Well drained; loamy or sandy eolian deposit	Patricia	Plains	45	N	N
		Brownfield	Plains	30	N	N
		Amarillo	Playa slopes, plains	15	N	N
		Other	-	10		
Potter - Portales - Mansker - Arch (s5373)	Well drained; calcareous loamy eolian deposits, lacustrine deposits, or loamy alluvium	Potter	Draws, shoulders	14	N	N
		Portales	Plains, interdunes, playa steps	13	N	Y
		Mansker	Plains, draws	31	N	Y
		Arch	Interdunes, playa steps	10	N	N

TABLE 2-13 MAPPED SOIL UNITS WITHIN THE STUDY AREA

SOIL ASSOCIATION	DESCRIPTION	SOIL SERIES	LANDFORM	~PERCENT OF ASSOCIATION	HYDRIC SOIL	PRIME FARMLAND SOIL
		Other	-	32		
Pullman - Olton (7572)	Well drained; clayey eolian deposits	Pullman	Plains	70	N	N
		Olton	Plains	15	N	Y
		Other	-	15		
Springer - Nutivoli - Brownfield - Arch (s7503)	Well to excessively drained, sandy eolian deposits or sands	Springer	Plains, sand sheets	33	N	N
		Nutivoli	Dunes	33	N	N
		Brownfield	Plains	15	N	N
		Arch	Interdunes, playa steps	15	N	Y
		Other	-	4		
Spur - Potter - Mansker (s7451)	Well drained; Calcareous, loamy alluvium and eolian deposits	Spur	Draws	35	N	N
		Potter	Draws, scarps	15	N	N
		Mansker	Plains, draws	50	N	Y
Zita - Midessa - Drake (s7561)	Well Drained; oamy eolian deposits and/or calcareous loamy lacustrine deposits	Zita	Plains	12	N	Y
		Midessa	Draws, playa slopes	26	N	N
		Drake	Playa dunes, draws, slopes	23	N	N
		Other	-	39		

Source: NRCS 2016.

Upland soil units within the study area are dominated by Amarillo, Olton – Amarillo – Acuff, Pullman – Olton, and Patricia – Amarillo soils. Soil units typically located in draws and drainage areas include Spur – Potter – Mansker and Mansker – Estacado – Bippus – Berda. Other soils units are scattered throughout the study area and typically associated with large depressional areas or basins.

2.6.2.2 Hydric Soils

The National Technical Committee for Hydric Soils defines hydric soils as soils that were formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation (NRCS 2016). Map units that are dominantly comprised of hydric soils might have small areas or inclusions of non-hydric soils in the higher positions on the landform, and map units dominantly made up of non-hydric soils might have inclusions of hydric soils in the lower positions on the landform (NRCS 2016).

According to the NRCS (2016) Web Soil Survey data for the study area, there are minor soil components in multiple soil associations designated as hydric soils located within the study area. Table 2-13 lists whether there are map unit components that are rated as hydric soils in the study area. Minor soils (Other) within each association were not evaluated for this criterion. None of the major soil units in each association were listed as hydric soils.

2.6.2.3 Prime Farmland Soils

The Secretary of Agriculture, within 7 U.S.C. § 4201(c)(1)(A), defines "prime farmlands" as lands that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. These areas have the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. Additional potential prime farmlands are those soils that meet most of the requirements of prime farmland but fail because they lack the installation of water management facilities, or they lack sufficient natural moisture. These soils would be considered prime farmland if such practices were installed. Review of the Soil Survey Geographic database listed prime farmland soils within the study area indicate the Masker, Estacado, Bippus, Olton, Acuff, Portales, Arch and Zita soil series as prime farmland soils (NRCS 2016).

This transmission line Project is not subject to the requirements of the NEPA or the Farmland Protection Policy Act because this Project will not be completed by and will not receive assistance from any Federal agency. The NRCS responded to POWER's solicitation for information in a letter dated September 29, 2014 that states "[t]he proposed project is exempt because transmission lines are not a conversion of Important Farmlands and the site can still be used after construction" (see Appendix A). The NRCS encourages the use of accepted erosion control methods during construction.

While the study area may contain prime and other important farmland soils the Project would be considered exempt from the Farmland Protection Policy Act.

2.6.3 Water Resources

Information on water resources within the study area was obtained from a variety of sources including USGS topographical maps, NHD, aerial photographs, and field reconnaissance.

2.6.3.1 Surface Water

The study area is located within the Brazos and Colorado River basins. Blackwater Draw and Yellow House Draw run through the north portion of the study area and flow into the North Fork Double Mountain Fork Brazos River near the City of Lubbock, Texas, approximately 5.5 miles east of the study area. Tributaries of the Colorado River within the study area include Sulfur Draw, Lost Draw, Sulfur Springs Draw, and McKenzie Draw. Additional surface waters identified within the study area include numerous playa lakes, small ponds, lakes, and unnamed streams/creeks. Named lakes within the study area include Rich Lake, Mound Lake, and Cedar Lake. These alkaline lakes and other smaller lakes may be important stop-over habitats for sandhill cranes and other waterfowl/wading birds during spring and winter migrations.

Review of the 2012 State Water Plan and the 2016 Region O Water Plan does not indicate any proposed new surface water developments within the study area (TWDB 2012, 2016c).

Under 31 TAC § 357.8, TPWD has designated Ecologically Significant Stream Segments (ESSS) based on habitat value, threatened and endangered species, species diversity, and aesthetic value criteria. Review of the TPWD database for Water Planning Region O (Llano Estacado) did not indicate any designated ESSS within the study area (TPWD 2016c).

In accordance with Section 303(d) and 304(a) of the Clean Water Act, the TCEQ identifies surface waters for which effluent limitations are not stringent enough to meet water quality standards and for which the associated pollutants are suitable for measurement by maximum daily load. Review of the TCEQ website and most recent TCEQ CWA § 303(d) lists (TCEQ 2014) did not indicate any surface waters within the study area that did not meet these water quality standards.

2.6.3.2 Ground Water

The study area is underlain by the Ogallala aquifer. The Ogallala is the largest aquifer in the U.S. and underlies much of the High Plains Region. It consists of sand, gravel, clay, and silt. In Texas, the salinity increases in areas south of the Canadian River. The aquifer provides significantly more water for users (irrigation) than any other major aquifer in the state. Well yields, from a depth of 200 feet, range from 500 to 1,000 gallons per minute (TWDB 2016c).

The TWDB database was reviewed for public and private water wells within the study area. The database identified numerous irrigation well locations throughout the study area. Water well locations were mapped utilizing GIS data layers. No major or historical springs were identified within the study area (TWDB 1975). Based on a review of topographical maps, there are three unnamed spring/seeps located approximately eight to nine miles east of the City of Brownfield, Texas near Lost Draw and one near Cedar Lake (TPWD 2016d).

2.6.3.3 Floodplains

The FEMA mapped floodplains (FEMA 2016) were reviewed and FEMA National Flood Hazard Layer (NFHL) data were only available for Lubbock and Hale counties within the study area. Within those counties, FEMA mapped 100-year floodplains occur within most playa lake depressions and Blackwater Draw and Yellow House Draw. In lieu of FEMA floodplain maps, it is reasonable to assume a floodplain area associated with the playa lakes and creeks/draws and their tributaries within the study area. The 100-year flood (1% flood or base flood) represents a flood event that has a one percent chance of being equaled or exceeded for any given year (FEMA 2016).

2.6.4 Ecological Resources

Data and information on ecological resources within the study area were obtained from a variety of sources, including aerial photograph interpretation, field reconnaissance surveys, correspondence with the USFWS, TPWD and published literature and technical reports.

2.6.4.1 Ecological Region

The study area is located within the High Plains Level III Ecoregion and the Llano Estacado and Shinnery Sands Level IV Ecoregions (Griffith et al. 2007). The High Plains Ecoregion consists of flat to rolling grassland plains with a high percentage of the area converted to cropland. Oil and gas production are also common in this area. Thousands of playa lakes are scattered within the High Plains area. These seasonal playa features are important habitats for a variety of wildlife and for aquifer recharge, although many of these playas have been converted into cropland.

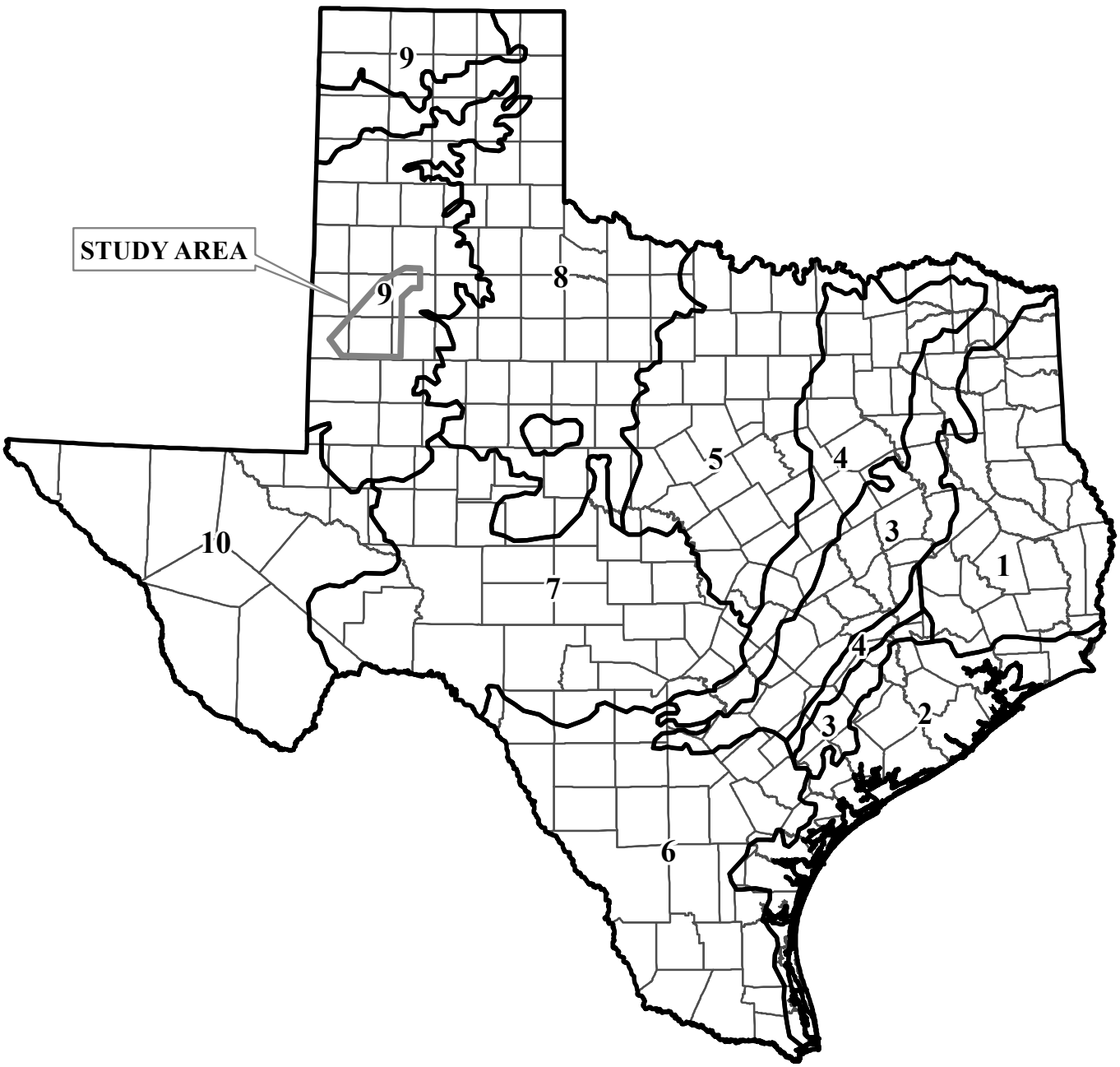
The Llano Estacado Ecoregion is characterized by a level, treeless plain. Historically this area was a vast shortgrass prairie, with abundant herds of bison (*Bos bison*) and prairie dog (*Cynomys ludovicianus*) colonies. Today, approximately 80 percent of the Llano Estacado is tilled for agriculture, growing cotton, corn, and wheat, using dry land farming practices or irrigation pumped from the Ogallala Aquifer (Griffith et al. 2007). The Shinnery Sands Ecoregion is characterized by sand dunes, flats, and hills on the western edge of the High Plains. The area is named for the shrubby shinnery oak (*Quercus havardii*) that grows in the sand soils. The sand dunes act as a major recharge source for the Pecos River in some areas. Land use within the Shinnery Sands Ecoregion is primarily for grazing livestock, wildlife habitat, and croplands.

2.6.4.2 Vegetation Types

The study area is located within the High Plains vegetation area (see Figure 2-5) as described by Gould et al. (1960). The original vegetation of the High Plains region is described by Hatch et al. (1990) as predominantly mixed prairie and shortgrass prairie with tallgrass prairie occurring on deep, sandy soils. Typical native vegetation occurring on clay and clay loam sites include blue grama (*Bouteloua gracilis*), buffalograss (*Bouteloua dactyloides*), and galleta (*Hillaria jamesii*), which are the principle plant species originally encountered in this region, prior to widespread agricultural development. Historically, sandy loam soils of the region supported little bluestem (*Schizachyrium scoparium*), western wheatgrass (*Elytrigia smithii*), sideoats grama (*Bouteloua curtipendula*), and sand dropseed (*Sporobolus cryptandrus*). While the High Plains area was characteristically treeless and brush free, today, sand sagebrush (*Artemisia filifolia*), honey mesquite (*Prosopis glandulosa*), pricklypear (*Opuntia* spp.), and *Yucca* spp. have invaded many sandy and sandy loam sites (Hatch et al. 1990). Currently, most of the High Plains is in irrigated cropland. Major crops produced in the High Plains include cotton, corn, sorghum, wheat, vegetables, and sugar beets. Many of the historical playa lakes have also been converted to agricultural croplands (Hatch et al. 1990).

Vegetation within the Llano Estacado Ecoregion consists of mixed gramas (*Bouteloua* spp.) in short-grass prairies and midgrasses that include sideoats grama, western wheatgrass, galleta, yellow indiangrass (*Sorghastrum nutans*), and tobosa (*Pleuraphis mutica*). Sandy soils may hold species such as sand bluestem (*Andropogon hallii*) and sand dropseed. Common forbs may include *Dalea* spp., scarlet globemallow (*Sphaeralcea coccinea*), sunflower (*Helianthus* spp.), and stiffstem flax (*Linum rigidum*). Honey mesquite, *yucca* spp., and juniper (*Juniperus* spp.) may be common invading woody species. Playa lake depressions may host a variety of short and mid-grasses, willow (*Salix* spp.), rushes (*Juncus* spp.), and aquatic plants (Fry et al. 1984; Griffith et al. 2007).

Common woody vegetation within the Shinnery Sands Ecoregion may include shinnery oak, fourwing saltbush (*Atriplex canescens*), sand sagebrush, and yucca. Grasses may include sand dropseed, sand bluestem, big sandreed (*Calamovilfa longifolia*), little bluestem, switchgrass (*Panicum virgatum*), sideoats grama, buffalograss, alkali sacaton (*Sporobolus airoides*), and black grama (*Bouteloua eriopoda*) (Fry et al. 1984; Griffith et al. 2007).



0 30 60 120 180 240

Miles

Source: Gould, F.W., Hoffman, G.O., and Rechenthin, C.A. 1960, modified

Legend

Vegetational Areas Boundary

1 Pineywoods
2 Gulf Prairies and Marshes
3 Post Oak Savannah
4 Blackland Prairies
5 Cross Timbers and Prairies
6 South Texas Plains
7 Edwards Plateau
8 Rolling Plains
9 High Plains
10 Trans-Pecos

County Boundary

TUCO - Yoakum
345-kV Project

Figure 2-5
Location of Study Area In Relation to the Vegetational Areas of Texas

POWER ENGINEERS

Date: 3/9/2016

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2.6.4.3 Wetlands

Mapped wetlands information was incorporated for the study area from the USFWS NWI mapper and the Playa Lakes Joint Venture (Playa Lakes Joint Venture 2011; USFWS 2016a). NWI maps are based on topography and interpretation of infrared satellite data and color aerial photographs and are classified under the Cowardin System (Cowardin et al. 1979). Mapped wetlands types identified within the study area include palustrine open water ponds with unconsolidated bottoms (PU), palustrine emergent (PEM), palustrine farmed (Pf), palustrine shrub/scrub (PSS), palustrine forested (PFO), lacustrine (L). The PU, PEM, Pf, and L wetlands are the dominant wetland types within the study area and are primarily associated with the playa lake depressions and stock ponds. The PSS/PFO wetlands are typically associated with playa lakes, draws or abandoned fields that have been invaded by shrubby species.

Emergent wetlands are typically located along the edges and shallows of playa lakes, ponds and streams or other depressional areas and are comprised of such species as cattails (*Typha* spp.), rushes (*Scirpus* spp.), sedges (*Carex* spp.), flatsedges (*Cyperus* spp.), millet (*Setaria* spp.), spikerushes (*Eleocharis* spp.), smartweeds (*Polygonum* spp.), cocklebur (*Xanthium* sp.), ragweed (*Ambrosia* spp.) and occasionally woody species such as cottonwood (*Populus deltoides*) and willows. Shrub/scrub wetlands are likely to be comprised of similar woody species as described for the riparian areas above (Chadde 2012a, 2012b).

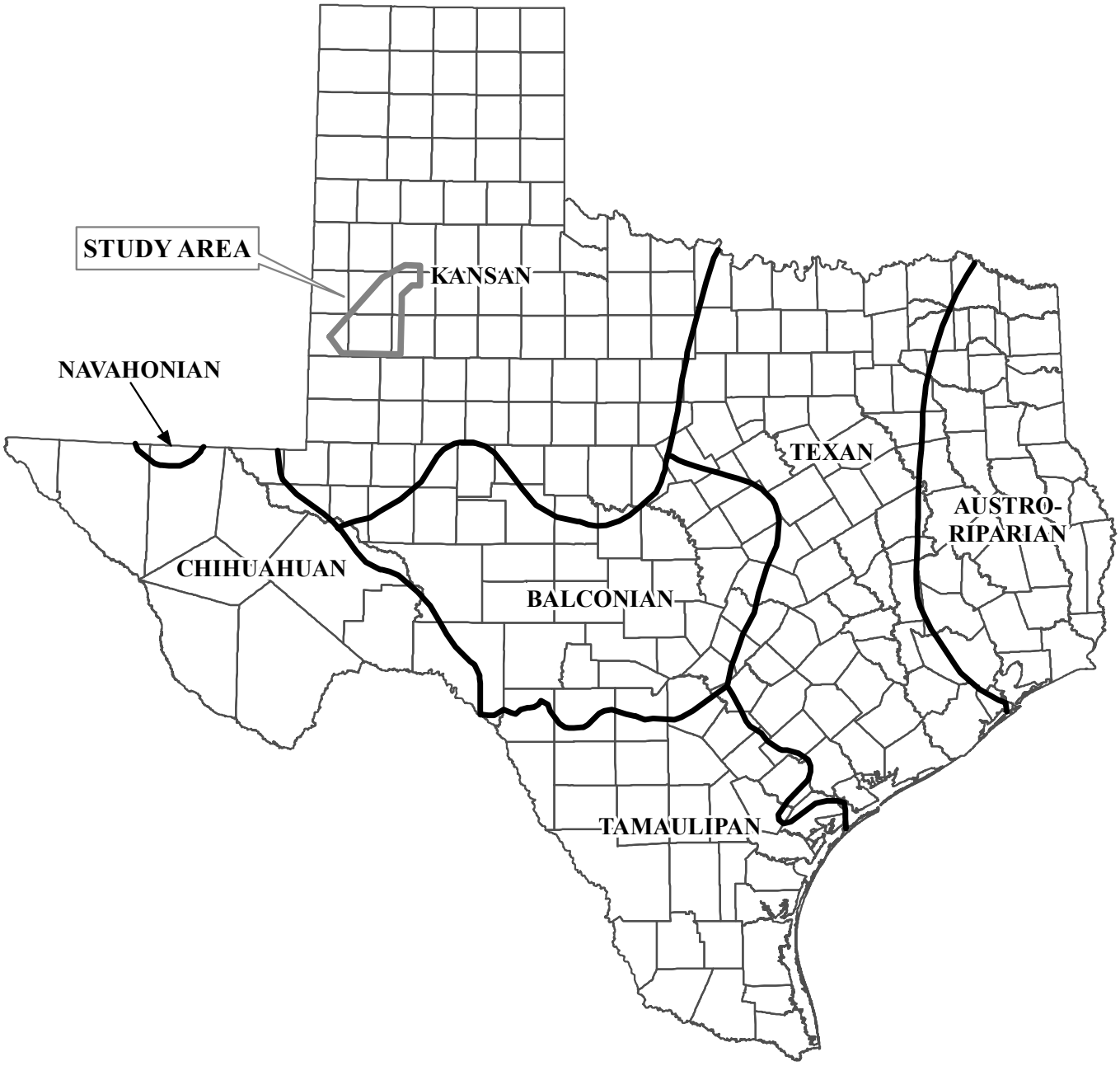
2.6.4.4 Wildlife and Fisheries

Wildlife

The study area is located within the Kansan Biotic Province (see Figure 2-6) as described by Blair (1950). The historical terrestrial wildlife community assemblage within this district was an interdependent web with dominant species including the bison, black-tailed prairie dog, black-footed ferret (*Mustela nigripes*), burrowing owl (*Athene cunicularia*), ferruginous hawk (*Buteo regalis*), coyote (*Canis latrans*), gray wolf (*Canis lupis*), swift fox (*Vulpes velox*), pronghorn antelope (*Antilocarpa americana*), deer (*Odocoileus* spp.), and mountain lion (*Puma concolor*) (Griffith et al. 2007). Many species are no longer common throughout the province due to overharvesting, eradication, loss or degradation of habitat due to conversion to croplands or grazing pastures, natural fire suppression, and barbed wire fences. Generalist species able to adapt to the conversion in habitat and land use conditions will be more commonly observed within the study area. Ephemeral playa lakes can be important seasonal habitats to various amphibians, mammals, and birds, especially migratory species such as waterfowl, wading birds, and shorebirds. According to Blair (1950), species diversity within the Kansan Biotic Province includes 14 frogs and toads, 31 snake species, 14 lizards, one land turtle, and 59 species of mammals.

Amphibians

Amphibian species (frogs, toads, salamanders, and newts) that might occur within the study area are listed in Table 2-14 (Tipton et al. 2012; Dixon 2013). Frogs and toads might occur in all vegetation types while salamanders and newts are typically restricted to moist or hydric habitats.



0 30 60 120 180 240

Miles

Source: Blair, 1950, modified

Legend

Biotic Province Boundary

County Boundary

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Figure 2-6
Location of Study Area In Relation to the Biotic Provinces of Texas

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Date: 3/9/2016

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TABLE 2-14 AMPHIBIAN SPECIES OF POTENTIAL OCCURRENCE WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Salamanders/Frogs/Toads	
Barred tiger salamander	*Ambystoma marortium*
Blanchard's cricket frog	*Acris blanchardi*
Bullfrog	*Lithobates catesbeiana*
Couch's spadefoot	*Scaphiopus couchi*
Great plains toad	*Anaxyrus cognatus*
Green toad	*Anaxyrus debilis*
Mexican spadefoot	*Spea multiplicata*
Plains leopard frog	*Lithobates blairi*
Plains spadefoot	*Spea bombifrons*
Red-spotted toad	*Anaxyrus punctatus*
Woodhouse's toad	*Anaxyrus woodhousii*
Spotted chorus frog	*Pseudacris clarkii*
Texas toad	*Anaxyrus speciosus*
Great Plains narrow-mouthed toad	*Gastrophryne olivacea*

Source: Tipton et al. 2012, Dixon 2013.

Reptiles

Reptiles (turtles, lizards, and snakes) that might occur in the study area are listed in Table 2-15 (Dixon 2013). These include those species that are more commonly observed near water (e.g., aquatic turtles) and those that are more common in terrestrial habitats.

TABLE 2-15 REPTILIAN SPECIES OF POTENTIAL OCCURRENCE WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Turtles	
Plains box turtle	*Terrapene ornata ornata*
Pond slider	*Trachemys scripta elegans*
Snapping turtle	*Chelydra serpentine*
Spiney softshell	*Apalone spinifera*
Yellow mud turtle	*Kinosternon flavescens*
Lizards	
Common side-blotched lizard	*Uta stansburiana*
Common spotted whiptail	*Aspidoscelis gularis*
Eastern collared lizard	*Crotaphytus collaris collaris*
Great plains skink	*Plestiodon obsoletus*
Great plains earless lizard	*Holbrookia maculata maculata*
Marbled whiptail	*Aspidoscelis marmoratus*
Northern many-lined skink	*Plestiodon multivirgatus multivirgatus*
Prairie racerunner	*Cnemidophorus sexlineatus viridis*
Prairie lizard	*Sceloporus consobrinus*
Round-tailed horned lizard	*Phryosoma modestum*
Texas greater earless lizard	*Cophosaurus texanus texanus*
Texas horned lizard	*Phryosoma cornutum*
Texas spiny lizard	*Sceloporus olivaceus*

TABLE 2-15 REPTILIAN SPECIES OF POTENTIAL OCCURRENCE WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Snakes	
Bullsnake	*Pituophis catenifer sayi*
Checkered gartersnake	*Thamnophis marcianus*
Chihuahuan nightsnake	*Hypsiglena jani*
Central plains milksnake	*Lampropeltis triangulum gentilis*
Desert kingsnake	*Lampropeltis splendida*
Eastern hog-nosed snake	*Heterodon platirhinos*
Eastern yellow-bellied racer	*Coluber constrictor flaviventris*
Flat-headed snake	*Tantilla gracilis*
Great plains ratsnake	*Pantherophis emoryi*
Kansas glossy snake	*Arizona elegans elegans*
Long-nosed snake	*Rhinocheilus lecontei*
Massasauga	*Sistrurus catenatus*
Plain-bellied watersnake	*Nerodia erthrogaster*
Plains black-headed snake	*Tantilla nigriceps*
Plains hog-nosed snake	*Heterodon nasicus*
Prairie rattlesnake	*Crotalus viridis*
Ring-necked snake	*Diadophis punctatus*
Texas threadsnake	*Rena dulcis*
Western coachwhip	*Coluber flagellum testaceus*
Western diamond-backed rattlesnake	*Crotalus atrox*
Variable groundsnake	*Sonora semiannulata semiannulata*

Sources: Dixon 2013.

Birds

Numerous avian species may be present within the study area. They include year-round residents as listed in Table 2-16. Additional bird species may migrate within or through the study area in the spring and fall and/or use the area for nesting (spring/summer) or to overwinter. Winter migrant species that may occur in the study area are listed in Table 2-17. Summer migrant species that may occur in the study area are listed in Table 2-18 (TPWD 2002; Lockwood and Freeman 2014). The likelihood for occurrence of each species will depend upon suitable habitat and the season. All migratory birds are protected under the MBTA.

TABLE 2-16 RESIDENT BIRDS OF POTENTIAL OCCURRENCE WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
American coot	*Fulica americana*
American kestrel	*Falco sparverius*
American robin	*Turdius migratorius*
Barn owl	*Tyto alba*
Belted kingfisher	*Megaceryle alcyon*
Bewick's wren	*Thryomanes bewickii*
Black-crowned night heron	*Nycticorax nycticorax*
Blue jay	*Cyanocitta cristata*
Brown-headed cowbird	*Molothrus ater*

TABLE 2-16 RESIDENT BIRDS OF POTENTIAL OCCURRENCE WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Burrowing owl	*Athene cunicularia*
Cactus wren	*Campylorhynchus brunneicapillus*
Canyon towhee	*Melozone fuscus*
Chihuahuan raven	*Corvus cryptoleucus*
Common grackle	*Quiscalus quiscula*
Curve-billed thrasher	*Toxostoma curvirostre*
Eastern meadowlark	*Sturnella magna*
Eastern screech owl	*Megascops asio*
Eurasian collared-dove	*Streptopelia decaocto*
European starling	*Sturnus vulgaris*
Great blue heron	*Ardea herodias*
Great horned owl	*Bubo virginianus*
Greater roadrunner	*Geococcyx californianus*
Great-tailed grackle	*Quiscalus mexicanus*
Harris hawk	*Parabuteo unicinctus*
Horned lark	*Eremophila alpestris*
House finch	*Haemorhous mexicanus*
House sparrow	*Passer domesticus*
Inca dove	*Columbina inca*
Killdeer	*Charadrius vociferus*
Ladder-backed woodpecker	*Picoides scalaris*
Loggerhead shrike	*Lanius ludovicianus*
Mallard	*Anas platyrhynchos*
Mourning dove	*Zenaida macroura*
Northern bobwhite	*Colinus virginianus*
Northern cardinal	*Cardinalis cardinalis*
Northern flicker	*Colaptes auratus*
Northern mockingbird	*Mimus polyglottos*
Pyrrhuloxia	*Cardinalis sinuatus*
Red-tailed hawk	*Buteo jamaicensis*
Red-winged blackbird	*Agelaius phoeniceus*
Ring-necked pheasant	*Phasianus colchicus*
Rock pigeon	*Columba livia*
Rock wren	*Salpinctes obsoletus*
Rufous-crowned sparrow	*Aimophila ruficeps*
Scaled quail	*Callipepla squamata*
Verdin	*Auriparus flaviceps*
Western meadowlark	*Sturnella neglecta*
White-winged dove	*Zenaida asistica*
Wild turkey	*Meleagris gallopavo*

Source: Lockwood and Freeman 2014.

TABLE 2-17 WINTER MIGRANT BIRDS OF POTENTIAL OCCURRENCE WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
American crow	*Corvus brachyrhynchos*
American goldfinch	*Spinus tristis*
American pipit	*Anthus rubescens*
American white pelican	*Pelecanus erythrorhynchos*
American wigeon	*Anas americana*
Bald eagle	*Haliaeetus leucocephalus*
Brewer's blackbird	*Euphagus cyanocephalus*
Brown creeper	*Certhia americana*
Bufflehead	*Bucephala albeola*
Cackling goose	*Branta hutchinsii*
Canada goose	*Branta canadensis*
Canvasback	*Aythya valisineria*
Cedar waxwing	*Bombycilla cedrorum*
Chestnut-collared longspur	*Calcarius ornatus*
Chipping sparrow	*Spizella passerina*
Cinnamon teal	*Anas cyanoptera*
Clark's grebe	*Aechmophorus clarkii*
Common goldeneye	*Bucephala clangula*
Common loon	*Gavia immer*
Common merganser	*Mergus merganser*
Common yellowthroat	*Geothlypis trichas*
Cooper's hawk	*Accipiter cooperii*
Dark-eyed junco	*Junco hyemalis*
Double-crested cormorant	*Phalacrocorax auritus*
Downy woodpecker	*Picoides pubescens*
Eared grebe	*Podiceps nigricollis*
Eastern bluebird	*Sialia sialis*
Ferruginous hawk	*Buteo regalis*
Field sparrow	*Spizella pusilla*
Gadwall	*Anas strepera*
Golden eagle	*Aquila chrysaetos*
Golden-crowned kinglet	*Regulus satrapa*
Greater scaup	*Aythya marila*
Greater white-fronted goose	*Anseralbifrons*
Green-tailed towhee	*Pipilo chlorurus*
Green-winged teal	*Anas crecca*
Hermit thrush	*Catharus guttatus*
Herring gull	*Larus argentatus*
Hooded merganser	*Lophodytes cucullatus*
House wren	*Troglodytes aedon*
Lapland larkspur	*Calcarius lapponicus*
Lark bunting	*Calamospiza melanocorys*
Least sandpiper	*Calidris minutilla*

TABLE 2-17 WINTER MIGRANT BIRDS OF POTENTIAL OCCURRENCE WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Lesser scaup	*Aythya affinis*
Lincoln's sparrow	*Melospiza lincolnii*
Long-eared owl	*Asio otus*
Marsh wren	*Cistothorus palustris*
McCown's longspur	*Rhynchophanes mccownii*
Merlin	*Falco columbarius*
Mountain bluebird	*Sialia currucoides*
Northern harrier	*Circus cyaneus*
Northern pintail	*Anas acuta*
Northern shoveler	*Pinas clypeata*
Orange-crowned warbler	*Oreothlypis celata*
Pied-billed grebe	*Podilymbus podiceps*
Prairie falcon	*Falco mexicanus*
Red-breasted nuthatch	*Sitta canadensis*
Red-naped sapsucker	*Sphyrapicus nuchalis*
Redhead	*Aythya americana*
Ring-billed gull	*Larus delawarensis*
Ring-necked duck	*Aythya collaris*
Ross Goose	*Chen rossii*
Rough-legged hawk	*Buteo lagopus*
Ruby-crowned kinglet	*Regulus calendula*
Ruddy duck	*Oxyura jamaicensis*
Sandhill crane	*Grus canadensis*
Savannah sparrow	*Passerculus sandwichensis*
Sharp-shinned hawk	*Accipiter striatus*
Short-eared owl	*Asio flammeus*
Snow goose	*Chen caerulescens*
Song sparrow	*Melospiza melodia*
Sora	*Porzana carolina*
Swamp sparrow	*Melospiza georgiana*
Townsend's solitaire	*Myadestes townsendi*
Vesper sparrow	*Pooecetes gramineus*
Virginia rail	*Rallus limicola*
Western grebe	*Aechmophorus occidentalis*
White-breasted nuthatch	*Sitta carolinensis*
White-crowned sparrow	*Zonotrichia leucophrys*
White-throated sparrow	*Zonotrichia albicollis*
Wilson's snipe	*Gallinago delicata*
Wood duck	*Aix sponsa*
Yellow-bellied sapsucker	*Sphyrapicus varius*
Yellow-rumped warbler	*Setophaga coronata*

Source: Lockwood and Freeman 2014.

TABLE 2-18 SUMMER MIGRANT BIRD OF POTENTIAL OCCURRENCE WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
American avocet	*Recurvirostra americana*
Ash-throated flycatcher	*Myiarchus cinerascens*
Barn swallow	*Hirundo rustica*
Black-chinned hummingbird	*Archilochus alexandri*
Black-necked stilt	*Himantopus mexicanus*
Blue grosbeak	*Passerina caerulea*
Blue-winged teal	*Anas discors*
Bronzed cowbird	*Molothrus aeneus*
Bullock's oriole	*Icterus bullockii*
Cassin's sparrow	*Peucaea cassinii*
Cattle egret	*Bubulcus ibis*
Cave swallow	*Petrochelidon fulva*
Chimney swift	*Chaetura pelagica*
Cliff swallow	*Petrochelidon pyrrhonota*
Common gallinule	*Gallinula galeata*
Common nighthawk	*Chordeiles minor*
Common poorwill	*Phalaenoptilus nuttallii*
Dickcissel	*Spiza americana*
Eastern phoebe	*Sayornis nigricans*
Grasshopper sparrow	*Ammodramus savannarum*
Great egret	*Ardea alba*
Green heron	*Butorides virescens*
Lark sparrow	*Chondestes grammacus*
Lesser goldfinch	*Spinus psaltria*
Mississippi kite	*Ictinia mississippiensis*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Orchard oriole	*Icterus spurius*
Painted bunting	*Passerina ciris*
Purple martin	*Progne subis*
Say's phoebe	*Sayornis saya*
Scissor-tailed flycatcher	*Tyrannus forficatus*
Snowy plover	*Charadrius nivosus*
Swainson's hawk	*Buteo swainoni*
Turkey vulture	*Cathartes aura*
Western kingbird	*Tyrannus verticalis*
Yellow-billed cuckoo	*Coccyzus americanus*
Yellow-crowned night-heron	*Nyctanassa violacea*

Source: Lockwood and Freeman 2014.

Mammals

Mammals that might occur in the study area are listed in Table 2-19 (Schmidly 2004). The occurrence of each species within the study area is dependent on availability of suitable habitat.

TABLE 2-19 MAMMALIAN SPECIES OF POTENTIAL OCCURRENCE WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
American badger	*Taxidea taxus*
American perimyotis	*Perimyotis hesperus*
Banner-tailed kangaroo rat	*Dipodomys spectabilis*
Big brown bat	*Eptesicus fuscus*
Big free-tailed bat	*Nyctinomops macrotis*
Black-tailed jackrabbit	*Lepus californicus*
Black-tailed prairie dog	*Cynomys ludovicianus*
Bobcat	*Lynx rufus*
Brazilian free-tailed bat	*Tadarida brasiliensis*
Cave myotis bat	*Myotis velifer*
Chihuahuan desert pocket mouse	*Chaetodipus eremicus*
Common gray fox	*Urocyon cinereoargenteus*
Coyote	*Canis latrans*
Desert cottontail rabbit	*Sylvilagus audubonii*
Desert shrew	*Notiosorex crawfordi*
Deer mouse	*Peromyscus maniculatus*
Eastern cottontail rabbit	*Sylvilagus floridanus*
Eastern fox squirrel	*Sciurus niger*
Eastern red bat	*Lasiurus borealis*
Eastern spotted skunk	*Spilogale putorius*
Eastern white-throated woodrat	*Neotoma leucodon*
Feral pig	*Sus scrofa*
Hispid cotton rat	*Sigmodon hispidus*
Hispid pocket mouse	*Chaetodipus hispidus*
Hog-nosed skunk	*Conepatus leuconotus*
Hoary bat	*Lasiurus cinereus*
House mouse	*Mus musculus*
Jones's pocket gopher	*Geomys knoxjonesi*
Least shrew	*Cryptotis parva*
Long-tailed weasel	*Mustela frenata*
Merriam’s kangaroo rat	*Dipodomys merriami*
Merriam’s pocket mouse	*Perognathus merriami*
Mexican ground squirrel	*Spermophilus mexicanus*
Mountain lion	*Puma concolor*
Mule deer	*Odocoileus hemionus*
Nine-banded armadillo	*Dasypus novemcinctus*
Northern grasshopper mouse	*Onychomys leucogaster*
Northern pygmy mouse	*Baiomys taylori*
Norway rat	*Rattus norvegicus*
Ord’s kangaroo rat	*Dipodomys ordii*
Palid bat	*Antrozous pallidus*
Plains harvest mouse	*Reithrodontomys montanus*
Plains pocket gopher	*Geomys bursarius*
Plains pocket mouse	*Perognathus flavescens*

TABLE 2-19 MAMMALIAN SPECIES OF POTENTIAL OCCURRENCE WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Porcupine	*Erethizon dorsatum*
Raccoon	*Procyon lotor*
Red fox	*Vulpes vulpes*
Ringtail	*Bassariscus astutus*
Roof rat	*Rattus rattus*
Silver-haired bat	*Lasionycteris noctivagans*
Southern plains woodrat	*Neotoma micropus*
Spotted ground squirrel	*Spermophilus spilosoma*
Striped skunk	*Mephitis mephitis*
Swift fox	*Vulpes velox*
Texas antelope squirrel	*Ammospermophilus interpres*
Texas mouse	*Peromyscus attwateri*
Thirteen-lined ground squirrel	*Spermophilus tridecemlineatus*
Townsend's big-eared bat	*Plecotus townsendii*
Virginia opossum	*Didelphis virginiana*
Western harvest mouse	*Reithrodontomys megalotis*
Western spotted skunk	*Spilogale gracilis*
White-footed mouse	*Peromyscus leucopus*
White-tailed deer	*Odocoileus virginianus*
Yellow-faced pocket gopher	*Cratogeomys castanops*

Source: Schmidly 2004.

Aquatic Communities

Open water aquatic habitats within the study area are primarily associated with the ephemeral playa lakes, alkaline ponds and lakes, and larger creeks/draws and their tributaries. Emergent vegetation within the open water aquatic habitats is typically limited to the shallow areas along the shorelines with hydrophytic tree/shrub species growing near constant level water sources. Creeks and draws within the study area are anticipated to flow intermittently due to the high water use for irrigation and the lowered groundwater table (reduced springflows). The divisions of the biotic provinces were separated on the basis of terrestrial vertebrate distributions; however, the distribution of freshwater fishes generally corresponds with the terrestrial province boundaries (Hubbs 2008).

Aquatic species supported by the ephemeral water regime are typically adapted to rapid dispersal and life cycle completion within pool habitats typically having fine-grained substrates. The intermittent flowing streams and seasonally and smaller ponds likely support aquatic species primarily adapted to ephemeral pool habitats. Because water is present seasonally, the aquatic species assemblage consists primarily of invertebrate species. Intermittent flowing surface waters may support populations of mosquitofish (*Gambusia affinis*), minnows (*Cyprinids*), killifish (*Fundulus* spp.) and sunfishes (*Lepomis* spp.) (Thomas et al. 2007).

2.6.4.5 Threatened and Endangered Species

For this routing study, emphasis was placed on obtaining documented occurrences of special status species and/or their designated critical habitat within the study area. The documented occurrences of species of concern and/or other unique vegetative communities within the study area were also

reviewed. The USFWS and TPWD maintain listings by county for all special status species pursuant to federal and state law (USFWS 2016b; TPWD 2016e). Special status species include those listed by the USFWS as threatened, endangered, or candidate; and those species listed by TPWD as threatened or endangered. Species of concern include those listed as rare by TPWD (TXNDD 2014). A GIS data layer of historical known occurrences for listed species and/or sensitive vegetative communities was obtained from the TXNDD (2014). For the purpose of this study, the TXNDD information is not used as a substitute for a presence/absence survey, but as an indication of previous occurrences within suitable habitat for the species.

The USFWS regulates activities affecting plants and animals designated as endangered or threatened under the ESA (16 U.S.C. § 1531 et seq.). By definition, an endangered species is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as likely to become endangered within the near foreseeable future throughout all or a significant portion of its range. Candidate species are those that have sufficient information on their biological vulnerability and threat(s) to support listing as threatened or endangered and might be proposed for listing in the near foreseeable future. The ESA also provides for the conservation of "designated critical habitat," which is defined by the USFWS as the areas of land, water, and air space that an endangered species needs for survival. These areas include sites with food and water, breeding areas, cover or shelter sites, and sufficient habitat to provide for normal population growth and behavior for the species. USFWS data regarding designated critical habitat areas were reviewed no areas were identified (USFWS 2016c). Species not designated as federally threatened or endangered are not afforded any regulatory protection under the ESA; however, additional federal and state laws may provide additional regulatory protection.

The TPWD also regulates plants and animals designated as endangered or threatened (Chapters 67 and 68 of the TPWC and 31 TAC §§ 65.171 - 65.176; and Chapter 88 of the TPWC and 31 TAC §§ 69.01 - 69.9). Under Texas law, endangered animal species are those deemed to be "threatened with statewide extinction" and endangered plant species are those "in danger of extinction throughout all or a significant portion of its range." Threatened animal and plant species are those deemed to be likely to become endangered within the foreseeable future.

Plants

No federal or state listed threatened or endangered plant species were listed for the study area counties (TPWD 2016f; USFWS 2016b).

Animals

Threatened and endangered animal species lists were reviewed from the USFWS and TPWD. The study area counties and are summarized in Table 2-20 (TPWD 2016e; USFWS 2016b). Species not designated as federally threatened or endangered are not afforded any regulatory protection under the ESA; however, additional federal and state laws may provide additional regulatory protection.

TABLE 2-20 LISTED THREATENED AND ENDANGERED SPECIES WITHIN THE STUDY AREA

LISTED SPECIES		COUNTY						LEGAL STATUS	
Common Name	Scientific Name	Hale	Hockley	Lubbock	Lynn	Terry	Yoakum	USFWS[1]	TPWD[1]
Birds									
Bald eagle	*Haliaeetus leucocephalus*	X	X	X	X	X	X	DL	T
Interior least tern	*Sterna antillarum athalassos*							E*	E
Lesser prairie-chicken	*Tympanuchus pallidicinctus*		X[2]			X[2]	X[2]	T[2]	
Peregrine falcon *(2 sub-sp.)*	*Falco peregrinus*	X	X	X	X	X	X	DL	T
Whooping crane	*Grus americana*	X	X	X	X	X	X	E	E
Fishes									
Sharpnose shiner	*Notropis oxyrhynchus*							E	
Smalleye shiner	*Notropis buccula*							E	
Reptiles									
Texas horned lizard	*Phrynosoma cornutum*	X	X	X	X	X	X		T
Mammals									
Black-footed ferret	*Mustela nigripes*	X	X	X	X	X	X	E, EXT	EXT
Gray wolf	*Canis lupis*	X	X	X	X	X	X	E, EXT	E, EXT
Palo Duro mouse	*Peromyscus truei comanche*				X				T

[1] Legal Status abbreviation: E - Endangered, E* - Wind Energy Projects Only, T - Threatened, DL - Delisted, C - Candidate, NL – Not Listed, EXT - Extirpated.
[2] The lesser prairie-chicken has recently been removed from ESA protection. However, based on the IPAC, it is still listed as threatened by USFWS.
Sources: USFWS 2016b; TPWD 2016e.

Lesser Prairie-Chicken

The final listing rule to list the LPC (*Tympanuchus pallidicinctus*) as federally threatened was delivered in March 27, 2013; however on September 2, 2015, a U.S. District Court in West Texas vacated the listing of the LPC. The TPWD status for the species remains as a game bird with an indefinitely suspended harvest and hunting season.

In an effort to preclude federal listing, the LPC Interstate Working Group drafted a LPC Range-Wide Conservation Plan (RWP) in 2013 as a voluntary measure implemented by the WAFWA and the Foundation for Western Fish and Wildlife (Van Pelt et al. 2013). Participants in the program are required to register and pay annual fees that would count towards any mitigation costs associated with enrolled facilities. Planning and mitigation costs are determined by utilizing a Southern Great Plains Crucial Habitat Assessment Tool (CHAT) (Southern Great Plains CHAT 2015). The RWP includes public and private property that currently provides or could potentially provide suitable LPC habitat within the current estimated occupied range (EOR) and within 10 miles of the EOR delineated boundary (Van Pelt et al. 2013).

Based on the CHAT model, the Project area is only within the CHAT categories 3 and 4 modeled habitats (Southern Great Plains CHAT 2015). CHAT categories 1 and 2 are considered focal areas and connectivity zones for LPC habitat. CHAT category 3 is considered modeled habitat. CHAT category 4 is considered modeled non-habitat and is comprised of the EOR for the LPC plus 10 miles.

SPS is a participant of the WAFWA program and is required to evaluate potential project impacts of enrolled facilities and pay mitigation costs for associated potential impacts to LPC habitat. Despite the recent vacated status SPS's participation in this program provides cost certainty for enrolled facilities concerning RWP compliance and removes the delays to the construction schedule if the species is listed in the future. Even though the Final Rule listing the LPC as a threatened species has been vacated, SPS remains a participant in its WAFWA Conservation Agreement and all appropriate conservation measures will continue to be implemented for enrolled facilities.

Federal Listed Species

Interior least tern

The interior least tern (*Sterna antillarum)* is a migratory subspecies of least tern that nests inland along sand and gravel bars within braided inland streams and rivers. It is also known to nest on man-made structures (inland beaches, wastewater treatment plants, gravel quarries, etc.). The bird preys on small fish and crustaceans, and forages within a few hundred feet of nesting colony. It breeds in isolated areas along the Red, Missouri, Arkansas, Mississippi, Ohio, and Rio Grande rivers. This species is not anticipated within the study area due to the lack of suitable habitat, but may occur as a rare non-breeding migrant (USFWS 1994).

Whooping crane

The study area is located outside of the primary central migratory corridor for the whooping crane (*Grus americana*). The primary migration path includes a 220-mile wide corridor that begins at their nesting site at Wood Buffalo National Park in Canada and continues south to their wintering grounds at the Aransas National Wildlife Refuge (ANWR) along the Texas coast. They begin their southern migration in September and arrive at their Texas wintering grounds at or near the ANWR between October and December. The migratory pathway contains 95 percent of all confirmed whooping crane stopover sightings, during migration, through spring of 2007 (USFWS 2009). The whooping crane is the tallest bird in North America and uses a variety of habitat types along their migration, from croplands to large wetlands, to feed and roost. Cranes typically feed on insects, frogs, fish, rodents, small birds, berries, fruits, crabs, or clams. During migration, they typically fly at altitudes greater than 1,000 feet but will roost and feed in areas away from human disturbance during nightly stopovers. Stopover areas include large rivers, lakes and associated wetlands, playa lakes, pastureland, and cropland (USFWS 2009). The whooping crane is not anticipated to occur within the study area, except as a rare non-breeding migrant during the spring and fall where suitable stopover habitat is available (TPWD 2002).

Federal Extirpated Species

Gray Wolf

The gray wolf (*Canis lupis*) was formerly known throughout the western two-thirds of the state inhabiting forests, brushlands, and grasslands. The gray wolf preys on large herbivores such as deer and pronghorn antelope, but will also feed on rabbits, ground squirrels, and mice (Schmidly 2004). However, the species is now considered extirpated from the state of Texas and occurrence of a gray wolf within the study area is not anticipated.

Black-footed Ferret

The federally-listed endangered black-footed ferret (*Mustela nigripes*) is associated primarily with prairie dog towns and historically ranged in Texas throughout the northwestern portion of the state including the Panhandle, much of the Trans-Pecos, and a considerable part of the Rolling Plains.

However, the black footed ferret is now considered extirpated from Texas with the last records from Dallam County in 1953 and Bailey County in 1963 (Schmidly 2004). Therefore, the occurrence of the black-footed ferret within the study area is not anticipated.

Federal Delisted Species

Bald Eagle

The (*Haliaeetus leucocephalus*) was delisted in 2007 by the USFWS because the population had recovered beyond the ESA criteria for listing. The status of the bald eagle population currently is monitored by USFWS and the species is still afforded federal protection under the BGEPA and MBTA. Bald eagles may nest and/or winter in Texas. The bald eagle is found primarily near rivers and large lakes and will build large nests in tree tops or on cliffs usually near large bodies of water. The bald eagle primarily preys on fish, but will also eat birds, small mammals, and turtles and will often scavenge or steal carrion. The study area is located outside of the known bald eagle nesting and wintering range in Texas (Campbell 2003). Bald eagles are not expected to occur within the study area, except as an uncommon migrant (TPWD 2002).

Peregrine Falcon

The peregrine falcon (*Falco peregrinus*) state listing includes two subspecies: American peregrine falcon (*F.p.anatum*) and Arctic peregrine falcon (*F.p.tundrius*). Although only the American subspecies is listed as state threatened, both sub-species are listed together due to their similarity of appearance (TPWD 2016e). Both subspecies have been delisted from federal listings due to the recovery of population numbers. The American peregrine falcon inhabits nests in tall cliff eyries and occupies many kinds of habitats during migration, including urban. Stopover habitat during migration may include lake shores and coastlines and the falcon is also a resident breeder in west Texas (TPWD 2016e). Diet primarily consists of other birds such as ducks, shorebirds and seabirds (Alsop 2002). This species is not anticipated to occur in the study area, except as an uncommon migrant (TPWD 2002).

State Listed Species

Palo Duro Mouse

The Palo Duro mouse (*Peromyscus truei comanche*) is associated with the steep slopes of the eastern edge of the caprock escarpment where the Llano Estacado drops off into the Rolling Plains. The mouse utilizes rocky juniper-mesquite covered slopes and juniper woodlands within the canyons. The Palo Duro mouse is restricted to Palo Duro Canyon and adjacent canyons in Armstrong, Briscoe, and Randall Counties (Schmidly 2004). This species is not anticipated to occur within the study area, due to a lack of suitable habitat.

Texas Horned Lizard

The Texas horned lizard (*Phrynosoma cornutum*) population has recently decreased due to collection, land use conversions, habitat loss and affects from increased fire ant populations. The Texas horned lizard inhabits a variety of habitats including open desert, grasslands and shrubland in arid and semiarid habitats that contain bunch grasses, cacti and yucca on soils varying from pure sands and sandy loams to coarse gravels, conglomerates and desert pavements. Their primary prey item is the harvester ant (*Pogonomyrmex* spp.), but they may also consume grasshoppers, beetles and grubs. The Texas horned lizard thermo-regulates by basking or burrowing into the soil and is active (not hibernating) between early spring to late summer (Henke and Fair 1998). TXNDD (2014) data

indicates one horned lizard observation within Hockley County. This species may occur within the study area where suitable habitat exists.

State Listed Species of Concern

TPWD (2016e) lists species of concern that may receive protection under other federal and/or state laws, such as the MBTA, Chapters 64 - 67, and 78 under Title 5 of the TPWC, and Chapters 65 and 69 under Title 31 of the TAC. TPWD generally recommends consideration for these species when routing linear utility corridors. Species of concern are those within the state that are considered rare. TPWD promotes the conservation of these species and their habitats. TPWD lists seven bird species, seven mammals, one plant, and one reptile as species of concern as shown in Table 2-21.

TABLE 2-21 STATE-LISTED SPECIES OF CONCERN WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME	COUNTY					
		Hale	Hockley	Lubbock	Lynn	Terry	Yoakum
Birds							
Baird's sparrow	*Ammodramus bairdii*	X	X	X	X	X	X
Ferruginous hawk	*Buteo regalis*	X	X	X	X	X	X
Mountain plover	*Charadrius montanus*	X	X	X	X	X	X
Prairie falcon	*Falco mexicanus*	X	X	X	X	X	X
Snowy plover	*Charadrius alexandrinus*	X	X	X	X	X	X
Western burrowing owl	*Athene cunicularia hypugaea*	X	X	X	X	X	X
Western snowy plover	*Charadrius alexandrinus nivosus*	X	X	X	X	X	X
Mammals							
Big free-tailed bat	*Nyctinomops macrotis*	X	X	X	X	X	
Black-tailed prairie dog	*Cynomys ludovicianus*	X	X	X	X	X	X
Cave myotis bat	*Myotis velifer*			X	X		
Jones' pocket gopher	*Geomys knoxjonesi*		X		X	X	X
Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*	X	X	X	X	X	X
Plains spotted skunk	*Spilogale putorius interrupta*	X	X	X	X	X	X
Swift fox	*Vulpes velox*	X	X	X	X	X	X
Plants							
Mexican mud-plantain	*Heteranthera mexicana*		X	X			
Reptiles							
Dune sagebrush lizard	Sceloporus arenicolus						X

Source: TPWD 2016e.

Birds

Baird's Sparrow

Baird's sparrow (*Ammodramus bairdii*) is a migrant species and inhabits shortgrass prairie with scattered low bushes and matted vegetation. This species is generally migratory with about 60 percent of the breeding populations located in Canada. The non-breeding winter range may extend south to southwest Texas, Arizona, New Mexico, and Mexico. Habitat loss and degradation due to land conversion to agriculture, grazing, and drainage of wetlands have led to population declines in portions of its range. This species may occur within the study area as a rare non-breeding migrant (NatureServe 2012).

Ferruginous Hawk

The ferruginous hawk (*Buteo regalis*) inhabits open prairie, plains, and badlands nesting in tall trees or structures. They are frequently observed near active prairie dog towns and primarily feed on rodents and rabbits. Historically, this species nested frequently in the panhandle, but due to poaching and prairie dog eradication, their numbers have steeply declined. TXNDD (2014) data indicates two ferruginous hawk recorded occurrences within Lubbock County. This species may occur within the study area as a non-breeding winter migrant (Lockwood and Freeman 2014).

Mountain Plover

The mountain plover (*Charadrius montanus*), unlike many other plover species, is not typically found near water. Non-breeding habitat includes shrub steppe, shortgrass prairie, and bare ground landscapes, including plowed fields. This species nests on the ground in shallow depressions in high plains or shortgrass prairie habitats. The mountain plover is insectivorous and primarily forages on crickets, beetles and ants. On two separate occasions the mountain plover was ruled a proposed candidate under the ESA. But on both occasions the USFWS determined the species was not threatened or endangered throughout all and a significant portion of the species range. This species may occur within the study area as a potential migrant (Lockwood and Freeman 2014).

Prairie Falcon

The prairie falcon (*Falco mexicanus*) inhabits open plains, grasslands, deserts, and prairies, nesting on cliff faces. Wheat fields and other irrigated croplands also are used for foraging in winter. Winter roosts and nesting sites may be located far from foraging areas. These falcons generally prey on small mammals, birds and reptiles. The combination of many events and practices such as the eradication of prey species, pesticides, habitat loss, change in land use, and invasion of exotic species may have led to population declines in portions of its range. This species may occur within the study area as a non-breeding winter migrant (TPWD 2002; NatureServe 2012).

Snowy Plover

The snowy plover (*Charadrius alexandrinus*) and the western snowy plover subspecies (*C. a. nivosus*) both favor alkaline flats and lake or river shoreline habitats. They feed on small insects, crustaceans, and other small invertebrates while probing sand or mud substrates. The western snowy plover is listed as federally threatened if within 50 miles of the Pacific coast. Populations are typically scattered and have declined due to habitat loss/degradation, disturbance of nesting sites, and impacts by non-native predators. These species may occur within the study area as a transient or casual summer migrant along major waterways (Lockwood and Freeman 2014; NatureServe 2012).

Western Burrowing Owl
The western burrowing owl (*Athene cunicularia hypugaea*) inhabits open grasslands, such as prairie, plains, and savanna, and sometimes in open areas, including vacant lots near human habitation or airports. This species nests and roosts in abandoned mammal burrows. They frequently use prairie dog burrows, but have also been observed utilizing other species such as canid (*Canidae*), mustelid (*Musteloidea*), and armadillo (*Dasypus novemcinctus*) burrows. This species was listed as an ESA candidate species from 1994 to 1996. They are listed as endangered in Canada and threatened in Mexico and still considered to be a Bird of Conservation Concern by USFWS. They are opportunistic feeders and primarily forage on arthropods, small mammals, amphibians, and reptiles (USFWS 2003).

Reptiles

Dune Sagebrush Lizard
The dune sagebrush lizard (*Sceloporus arenicolus*) is found only in active and semi-stable shinnery oak dunes of southeastern New Mexico and adjacent Texas. This species may occur within the southwestern portion of the study area if suitable habitat exists (NMDGF 2014).

Mammals

Big Free-tailed Bat
The big free-tailed bat (*Nyctinomops macrotis*) is an opportunistic insectivore feeding primarily on moths, but may also feed on crickets, flying ants, beetles and true bugs. It roosts in rocky landscapes roosting in rock crevices on high cliff faces, but may also roost on buildings. These bats will mate in the spring and give birth to a single pup in June or July. Nursery colonies may range from 20 to 150 individuals. It is thought that records observed in the Panhandle are juveniles dispersing from colonies in the Trans-Pecos (Tuttle 2003; Schmidly 2004). This species may occur within the study area, if suitable habitat is present.

Black-tailed Prairie Dog
The black-tailed prairie dog lives in large colonies, creates numerous burrows and primarily feed on plant material. Females may give birth to single litter of four or five young, per year, in March through April (Schmidly 2004). Historically, they inhabited the short-grass prairies and plains across west Texas and the Panhandle. Today, with the eradication and fragmentation of prairie dog towns associated with the conversion of prairies to agriculture, population numbers for this species have decreased rapidly. It is estimated that 98 percent of the original Texas population has been eradicated. Populations have shown improvement in the past few years. After a USFWS review in 2004, black-tailed prairie dog was removed as a candidate species. Recently, USFWS announced after a 12-month finding that no ESA protection of the species was warranted because potential impacts do not threaten the long-term persistence of the species (USFWS 2011). TXNDD (2014) data identified several prairie dog colonies within the study area. This species may occur within the study area, where suitable habitat is present.

Cave Myotis Bat
The cave myotis bat (*Myotis velifer*) is an insectivorous, cave dwelling, colonial species that also roosts in rock crevices, old buildings, bridges, culverts, and bat houses, often near waterways in more arid regions. Roosts are often shared with Mexican free-tailed bat (*Tadarida brasiliensis*) nursery colonies and may range from a few dozen to 15,000 individuals. Mexican free-tailed bats may hibernate in the Edwards Plateau and Panhandle regions during the winter (Tuttle 2003). Although

locally common, the disruption of roost sites and pesticides has caused threats in portions of their range (Schmidly 2004). This species may occur within the study area, if suitable habitat is present.

Jones' Pocket Gopher

Jones' pocket gopher (*Geomys knoxjonesi*) inhabits the southwestern plains primarily utilizing deep sandy soils of Aeolian origins. Some hybridization of the species occurs where their range overlaps with the Plains pocket gopher (*Geomys bursarius*). The Jones' pocket gopher is sensitive to land use changes (TPWD 2016e). This species may occur within the study area, if suitable habitat is present.

Pale Townsend's Big-eared Bat

The Pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens*) is an opportunistic insectivore that roosts in caves, mines, and occasionally old buildings. The species hibernates in groups during the winter, and during breeding season maternal colonies are formed. Females may give birth to a single offspring in late May to June. This species may occur in suitable habitats, but historic blasting of caves and mine tunnels potentially destroyed large numbers of these bats (Schmidly 2004). This species may occur within the study area, if suitable habitat is present.

Plains Spotted Skunk

The plains spotted skunk (*Spilogale putorius interrupta*) is one of three recognized sub-species of the eastern spotted skunk (*S. putorius*). The plains spotted skunk is a small slender skunk that lives in a variety of habitats but requires extensive vegetative cover. Habitats include, but are not limited to, wooded or brushy areas and tallgrass prairie, croplands, fence rows, farmyards, and forest edges. This skunk is omnivorous and primarily feeds on arthropods rabbits, voles, and rats (Schmidly 2004). TXNDD (2014) data indicates one plains spotted skunk recorded occurrence within Lubbock County from 1963. This species may occur within the study area, if suitable habitat is present.

Swift Fox

The swift fox lives in dens on sparsely vegetated short-grass prairies, open desert, grasslands, and pastureland. Mating pairs are formed in the fall and litters of three to six young are born in March through April. They are largely nocturnal and prey on rabbits, rodents, small birds and insects. The swift fox is susceptible to trapping and historic efforts to eradicate other carnivore species have greatly reduced their numbers (Schmidly 2004). In 1995, the USFWS determined the swift fox was a candidate to be listed as threatened, but was not listed due to higher priority species. Due to conservation and management efforts, in 2001 USFWS decided not to list the fox and to remove it from candidate status. TXNDD (2014) data indicates one swift fox recorded occurrence in Hockley County from 1964. This species may occur within the study area, if suitable habitat is present.

Plants

Mexican Mud-Plantain

Mexican mud-plantain (*Heteranthera mexicana*) is an annual forb that produces mauve flowers from June to December. Habitat is characterized as wet clayey soils of resacas and ephemeral wetlands (Poole et al. 2007). TXNDD (2014) data indicated one observation of the Mexican mud-plantain within Hockley and Terry counties. This species may occur within the study area, if suitable habitat is present.

Sensitive Plant Communities

Other information typically included in TXNDD report data, but not on county lists, includes natural plant communities. Review of the TXNDD (2014) data did not indicate any sensitive plant communities within the study area. The TXNDD data does not indicate the presence or absence of a species or suitable habitat within an area, but merely provides documentation of historical occurrences. No other rare natural plant communities were identified within the study area.

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3.0 ALTERNATIVE ROUTE DEVELOPMENT

The objective of this EA was to develop and evaluate an adequate number of geographically diverse alternative routes that comply with the routing criteria in PURA § 37.056(c)(4)(A)-(D) and 16 TAC § 25.101(b)(3)(B), including the PUC's policy of prudent avoidance. This section describes the alternative route development process, which began with mapping constraints and developing 191 preliminary alternative links. Considering input received from the public open-house meeting and from various governmental agencies, the preliminary alternative links were modified resulting in the development of 184 primary alternative links. Ultimately, all of the 184 primary alternative links were used to develop 22 alternative routes. Each phase of this alternative route development process is described in detail below.

3.1 CONSTRAINTS MAPPING

In an effort to minimize potential impacts to sensitive environmental and land use features, the alternative route development process began with a constraints mapping process wherein POWER initially identified and mapped the geographic locations of environmentally sensitive and other restrictive areas within the study area. This mapping process resulted in an environmental and land use "composite constraints map" for the study area.

POWER considered the following in development of the composite constraints map:

- **Resource Value**: A measure of rarity, intrinsic worth, singularity, or diversity of a resource within a particular area.
- **Protective Status**: A measure of the formal concern as expressed by legal protection or special status designation.
- **Present and Known Future Uses**: A measure of the level of potential conflict with land management and land use policies.
- **Hazards**: A measure of the degree to which construction and operation of the transmission line could be affected by a known resource hazard.

Through the constraints mapping process, POWER identified both constraint areas and areas of potential routing possibilities, and used the composite constraints map to develop and refine possible preliminary alternative links. To the extent feasible and practicable, POWER avoided identified constraints to minimize potential impacts or conflicts.

In accordance with PURA § 37.056(c) and 16 TAC § 25.101(b)(3)(B)(i)-(iii), POWER also considered opportunities to parallel or utilize existing compatible linear land uses, and identified and utilized numerous such opportunities. Locating a transmission line adjacent to linear land uses typically minimizes environmental impacts due to existing adjacent disturbances, improved access, and decreased habitat fragmentation. Examples of linear land uses identified within the study area include roadways (though habitable structures are frequently located near these features), railways, apparent property boundaries and existing electrical transmission lines. Distribution lines within the study area were reviewed on the aerial photography. SPS does not consider distribution lines a routing opportunity due to engineering constraints.

3.2 ALTERNATIVE ROUTE IDENTIFICATION

3.2.1 Preliminary Alternative Links

The POWER planning team—comprised of technical experts within the resource fields of land use, aesthetics, ecology, and cultural resources—used the composite constraints map, in conjunction with existing aerial photography, to identify preliminary alternative links to connect the Project's endpoints. To the extent practicable, the POWER planning team sought to maximize the use of opportunity areas while avoiding areas with environmental constraints or conflicting land uses. Information that was used to identify the preliminary alternative links included the following:

- Input received from correspondence with local officials, regulatory agencies, and others.
- Results of reconnaissance surveys in portions of the study area.
- Aerial photography.
- Findings of various data collection activities.
- Environmental and land use constraints data.
- Apparent property boundaries.
- Existing compatible linear land use opportunities.
- Location of existing development.

To comply with PURA § 37.056(c)(4)(A)-(D) and 16 TAC § 25.101, POWER identified an adequate number of environmentally acceptable and geographically diverse preliminary alternative links while also considering factors such as community values, parks and recreation areas, historical and aesthetic values, environmental integrity, route length parallel to existing compatible corridors or parallel to apparent property boundaries, and the PUC's policy of prudent avoidance. The proposed links also were reviewed by SPS and POWER from an engineering and constructability standpoint.

SPS and POWER identified 191 preliminary alternative links. These preliminary alternative links were presented at public open-house meetings as further discussed below (refer to Figure 3-1 in Appendix C and the open-house handout map in Appendix B).

3.2.2 Public Open-house Meetings

SPS hosted four public open-house meetings within the affected communities to solicit comments from landowners, public officials, and other interested residents and persons regarding the preliminary alternative links for three separate projects (the TUCO-Yoakum Project in Texas, the Yoakum-State Line Project in Texas (Docket Number 44726) and the State Line-Hobbs Project in New Mexico). The meetings were conducted within a two-week timeframe. The combined open-house meetings allowed the community to see the full scope of the transmission work being done and provided four separate opportunities and locations for participation.

TABLE 3-1 OPEN-HOUSE MEETING SCHEDULE

TUESDAY JANUARY 6, 2015	THURSDAY JANUARY 8, 2015	TUESDAY JANUARY 13, 2015	THURSDAY JANUARY 15, 2015
6:30 – 8:30 p.m. CST	5:30 – 7:30 p.m. CST	5:30 – 7:30 p.m. CST	5:30 – 7:30 p.m. CST
Hobbs Event Center 5101 N. Lovington Hwy Hobbs, NM 88240	Denver City High School Auditorium 601 Mustang Drive Denver City, TX 79323	Brownfield Middle School Auditorium 1001 E. Broadway St. Brownfield, TX 79316	Legacy Event Center 1500 14th Street Lubbock, TX 79401

Landowners within 500 feet of each of the preliminary alternative links' centerlines as identified by CLS from the County Appraisal Districts' tax rolls were invited to attend. SPS also invited local and other elected officials to the open-house meetings. The purpose of the meetings was to:

- Promote a better understanding of the Project, including the purpose, need, potential benefits and impacts, and the PUC's CCN application submittal and approval process;
- Inform and educate the public about the routing process, schedule, and decision-making process; and
- Ensure that the decision-making process adequately identifies and considers the values and concerns of the public and community leaders.

A public open-house meeting notice was submitted to 3,059 landowners who own property within 500 feet of the preliminary alternative link centerlines for any of the three separate projects. This notice included maps that depicted all three Project study areas and the preliminary alternative links for each of the three projects, a questionnaire, a copy of the landowner bill of rights, a copy of Landowners and Transmission Line Cases at the PUC, and a survey permission form. An example of the notice letter and a copy of the attachments are provided in Appendix B.

Each public meeting was held in an open-house format. Several information stations were set up around the meeting room. Each station was devoted to a particular aspect of the routing study and was manned by representatives of SPS, CLS, and/or POWER. Large displays of maps, illustrations, photographs, and/or text explaining each particular topic were presented at the stations.

Interested citizens and property owners were encouraged to visit each station in a particular order so the entire process and general Project development sequence could be explained clearly. The open-house or information station format is advantageous because it facilitates one-on-one discussions and encourages personalized landowner interactions. The open-house format also encourages more interaction from landowners.

When individuals arrived at each open-house meeting, they were asked to register on a sign-in sheet. After visiting the information stations, individuals were asked to complete the questionnaire; however, not all attendees responded nor answered every question.

According to the sign-in sheets, a total of 271 individuals attended the public open-house meetings. Sixty-two questionnaire responses were returned at the public open-house meetings and another 100 were submitted by mail or email. Table 3-2 shows the number of attendees and submitted questionnaire responses by open-house meeting location.

TABLE 3-2 OPEN-HOUSE MEETING ATTENDEE AND QUESTIONNAIRE SUMMARY

MEETING LOCATION	NUMBER OF OPEN HOUSE ATTENDEES	NUMBER OF QUESTIONNAIRES SUBMITTED
Hobbs, NM	14	2
Denver City, TX	26	5
Brownfield, TX	101	18
Lubbock, TX	130	37
N/A	N/A	100 (sent by email or mail)
TOTALS	271	162

Results from the questionnaires were reviewed and analyzed (not all respondents answered every question). Of the responses received, 90 of the respondents agreed that the need for the Project was adequately explained, while 17 respondents said it was not. Eighty-five of respondents were pleased with the open-house format of the meetings and 81 felt that the information provided was helpful to their understanding of the Project.

Respondents were asked to rank the 16 factors considered in a routing study, with **1** being the least important factor and **5** being the most important factor. Due to ties, the six criteria that were ranked by the respondents as being the most important are listed in descending order:

- Minimize length across cropland — Most Important: 82 responses
- Maximize distance from residences — Most Important: 81 responses
- Maximize length along property boundary lines — Most Important: 70 responses
- Maintain reliable electric service — Most Important: 63 responses
- Maximize length along existing transmission lines — Most Important: 50 responses
- Maximize length along highways or other roads — Most Important: 50 responses

When asked if there are other factors that should be considered, and if they had any comments regarding the listed factors, respondents provided the following:

- Selection of a route away from residential and commercial areas, homes, barns, croplands, pastures, vineyards, and high-value undeveloped property.
- Selection of a route that avoids interference with existing and future land uses or development.
- Selection of a route that avoids irrigation systems and wells.
- Selection of a route that does not bisect properties or reduce usable property.
- Selection of a route that avoids threatened or endangered species habitats.
- Selection of a route that avoids line of sight from residences.
- Selection of a route that avoids properties that are already impacted by transmission lines and other ROW projects.
- Concerns about economic impact on property values.
- Concerns about future wind power developments.
- Concerns about herbicide drift from transmission line maintenance.
- Concerns about health and safety.

Respondents also were asked if there are other features in the study area that are important and, if so, to please describe them and their locations, and to mark them on the maps attached to the questionnaire. Features marked on maps were taken into consideration. Written responses included:

- Existing or future residences, residential developments, barns, and other structures.
- Ranching or farming operations.
- Existing water, irrigation, and drainage systems.
- Existing utility lines/facilities, ROW, and roads.
- Land proposed for development.
- Yellow House Canyon Draw.

- Rare wildlife and other natural resources.
- Existing oil/gas wells and pipelines.
- Enrolled Conservation Reserve Program fields.
- Wetlands and playa lakes.
- City limits.
- Historical markers.

When asked which of four situations applied to them, respondents that answered this question provided the following (due to multiple responses on some questionnaires, totals do not equal 100 %.):

- 40 % (24 responses) indicated that a potential link is near their home.
- 19 % (49 responses) indicated that a potential link is near their business.
- 73 % (91 responses) indicated that a potential link crosses their land.
- 16% (20 responses) answered "Other."

Respondents who answered "other" included those who responded that they have a proposed link near their property, home, wells, irrigation, vineyards, sewer/water lines, historical items, or future development.

The questionnaire also provided a space for respondents to include any additional remarks and comments. Comments and responses included:

- Request for updates on the progress of the route selection or site surveys.
- Request for annual payments if a pole is on their property.
- Request to avoid irrigation systems, croplands, and future developments.
- Inquiries about location of storage and material lay down sites.
- Preference for routes that do not cross owners' properties or obstruct view from home.
- Concerns about property appraisals and legal fees.
- Concerns about safety of the transmission line with respect to humans, crops, and livestock.
- Concerns about agricultural operations near structures.
- Concerns about transmission line maintenance activities and potential impacts to croplands.

3.2.3 Correspondence with Agencies/Officials

As described previously in Section 2.1.5, POWER contacted federal, state, and local regulatory agencies, elected officials, and organizations regarding the Project. As of the date of this document, written replies to the letters sent in relation to the study area were received from the following agencies or offices:

- **Federal**: NPS, NRCS, USACE, USFWS
- **State**: GLO, TARL, TPWD, TWDB, TXNDD, TxDOT, THC
- **Local and Other Organizations**: Permian Basin Regional Planning Commission, Texas Agricultural Land Trust

Copies of all correspondence with these agencies and offices are included in Appendix A. All agency comments, concerns, and information received were taken into consideration by SPS and POWER in the preparation of this EA. Additionally, the information received from the agencies will be taken into consideration by SPS prior to and during construction of the Project.

3.2.4 Modifications to Preliminary Alternative Links

Following the public open-house meetings, SPS, and POWER performed an analysis of the input, comments, and information received at the open house meetings, and from follow-up meetings and communication with landowners, interested public stake-holders, and governmental agencies and offices. SPS, POWER and Burns & McDonnell also performed an additional analysis of aerial photography. The purpose of this further analysis was to determine any issues warranting modification to the preliminary alternative links and identify potential new links not presented at the meeting. After the open house meetings, Burns & McDonnell engineers performed a review of the links based on the aerial photography in April 2015. Additional analysis was done by SPS, POWER and Burns & McDonnell in March 2016 through analyzing the routing maps and updated aerial photographic imagery. In April 2016, Burns & McDonnell performed field reconnaissance. Preliminary alternative links were modified or removed to improve paralleling opportunities, reduce the bisecting of properties, minimize the impacts to habitable structures and irrigation systems, reduce the number of angle structures required and optimize constructability. In addition, some of the modifications resulted in the removal of the preliminary links proposed in Lynn County.

Modifications to the 191 preliminary alternative links resulted in development of 184 primary alternative links (route links). The resulting primary alternative route links are presented on Figures 3-2, 3-3 and 5-1 (Appendix C). Landowners that were impacted by these modifications that were not originally invited to the public open-house meetings were sent a letter with a map notifying them of the Project and inviting them to contact SPS to discuss the Project over the phone or at a meeting. A copy of the letter and map are included in Appendix B.

3.2.5 Primary Alternative Routes

POWER and SPS identified primary alternative routes and used each of the 184 primary alternative links in at least one route. Ultimately, 22 primary alternative routes were selected that form an adequate number of reasonably differentiated primary alternative routes that reflect all of the previously discussed routing considerations. These 22 primary alternative routes were then specifically studied and evaluated by POWER staff. The 184 primary alternative links produce numerous forward progressing route combinations.

The primary alternative routes, their link compositions, and approximate lengths are presented in Table 3-3 and are depicted in Figure 3-2, Figure 3-3 and Figure 5-1 in Appendix C. Aerial accuracy based on the 2014 NAIP imagery used for Figures 3-3 and 5-1 is approximately ±20 feet. Potential impacts for each of the evaluation criteria (refer to Table 2-1) were tabulated for each of the primary alternative routes (refer to Section 4.0 and Table 4-1).

TABLE 3-3 LINK COMPOSITION AND APPROXIMATE LENGTH OF THE PRIMARY ALTERNATIVE ROUTES

ALTERNATIVE ROUTE	LINK COMPOSITION	LENGTH (MILES)
A	1-2-6-7-14-15-19-30-52-54-56-65-77-105-126-146-159-160-161-162-163-164-165-172-180A-180B-186-190-191-192-193	110.4
B	1-2-6-7-10-11-17-20-24-26-31-37-35-46-57-65-77-106-107-110-116-126-131-147-160-168-169-175A-175B-181-184-189-193	108.7
C	1-3-5-7-10-16-19-30-42-53-54-56-65-78-79-88-91-108-109-110-116-126-131-147-160-168-176-195-180B-186-187-189-193	110.6
D	1-3-5-7-10-16-19-28-29-31-37-35-46-58A-58B-66-67-70-79-90-93-112A-185-113B-113C-119-120-121-123-127-129-130B-133-149-153-155-162-170-178-180A-180B-186-187-189-193	103.4
E	1-3-5-7-10-11-12-18-21-25-26-31-34-44-55-56-65-78-79-90-92-108-109-110-116-126-146-167-175A-174-184-189-193	108.4
F	1-3-5-7-10-16-19-28-29-31-37-38-40-58B-66-67-70-79-90-93-112A-112B-194-113C-119-120-122-124-127-128-146-167-175A-174-184-189-193	106.2
G	1-3-5-7-10-11-17-23-25-26-31-37-38-40-58B-66-68-69-70-79-90-93-112A-112B-194-113C-119-120-122-125-130A-130B-132-147-160-168-169-175A-174-184-189-193	106.3
H	1-3-5-7-10-11-17-23-25-26-31-37-38-40-58B-66-67-70-79-90-93-112A-185-113B-113C-119-120-122-124-127-129-130B-134-136-143-156-164-171-177-179-181-184-189-193	106.2
I	1-3-5-7-10-11-17-20-22-29-31-37-38-40-58B-66-68-71-81-83-93-112A-112B-112C-115-116-126-131-147-160-168-169-175A-174-184-189-193	107.8
J	1-2-6-7-10-11-17-20-22-29-31-37-38-40-58B-66-68-71-81-83-93-112A-112B-194-113C-114-118-123-127-129-130B-134-135-150-151-157-172-180A-180B-186-187-189-193	110.7
K	1-2-13-15-19-30-42-43-44-45-46-58A-58B-59-72-80-88-89-107-109-111-117-118-123-127-128-146-167-175A-174-184-189-193	110.3
L	1-3-5-7-10-16-19-28-29-31-34-44-45-46-58A-58B-59-60-73-75-84-97A-96-120-121-123-127-129-130B-133-149-153-155-162-170-177-179-181-184-189-193	99.2
M	1-2-6-7-10-11-17-23-25-26-31-37-38-40-58B-59-60-73-75-84-97A-96-120-122-124-127-129-130B-134-136-143-156-164-171-177-179-181-184-189-193	104.7
N	1-3-5-7-10-11-17-20-24-26-31-34-44-45-46-58A-58B-59-60-73-75-84-95-113A-113B-113C-119-120-122-125-130A-130B-132-147-160-168-169-175A-174-184-189-193	107.1
O	1-3-5-7-10-11-12-18-21-25-26-31-37-38-40-58B-59-60-73-75-82-83-93-94-113A-113B-113C-119-120-122-125-130A-130B-134-135-153-154-168-169-175A-175B-182-186-187-189-193	108.8
P	1-3-4-18-27-32-36-40-58B-59-60-73-75-84-97A-96-120-121-123-127-129-130B-133-149-153-155-162-170-178-180A-180B-186-187-189-193	101.0
Q	1-3-5-7-10-11-12-18-27-32-39-41-47-49-50-62-76-86-99-102-104-130A-130B-132-147-160-168-169-175A-174-184-189-193	107.2
R	1-3-4-18-27-33-41-47-49-50-61-73-75-84-97A-96-120-122-125-130A-130B-133-149-153-155-162-170-177-179-181-184-189-193	100.4
S	1-3-5-7-10-11-12-18-27-32-39-41-47-49-50-62-74-75-84-97A-97B-98-104-130A-130B-132-147-160-161-162-163-164-165-172-180A-180B-186-187-189-193	110.5
T	1-3-5-7-10-11-12-18-27-32-39-41-47-49-50-62-76-86-87-98-104-130A-130B-134-136-143-156-164-171-177-179-181-184-189-193	106.9
U	1-3-4-18-27-32-39-41-47-49-50-62-76-86-99-103-142-143-156-164-171-177-179-182-186-187-189-193	110.5

TABLE 3-3 LINK COMPOSITION AND APPROXIMATE LENGTH OF THE PRIMARY ALTERNATIVE ROUTES

ALTERNATIVE ROUTE	LINK COMPOSITION	LENGTH (MILES)
V	1-3-4-18-27-32-39-41-47-49-50-62-76-86-99-103-137-140-144-157-172-180A-180B-186-190-191-192-193	110.4

4.0 POTENTIAL IMPACTS OF THE PRIMARY ALTERNATIVE ROUTES

This section discusses potential impacts of the Project's construction and operation. POWER evaluated the potential impacts of each of the primary alternative routes identified in Section 3.0 by tabulating the data for the evaluation criteria in Table 2-1 (relating to community values, parks and recreation areas, cultural resources, aesthetics, and environmental integrity). The results of the tabulation are presented in Table 4-1. Additionally, through the identification of key evaluation criteria and a consensus process, POWER recommended to SPS the alternative route that minimizes the potential impacts to land use, community values, cultural resources and environmental integrity, and thus best balances the PURA and PUC routing criteria related to land use, aesthetics, ecology, and cultural resources. SPS conducted an additional review of the routes from engineering, constructability and cost perspectives while considering POWER's recommendation to select the route they believe best addresses the requirements of PURA and the PUC Substantive Rules(refer to Section 5.0).

4.1 IMPACTS ON COMMUNITY VALUES, LAND USE, AND SOCIOECONOMICS

An evaluation of adverse impacts or effects upon community values is conducted to identify aspects of the proposed Project that would significantly and negatively alter the use, enjoyment, or intrinsic value attached to an important area or resource by a community. This evaluation considers community concerns that are applicable to this specific project's location and characteristics and does not include consideration of objections to electric transmission lines in general.

Potential impacts to community resources can be classified into direct and indirect effects. Direct effects are those that would occur if the location and construction of a transmission line would result in the removal or loss of public access to a valued resource. Indirect effects are those that would result from a loss in the enjoyment or use of a resource due to the characteristics (primarily aesthetic) of the proposed transmission line, tower structures, or ROW.

4.1.1 Impacts on Land Use

The magnitude of potential impacts to land use resulting from the construction of a transmission line is determined by the amount and type of land temporarily or permanently displaced by the actual ROW and by the compatibility of the facilities with adjacent land uses. During construction, temporary impacts to land uses within the ROW may occur due to the movement of workers, equipment, and materials through the area. Construction noise and dust, as well as temporary disruptions of traffic flow, might also temporarily affect local residents and businesses in the area immediately adjacent to the ROW. Coordination between SPS, its contractors, local governmental agencies and landowners regarding road and ROW access and construction scheduling should minimize these disruptions.

The evaluation criteria used to compare potential land use impacts include overall route length, route length parallel to existing linear corridors (including apparent property boundaries), route proximity to habitable structures, route length across various land use types, and route proximity to park and recreational areas. An analysis of the existing land use within and adjacent to the proposed ROW is required to evaluate the potential impacts.

Alternative Route Length

The total lengths of the alternative routes vary from 99.2 miles for Alternative Route L to 110.7 miles for Alternative Routes C and J. The differences in route lengths reflect the direct or indirect pathway of each alternative route between the Project endpoints. The lengths of the alternative routes may also reflect the effort to parallel existing transmission lines, other existing linear features, apparent property boundaries, and the geographic diversity of the alternative routes. The approximate lengths for each of the alternative routes (A through V) are presented in Table 4-1.

Compatible ROW

Commission Rule 16 TAC § 25.101(b)(3)(B) requires that the PUC consider whether new transmission line routes are within existing compatible ROWs and/or parallel to existing compatible ROWs, apparent property lines, or other natural features. Criteria were used to evaluate compatible ROW utilization, length of route parallel and adjacent to existing transmission line ROW, length of route parallel to other existing linear ROWs, and length of route parallel to apparent property lines.

It should also be noted that if a segment parallels more than one existing linear corridor, only one linear corridor was tabulated (e.g., a link parallels both an existing transmission line and a roadway, but it was only tabulated as paralleling the transmission line).

None of the alternative routes will potentially utilize existing transmission line ROW. The alternative routes with lengths paralleling existing transmission line ROW range from 1.6 miles for Alternative Routes G and I to 21.6 miles for Alternative Route L. The lengths parallel and adjacent to existing transmission line ROW for each of the alternative routes are presented in Table 4-1.

The alternative routes with lengths paralleling other existing compatible ROW, including public roadways, highways, and railways (excluding pipelines) range from approximately 42.6 miles for Alternative Route L to approximately 74.2 miles for Alternative Route J. The lengths paralleling other existing compatible ROW for each of the alternative routes are presented in Table 4-1.

The alternative routes were developed to parallel apparent property boundaries to the extent feasible in the absence of other existing compatible ROW. The route lengths paralleling apparent property lines range from approximately 17.2 miles for Alternative Route P to approximately 43.6 miles for Alternative Route A. The lengths paralleling apparent property boundaries for each of the alternative routes are presented in Table 4-1.

All of the alternative routes parallel existing compatible linear corridors including apparent property boundaries (excluding pipelines) for at least 81.3 percent of their lengths. The percentage of each route that parallels existing linear features ranges from 81.3 percent for Alternative Route E, to 91.9 percent for Alternative Route L. The percentages of each alternative route parallel to existing compatible linear corridors are presented in Table 4-1.

Table 4-1 Environmental Data for Route Evaluation

Evaluation Criteria	Route A	Route B	Route C	Route D	Route E	Route F	Route G	Route H	Route I	Route J	Route K	Route L	Route M	Route N	Route O	Route P	Route Q	Route R
Land Use																		
Length of alternative route	110.4	108.8	110.7	103.4	108.4	106.3	106.4	106.3	107.8	110.7	110.3	99.2	104.8	107.1	108.8	101.0	107.3	100.3
Number of habitable structures[1] within 500 feet of ROW centerline	45	44	27	30	37	31	40	30	47	57	48	37	36	59	57	80	124	145
Length of ROW using existing transmission line ROW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Length of ROW parallel to existing transmission line ROW	5.6	6.5	3.3	11.7	9.2	9.6	1.6	3.7	1.6	3.9	12.9	21.6	13.8	6.1	3.1	21.1	3.0	18.1
Length of ROW parallel to other existing compatible ROW (highways, public roadways,railways, etc. - excluding pipelines)	46.5	49.9	52.2	58.1	57.6	66.7	69.2	66.4	57.9	74.2	63.6	42.6	54.7	61.5	70.9	47.1	64.6	46.7
Length of ROW parallel to apparent property lines[2]	43.6	35.0	39.0	22.0	21.3	20.0	22.4	25.9	30.7	20.7	24.8	27.0	25.4	29.8	24.3	17.2	28.0	20.0
Length of ROW parallel to pipelines[3]	0	1.8	1.4	4.7	5.6	0	3.0	3.0	0	0	0	2.4	3.9	2.7	3.9	5.6	2.4	4.8
Percentage of ROW parallel to existing compatible corridors and apparent property boundaries (excluding pipelines)	86.8%	84.0%	85.4%	88.8%	81.3%	90.6%	87.5%	90.4%	83.6%	89.2%	91.8%	91.9%	89.7%	90.9%	90.4%	84.6%	89.1%	84.5%
Length of ROW through parks/recreational areas[4]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of parks/recreational areas[4] crossed by ROW centerline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of additional parks/recreational areas[4] within 1,000 feet of ROW centerline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Length of ROW through cropland	50.2	53.3	48.0	56.1	47.1	55.6	58.9	61.5	54.5	67.5	60.1	58.0	64.1	62.3	64.8	61.5	62.6	65.7
Length of ROW through pasture/rangeland	55.8	50.2	55.0	41.3	55.7	44.1	41.8	37.4	48.2	36.7	43.5	34.4	33.0	39.3	37.9	32.5	40.5	28.3
Length of ROW through land irrigated by traveling systems (rolling or pivot type)	4.5	4.7	4.9	5.4	5.0	6.2	5.4	7.2	5.1	6.4	6.7	6.4	7.6	5.5	5.8	6.6	4.4	5.9
Number of transmission pipeline crossings	32	39	46	34	46	40	33	34	40	37	52	40	39	39	48	44	29	36
Number of transmission line crossings	29	23	20	18	18	17	15	15	14	23	26	16	21	16	19	18	18	16
Number of US and State highway crossings	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	11	7
Number of farm-to-market road crossings	15	17	17	18	16	15	12	14	13	18	19	17	15	15	13	16	14	15
Number of cemeteries within 1,000 feet of the ROW centerline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of FAA registered airports with at least one runway more than 3,200 feet in length located within 20,000 feet of the ROW centerline	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Number of FAA registered airports having no runway more than 3,200 feet in length located within 10,000 feet of the ROW centerline	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Number of private airstrips within 10,000 feet of the ROW centerline	0	1	1	1	0	0	1	0	1	0	0	1	0	1	0	1	2	1
Number of heliports within 5,000 feet of the ROW centerline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of commercial AM radio transmitters within 10,000 feet of the ROW centerline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of FM radio transmitters, microwave towers, and other electronic installations within 2,000 feet of the ROW centerline	1	1	1	2	2	2	1	1	1	2	3	2	1	1	1	3	2	3
Number of recorded water wells within 75 feet of the ROW centerline	53	39	27	34	45	43	43	45	50	52	40	38	46	44	49	43	35	31
Number of recorded oil and gas wells within 200 feet of the ROW centerline	10	13	11	3	14	5	1	1	7	4	8	3	3	1	5	6	5	6
Aesthetics																		
Estimated length of ROW within the foreground visual zone[5] of US and State highways	10.7	6.6	6.3	8.8	9.6	9.7	9.7	6.7	8.6	13.3	16.0	7.8	5.6	8.7	5.7	7.7	11.8	6.1
Estimated length of ROW within the foreground visual zone[5] of farm-to-market roads	25.9	23.6	18.5	23.1	33.7	33.3	19.8	19.3	20.2	26.4	41.8	21.1	22.5	27.9	20.4	18.9	25.0	20.4
Estimated length of ROW within the foreground visual zone[5] of parks/recreational areas[4]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecology																		
Length of ROW through upland woodlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Length of ROW through bottomland/riparian woodlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Length of ROW across mapped NWI wetlands and playa lakes	2.0	2.2	1.8	2.3	2.1	1.9	2.2	1.8	2.4	2.5	2.3	2.4	1.8	2.4	2.1	2.0	1.6	1.1
Length of ROW across known habitat of federally listed endangered or threatened species	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WAFWA Estimated Lesser Prairie Chicken Habitat Mitigation Cost ($)	$4,447,988	$4,443,942	$4,869,812	$1,370,243	$2,477,899	$817,288	$2,631,079	$2,913,574	$4,004,822	$2,491,086	$494,373	$1,546,402	$2,551,929	$2,532,896	$2,887,649	$995,177	$2,226,907	$1,747,531
Length of ROW across open water (lakes, ponds)	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Number of stream crossings	13	6	7	12	6	6	9	8	6	15	7	8	8	8	8	12	7	8
Number of river crossings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Length of ROW parallel (within 100 feet) to streams or rivers	0.00	0.00	0.00	0.04	0.00	0.17	0.25	0.04	0.00	0.04	0.17	0.04	0.04	0.25	0.25	0.04	0.06	0.25
Length of ROW across 100-year floodplains[6]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cultural Resources																		
Number of archeological or historical sites crossed by ROW	1	1	1	1	0	1	0	0	1	1	1	1	0	1	0	0	0	0
Number of additional archeological or historical sites within 1,000 feet of ROW centerline	2	2	4	4	2	4	2	2	2	2	3	4	2	2	2	2	2	2
Number of National Register of Historic Places listed properties crossed by ROW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of additional National Register of Historic Places listed properties within 1,000 feet of ROW centerline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Length of ROW across areas of high archeological site potential	33.8	27.2	28.7	26.7	26.2	23.5	26.0	24.4	24.4	29.6	28.9	25.1	26.4	28.5	24.9	24.6	24.9	25.2

[1]Single-family and multi-family dwellings, mobile homes, apartment buildings, commercial structures, industrial structures, business structures, churches, hospitals, nursing homes, and schools, or other structures normally inhabited by humans or intended to be inhabited by humans on a daily or regular basis within 500 feet of the centerline of a transmission project of 230-kV or more.

[2]Apparent property lines created by existing roads, highways, or railroad ROWs are not "double-counted" in the length of ROW parallel to property lines criteria.

[3]This data is for informational purposes only. Pipelines were not considered compatible ROW.

[4]Defined as parks and recreational areas owned by a governmental body or an organized group, club, or church.

[5]One-half mile, unobstructed.

[6]Floodplain data not available for Hockley, Terry, and Yoakum Counties.

Note: All length measurements are shown in miles unless noted otherwise.

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Evaluation Criteria	Route S	Route T	Route U	Route V
Land Use				
Length of alternative route	110.6	107.0	110.5	110.4
Number of habitable structures[1] within 500 feet of ROW centerline	124	126	131	128
Length of ROW using existing transmission line ROW	0	0	0	0
Length of ROW parallel to existing transmission line ROW	3.7	3.0	2.6	1.9
Length of ROW parallel to other existing compatible ROW (highways, public roadways,railways, etc. - excluding pipelines)	63.1	66.1	68.8	69.9
Length of ROW parallel to apparent property lines[2]	30.3	27.1	26.0	24.7
Length of ROW parallel to pipelines[3]	2.4	2.4	2.4	2.4
Percentage of ROW parallel to existing compatible corridors and apparent property boundaries (excluding pipelines)	87.8%	90.0%	88.1%	87.4%
Length of ROW through parks/recreational areas[4]	0	0	0	0
Number of parks/recreational areas[4] crossed by ROW centerline	0	0	0	0
Number of additional parks/recreational areas[4] within 1,000 feet of ROW centerline	0	0	0	0
Length of ROW through cropland	62.2	66.4	64.5	68.0
Length of ROW through pasture/rangeland	43.9	35.2	40.0	37.4
Length of ROW through land irrigated by traveling systems (rolling or pivot type)	4.5	5.5	5.8	5.2
Number of transmission pipeline crossings	26	30	39	32
Number of transmission line crossings	23	18	20	20
Number of US and State highway crossings	11	11	11	11
Number of farm-to-market road crossings	15	15	15	17
Number of cemeteries within 1,000 feet of the ROW centerline	0	0	0	0
Number of FAA registered airports with at least one runway more than 3,200 feet in length located within 20,000 feet of the ROW centerline	0	0	1	1
Number of FAA registered airports having no runway more than 3,200 feet in length located within 10,000 feet of the ROW centerline	0	0	0	0
Number of private airstrips within 10,000 feet of the ROW centerline	1	1	1	1
Number of heliports within 5,000 feet of the ROW centerline	0	0	0	0
Number of commercial AM radio transmitters within 10,000 feet of the ROW centerline	0	0	0	0
Number of FM radio transmitters, microwave towers, and other electronic installations within 2,000 feet of the ROW centerline	2	2	4	3
Number of recorded water wells within 75 feet of the ROW centerline	36	37	41	35
Number of recorded oil and gas wells within 200 feet of the ROW centerline	7	5	8	7
Aesthetics				
Estimated length of ROW within the foreground visual zone[5] of US and State highways	9.1	8.9	10.0	10.1
Estimated length of ROW within the foreground visual zone[5] of farm-to-market roads	22.1	22.0	24.5	25.5
Estimated length of ROW within the foreground visual zone[5] of parks/recreational areas[4]	0	0	0	0
Ecology				
Length of ROW through upland woodlands	0	0	0	0
Length of ROW through bottomland/riparian woodlands	0	0	0	0
Length of ROW across mapped NWI wetlands and playa lakes	1.8	1.8	2.6	2.5
Length of ROW across known habitat of federally listed endangered or threatened species	0	0	0	0
WAFWA Estimated Lesser Prairie Chicken Habitat Mitigation Cost ($)	$2,815,580	$2,695,107	$2,192,908	$2,421,805
Length of ROW across open water (lakes, ponds)	0.00	0.00	0.00	0.00
Number of stream crossings	14	7	4	11
Number of river crossings	0	0	0	0
Length of ROW parallel (within 100 feet) to streams or rivers	0.06	0.06	0.00	0.00
Length of ROW across 100-year floodplains[6]	N/A	N/A	N/A	N/A
Cultural Resources				
Number of archeological or historical sites crossed by ROW	0	0	0	0
Number of additional archeological or historical sites within 1,000 feet of ROW centerline	2	2	2	2
Number of National Register of Historic Places listed properties crossed by ROW	0	0	0	0
Number of additional National Register of Historic Places listed properties within 1,000 feet of ROW centerline	0	0	0	0
Length of ROW across areas of high archeological site potential	30.2	24.2	27.3	27.4

[1]Single-family and multi-family dwellings, mobile homes, apartment buildings, commercial structures, industrial structures, business structures, churches, hospitals, nursing homes, and schools, or other structures normally inhabited by humans or intended to be inhabited by humans on a daily or regular basis within 500 feet of the centerline of a transmission project of 230-kV or more.

[2]Apparent property lines created by existing roads, highways, or railroad ROWs are not "double-counted" in the length of ROW parallel to property lines criteria.

[3]This data is for informational purposes only. Pipelines were not considered compatible ROW.

[4]Defined as parks and recreational areas owned by a governmental body or an organized group, club, or church.

[5]One-half mile, unobstructed.

[6]Floodplain data not available for Hockley, Terry, and Yoakum Counties.

Note: All length measurements are shown in miles unless noted otherwise.

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4.1.1.1 Impacts on Urban and Residential Areas

Typically, one of the most important measures of potential land use impacts is the number of habitable structures located in the vicinity of each alternative route. Based on direction provided by the PUC, habitable structure identification is included in the CCN filing. POWER determined the number of habitable structures located within 500 feet of each alternative route centerline and their distance from the centerline through the use of GIS software, interpretation of aerial photography, and verification during reconnaissance surveys. Refer to Tables 5-2 through 5-23 located in Appendix D for the number of habitable structures along each alternative route.

The number of habitable structures located within 500 feet of each alternative route centerline ranges from 27 for Alternative Route C, to 145 for Alternative Route R. The numbers of habitable structures located within 500 feet of each alternative route centerline are presented in Table 4-1.

Land Use Categories

An analysis of compatibility with adjacent land use types was completed for each alternative route. Land use categories identified within the study area include cropland, land with traveling irrigation systems, pastureland/rangeland, orchards, and lands with conservation easements.

4.1.1.2 Impacts on Agriculture

Impacts to agricultural land uses can generally be ranked by degree of potential impact, with the least potential impact occurring in areas where cultivation is not the primary use (pasture/rangeland), followed by cultivated croplands. The use of pasture/rangeland can typically be continued within the ROW following construction. Cultivated cropland use could also be continued within the ROW following construction.

All of the alternative routes cross lengths of pasture/rangeland; however, because the ROW for this Project will not be fenced or otherwise separated from adjacent lands, no significant long-term displacement of farming or grazing activities is anticipated. Alternative route lengths crossing pasture/rangeland areas range from approximately 28.3 miles for Alternative Route R, to approximately 55.8 miles for Alternative Route A. The lengths of each of the alternative routes crossing pasture/rangeland are presented in Table 4-1.

All of the alternative routes cross lengths of cropland; however, due to the relatively small area directly affected (beneath the structure foundations), and the short term duration of construction activities at any one location, structures' impacts will be limited to a small loss of production area and impacts related to construction will be short term. Alternative route lengths crossing cropland areas range from approximately 47.1 miles for Alternative Route E, to approximately 68.0 miles for Alternative Route V. The lengths of each of the alternative routes crossing croplands are presented in Table 4-1.

During the routing process, consideration was given to developing route links along field edges in order to span the traveling arc of the mobile irrigation systems to minimize the impact of the transmission line on traveling irrigation systems. Alternative route lengths crossing lands irrigated by traveling systems (rolling or pivot) range from 4.4 miles for Alternative Route Q, to approximately 7.6 miles for Alternative Route M. The lengths of each of the alternative routes crossing irrigated lands with traveling irrigation systems (rolling and pivot type) are presented in Table 4-1.

4.1.1.3 Impacts on Lands with Conservation Easements

As discussed in Section 2.2.2.2, no conservation easement areas within the study area were identified, based on a review of the TLTC, the National Conservation Easement Database (NCED 2015), and other non-governmental land trust groups . Therefore, the proposed Project is not anticipated to have an impact on lands with known conservation easements.

4.1.1.4 Impacts on Transportation, Aviation, and Utility Features

Transportation

Potential impacts to transportation could include temporary disruption of traffic or conflicts with future proposed roadways and/or utility improvements. Traffic disruptions would include those associated with the movement of equipment and materials to the ROW, and slightly increased traffic flow and/or periodic congestion during the construction phase of the proposed Project. In the rural portions of the study area, these impacts are typically considered minor, temporary, and short-term. In the developed portions of the study area, the temporary impacts to traffic flow can be significant during construction, and SPS will coordinate with TxDOT, county, and local agencies in control of the impacted roadways to address these traffic flow impacts during the construction phase of the Project.

Each alternative route crosses US and State highways. The number of US and State highway crossings ranges from seven for Alternative Route R, to 11 for Alternative Routes Q, S, T, U, and V. Each alternative route also crosses FM roads. The number of FM road crossing ranges from 12 for Alternative Route G, to 19 for Alternative Route K. SPS would be required to obtain road-crossing permits from TxDOT for any crossing of state-maintained roadways. The numbers of US and State highways, and FM road crossings for each of the alternative routes are presented in Table 4-1.

Aviation

According to FAA regulations, Title 14 CFR Part 77, the construction of a transmission line requires FAA notification if structure heights exceed 200 feet or the height of an imaginary surface extending outward and upward at a slope of 100:1 for a horizontal distance of 20,000 feet from the nearest point of the nearest public or military airport runway having at least one runway longer than 3,200 feet. The FAA also requires notification if structure heights exceed a 50:1 slope for a horizontal distance of 10,000 feet from the nearest public or military airport runway where no runway is longer than 3,200 feet in length. The FAA also requires notification if structure heights exceed a 25:1 slope for a horizontal distance of 5,000 feet for public or military heliports.

Alternative Routes A, B, K, U, and V each are located within 20,000 feet of one public FAA-registered airport with at least one runway more than 3,200 feet in length. None of the remaining Alternative Route centerlines are located within 20,000 feet of a public or military airport with a runway of at least 3,200 feet in length.

Only Alternative Routes C and K have one public FAA-registered airport with no runway more than 3,200 feet in length located within 10,000 feet of their ROW centerline. None of the alternative routes have a public or military heliport located within 5,000 feet of their centerlines. The numbers of airports and heliports located within the FAA notification distance criteria for each alternative route are listed in Table 4-1.

Following PUC approval of a route for the proposed transmission line, SPS will make a final determination of the need for any FAA notifications, based on specific route location and structure design. The result of this notification, and any subsequent coordination with the FAA, could include changes in the line design and/or potential requirements to mark and/or light the structures if required.

Alternative Routes B, C, D, G, I, L, N, P, R, S, T, U, and V have one private airstrip located within 10,000 feet of their centerlines. Alternative Route Q has two private airstrips located within 10,000 feet of its centerline. Table 4-1 presents the numbers of private airstrips located within 10,000 feet of each alternative route centerline.

The distance of the airstrip from the nearest route was measured using GIS software and aerial photography interpretation (refer to Table 4-2). All known airport/airstrip locations are shown on Figure 5-1 in Appendix C.

TABLE 4-2 AIRSTRIP RUNWAY LOCATIONS

FIGURE 5-1 MAP ID	AIRSTRIP	ALTERNATIVE ROUTES	ESTIMATED RUNWAY LENGTH (FEET)[1]	EXCEEDS SLOPE[1,2]
700	Biggin Hill Airport	C, K	Runway 12/30: 3,000	No
701	Levelland Municipal Airport	A, B, K	Runway 08/26: 2,072 Runway 17/35: 6,110	Yes
702	McNabb Farm Airport	O, P, Q, R, S, T, U, V	Runway 01/19: 1,500 Runway 10/28: 2,750	No
703	Private Airstrip	B, C, D, G, I, L, N, P, Q, R, S	Runway unknown: approximately 3500	Yes
704	Terry County Public Airport	U, V	Runway 2/20: 5,218 Runway 13/31: 2,765	No

[1] Sources: FAA 2016; POWER aerial photo and USGS interpretation.
[2] Sources: POWER aerial photo and USGS interpretation considering elevation information obtained from USGS topographic maps and a maximum allowable height of 205 feet.

Utilities

Utility features, including existing electrical transmission lines, distribution lines, pipelines, and water wells are crossed by all of the alternative routes. If these utility features are crossed by or are in close proximity to the centerline of the alternative route approved by the PUC, SPS will coordinate with the appropriate entities to obtain necessary permits or permission as required to ensure safety and the continued use of the existing services provided by these utility features.

Numerous existing electric transmission lines were identified within the study area. The number of existing transmission lines crossed by the alternative routes ranges from 14 for Alternative Route I, to 29 for Alternative Route A. The numbers of transmission line crossings for each of the alternative routes are presented in Table 4-1.

Numerous water wells were identified within 75 feet of each alternative route centerline. The number of water wells located within 75 feet of each alternative route centerline ranges from 27 for Alternative Route C, to 53 for Alternative Route A. The numbers of water wells located within 75 feet of each alternative route centerline are presented in Table 4-1.

SPS and POWER applied a set-back buffer distance of 200 feet from alternative route centerlines during route link development using 2014 RRC data layers, aerial photo interpretation, and GIS

software generated measurements to identify oil/gas well heads and ancillary oil/gas infrastructure. In some instances, the set-back distance was reduced due to the need to traverse a particular area to connect the Project endpoints while also considering other existing constraints in the area. Numerous oil/gas wells were identified within 200 feet of the alternative route centerlines. The number of oil/gas wellheads identified within 200 feet of each alternative route centerline ranges from one oil/gas well for Alternative Routes G, H, and N, to 14 for Alternative Route E.

The number of known transmission pipelines crossed by each alternative route ranges from 26 pipeline crossings for Alternative Route S, to 52 pipeline crossings for Alternative Route K. The numbers of pipeline crossings for each of the alternative routes are presented in Table 4-1. Pipelines that are crossed by the alternative route approved by the PUC will be indicated on engineering drawings and flagged in the field prior to construction. SPS will coordinate with pipeline companies during transmission line construction and operation for continued safe operation of potentially-affected oil and gas facilities.

4.1.1.4 Impacts on Electronic Communication Facilities

No commercial AM radio towers were identified within 10,000 feet of any of the alternative route centerlines. Alternative Routes A, B, C, G, H, I, M, N, and O have one FM radio transmitter, microwave tower and/or other electronic installation within 2,000 feet of their centerlines. Alternative Routes D, E, F, J, L, Q, S, and T have two FM radio transmitters, microwave towers and/or other electronic installations within 2,000 feet of their centerlines. Alternative Routes K, P, R, and V have three FM radio transmitters, microwave towers and/or other electronic installations within 2,000 feet of their centerlines. Alternative Route U has four FM radio transmitters, microwave towers and/or other electronic installations within 2,000 feet of its centerline.

4.1.1.5 Impacts on Socioeconomics

Construction and operation of the proposed transmission line is not anticipated to result in a significant change in the population or employment rate within the study area. For this Project, some short-term employment would be anticipated. SPS typically uses contract labor supervised by SPS employees during the clearing and construction phase of transmission line projects. Construction workers for the Project would likely commute to the work site on a daily or weekly basis instead of permanently relocating to the area. The temporary workforce increase would likely result in an increase in local retail sales due to purchases of lodging, food, fuel, and other merchandise for the duration of construction activities. No additional staff would be required for line operations and maintenance.

SPS is required to pay sales tax on purchases and is subject to paying local property tax on land or improvements as applicable.

4.2 IMPACTS ON PARKS AND RECREATION AREAS

Potential impacts to parks or recreation areas include the disruption or preemption of recreation activities. There are no parks and recreation areas crossed by or located within 1,000 feet or within the foreground visual zone of any of the alternative route centerlines. No impacts to the use or enjoyment of the parks and recreation facilities located within the study area are anticipated from the construction of any of the alternative routes.

4.3 IMPACTS ON HISTORICAL (CULTURAL RESOURCES) VALUES

4.3.1 Impacts on Historical (Cultural Resources) Values

Methods for identifying, evaluating, and mitigating impacts to cultural resources have been established for federal projects or permitting actions, primarily for purposes of compliance with the National Historic Preservation Act (NHPA). Similar methods are often used when considering cultural resources affected by state-regulated actions. In either case, this process generally involves: (1) identifying significant (i.e., national or state-designated) cultural resources within 1,000 feet of the centerline of each alternative route; (2) determining the potential impacts of the project on those resources; and (3) implementing, where appropriate, measures to avoid, minimize, or mitigate those impacts.

Impacts associated with the construction, operation, and maintenance of transmission lines can affect cultural resources either directly or indirectly. Construction activities associated with any proposed project can adversely impact cultural resources if those activities alter the integrity of key characteristics that contribute to a property's significance as defined by the standards of the NRHP or the Texas State Antiquities Code. These characteristics might include location, design, setting, materials, workmanship, feeling, or association for architectural and engineering resources or archeological information potential for archeological resources.

4.3.2 Direct Impacts

Construction activities associated with any proposed project may adversely impact cultural resources when they alter the integrity of the characteristics that contribute to a property's significance. As defined by the standards of the NRHP, these characteristics typically include location, design, setting, materials, workmanship, feeling, and association. The construction of a transmission line might directly alter, damage, or destroy historic buildings, archeological sites, engineering structures, landscapes, or historic districts. Additionally, an increase in vehicular traffic might damage surficial or shallowly buried sites, while the increase in pedestrian traffic might result in vandalism of some sites. Direct impacts might also include isolation of a historic resource from or alteration of its surrounding environment.

4.3.3 Indirect Impacts

Indirect impacts to cultural resources include those effects caused by the project that are farther removed in distance or that occur later in time but are reasonably foreseeable. These indirect impacts might include introduction of visual or audible elements that are out of character with the resource or its setting. Indirect impacts might also occur as a result of alterations in the pattern of land use, changes in population density, accelerated growth rates, or increased pedestrian or vehicular traffic. Historic buildings, structures, landscapes, and districts are among the types of resources that might be adversely impacted by the indirect impact of the proposed transmission towers and lines.

4.3.4 Mitigation

The preferred form of mitigation for adverse impacts to cultural resources is avoidance during the routing process or rerouting if significant resources (e.g., NRHP-eligible or listed properties, or SALs) are identified prior to construction. Mitigation measures for direct impacts may include implementing a program for data recovery excavations if an archeological site cannot be avoided. Indirect impacts on historical properties and landscapes can be lessened through careful design and

landscaping considerations, such as using vegetation screens or berms where practicable. Additionally, relocation might be possible for some historic structures.

4.3.5 Summary of Cultural Resource Impacts

The distance of each recorded cultural resource located within 1,000 feet from the proposed alternative routes was measured using GIS software. A review of the THSA and TASA (THC 2015a, 2015b) records, described in Section 2, indicated that no NHLs, NRHP-listed properties, or SALs have been recorded within the study area boundary; therefore none of these types of resources are recorded within 1,000 feet of the alternative routes. No cemeteries are recorded within 1,000 feet of any of the alternative route centerlines.

Of the 31 archeological sites recorded in the study area, seven are crossed or within 1,000 feet of the alternative route centerlines. Four of the sites, 41HA62, 41HA63, 41LU97, and 41LU98, are historic aged sites. Sites 41HA62 and 41HA63 date to the 1930s and between 1943 and 1964, respectively. Neither of these sites has been formally assessed for eligibility or inclusion on the NRHP. Sites 41LU97 and 41LU98 have been determined to be ineligible for listing on the NRHP, and no additional information is available for the two sites. Sites 41HA62 and 41HA63 are 506 feet and 955 feet, respectively, north of all of the alternative routes. Sites 41LU97 and 41LU98 are 273 feet and 245 feet, respectively, north of Alternative Routes C, D, F, and L.

Sites 41HA9, 41LU60, and 41LU61 are prehistoric sites. Sites 41LU60 and 41LU61 both have components that date to as early as the Paleoindian period. Site 41LU60 dates to as late as the Late Prehistoric period, and 41LU60 dates to as late as the Archaic period. Hearths are reported from 41LU60, a large site located on the margins of a playa lake. Folsom points were recovered from 41LU60 and 41LU61. Mammoth remains are reported from 41LU61, another large site near a playa lake. Site 41HA9 is a late Archaic to Late Prehistoric campsite located on a dune near a playa lake. None of these prehistoric sites have been formally evaluated for listing on the NRHP, although 41LU60 and 41LU61 are described on their site forms as potentially eligible as SALs. Site 41HA9 is located 729 feet north of Alternative Route K. Site 41LU60 is crossed by Alternative Routes B, I, J, and N. Site 41LU61 is crossed by Alternative Routes A, C, D, F, L, and K.

No systematic cultural resource surveys have been conducted along the alternative routes. Thus, the potential for undiscovered cultural resources does exist along all alternative routes. To assess this potential, a review of geological, soils, and topographical maps was undertaken by a professional archeologist to identify areas along the alternative routes where unrecorded prehistoric archeological resources have a higher probability to occur. These HPAs for prehistoric archeological sites were identified near major streams and their tributaries, near playa lakes, on terraces overlooking stream channels, and near previously recorded archeological sites. The larger streams near or crossed by alternative routes include Blackwater Draw, Yellow House Draw, Lost Draw, Sulphur Draw, and Sulphur Springs Draw. Mound Lake, Rich Lake, and the smaller playa lakes ubiquitous to the study area are also likely to have attracted prehistoric groups. To facilitate the data evaluation and alternative route comparison, each HPA was mapped using GIS and the length of each alternative route crossing these areas was tabulated.

All of the alternative routes cross HPAs for prehistoric cultural resources. Alternative Routes F and T have the shortest lengths crossing HPAs, with 23.5 and 24.2 miles, respectively. Alternative Routes A, S, and J have the longest lengths crossing HPAs, with 33.8, 30.2, and 29.6 miles, respectively. Table 4-1 presents each alternative route length crossing HPAs.

4.4 IMPACTS ON AESTHETIC VALUES

Aesthetic impacts, or impacts to visual resources, exist when the ROW, lines and/or structures of a transmission line system create an intrusion into, or substantially alter the character of the existing view. The significance of the impact is directly related to the quality of the view, as is the case of natural scenic areas, or to the importance of the existing setting in the use and/or enjoyment of an area, as is the case of valued community resources and recreational areas.

Construction of the proposed 345-kV transmission line could have both temporary and permanent aesthetic effects. Temporary impacts would include views of the actual assembly and erection of the tower structures. If wooded areas are cleared, the brush and wood debris could have an additional negative temporary impact on the local visual environment. Permanent impacts from the Project would involve the views of the cleared ROW, tower structures, and lines.

Since no unique, pristine, or very high quality landscapes, or extensive landscapes protected from most forms of development were identified within the study area, potential visibility impacts were evaluated by estimating the length of each alternative route that would fall within the foreground visual zones (one-half mile with unobstructed views) of US and State highways, and FM roads. There are no interstate highways or parks/recreational areas located within one-half mile of any of the alternative routes. The alternative route lengths within the foreground visual zone of US and State highways, and FM roads were tabulated in Table 4-1.

All of the alternative routes have lengths located within the foreground visual zone of US and State highways and these range from 5.6 miles for Alternative Route M, to 16.0 miles for Alternative Route K. All of the alternative routes have lengths located within the foreground visual zone of FM roadways and these range from 18.5 miles for Alternative Route C, to 41.8 miles for Alternative Route K.

4.5 IMPACTS ON ENVIRONMENTAL INTEGRITY

4.5.1 Impacts on Physiography and Geology

Construction of the proposed transmission line is not anticipated to have any significant adverse effects on the physiographic or geologic features and resources within the study area. Erection of the structures will require the excavation and/or minor disturbance of small quantities of near-surface materials, but should have no measurable impacts on the geologic resources or features along any of the alternative routes. No geologic hazards were identified in the study area, and none are anticipated to be created by the Project.

4.5.2 Impacts on Soils

Activities associated with the construction, operation, and maintenance of electrical transmission lines typically do not adversely impact soils when appropriate mitigation measures are implemented during the construction and post-construction phases. Potential impacts to soils include erosion, compaction, and the conversion of prime farmland soils.

The highest risk for soil erosion and compaction is primarily associated with the construction phase of a project. In accordance with SPS's standard construction practices, ROW clearing of woody vegetation including trees, brush, and undergrowth will be conducted within the approved ROW area (approximately 150 feet). Areas where vegetation on slopes is removed, with disturbance to the root

zone, will have the highest potential for soil erosion, and the repetitive use of heavy equipment on the cleared ROW creates the greatest potential for soil compaction. Prior to construction, SPS will develop a SWPPP to minimize potential impacts associated with soil erosion, compaction, and sedimentation off of the ROW. Implementation of this plan will incorporate temporary and permanent BMPs to minimize soil erosion on the ROW during significant rainfall events. The SWPPP will also establish the criteria for re-vegetation and mitigating soil compaction to ensure adequate soil stabilization during the construction and post-construction phases. The native herbaceous layer of vegetation will be maintained, during construction to the extent practicable. Areas with a high erosion potential, including steep slopes and areas with shallow topsoil, will require seeding and/or implementation of permanent BMPs (e.g., soil berms or interceptor slopes) to stabilize disturbed areas and minimize soil erosion potential during the post-construction phase. The ROW will be inspected prior to and during construction at SWPPP specified intervals to ensure that potential high-erosion areas are identified and appropriate BMPs are implemented and maintained to prevent erosion. The ROW will be inspected post-construction to identify the progress of any revegetated areas and identify where any additional erosion control measures will need to be in place to assist in soil stabilization.

As previously discussed, prime farmlands, as defined by the NRCS, are lands that are best suited for producing food, feed, forage, or fiber crops. All the alternative routes cross soils designated as prime farmland. However, the USDA-NRCS does not consider the limited area of direct impact associated with transmission line structures to be a significant conversion of these lands, as the majority of the ROW would be available for agricultural use once construction of the transmission line is completed. No significant impacts to prime farmland soils are anticipated for any of the alternative routes.

Potential impacts to soils, primarily erosion and compaction, would be minimized with the development and implementation of a SWPPP; therefore, the magnitude of potential soil impacts are considered equivalent for all of the alternative routes.

4.5.3 Impacts on Water Resources

4.5.3.1 Impacts on Surface Water

Surface waters identified within the study area would be crossed by all of the alternative routes. These surface waters typically include ephemeral or seasonal playa lakes/depressions and intermittent streams. These features can attract wildlife and can also support a fishery if they maintain a perennial characteristic. Named streams crossed include Blackwater Draw, Yellow House Draw, Sulfur Draw, Lost Draw, Sulfur Springs Draw, and McKenzie Draw. SPS proposes to span all surface waters crossed by any of the alternative routes if practical. Structure locations would be outside of the ordinary high water lines for spanned surface water crossings. Hand-cutting of woody vegetation within the ordinary high water lines may be implemented and limited to the removal of woody vegetation as necessary to meet conductor to ground clearances. The shorter understory and herbaceous layers of vegetation would remain, where allowable, and BMPs would be implemented in accordance with the SWPPP to reduce the potential for sedimentation into adjacent surface waters.

The alternative route centerline lengths crossing open waters (lakes, ponds, playas), parallel (within 100 feet) of streams, and the number of stream crossings are presented in Table 4-1. None of the alternative routes cross any rivers. The number of stream crossings ranges from four for Alternative Route U, to 15 crossings for Alternative Route J. Because all streams crossed will be spanned and a

SWPPP will be implemented, no significant impacts are anticipated to surface water integrity or water quality.

The approximate alternative route ROW lengths parallel (within 100 feet) to streams range from zero mile for Alternative Routes A, B, C, E, I, U, and V, to 0.25 mile for Alternative Routes G, N, O, and R. Alternative Routes with lengths of ROW across open water (lakes, ponds, etc.) include Alternative Routes A with 0.03 mile and Alternative Routes E and O with 0.01 mile each.

SPS proposes to span all stream crossings and a SWPPP will be implemented to reduce the risk of stream sedimentation. No significant adverse impacts to surface water integrity or water quality are anticipated from construction of any of the alternative routes.

4.5.3.2 Impacts on Groundwater

The construction, operation, and maintenance of the proposed transmission line are not anticipated to adversely affect groundwater resources within the study area, though potential fuel and/or chemical spills during the construction process could potentially impact both surface water and groundwater resources. Thus, standard operating procedures and spill response specifications relating to petroleum product storage, refueling, and maintenance activities of equipment are provided as a component of the SWPPP in order to avoid and minimize potential contamination to water resources. SPS will take all necessary and available precautions to avoid and minimize the occurrence of such spills, and any remedial and disposal activities associated with any accidental spills will be in accordance with state and federal regulations.

4.5.3.3 Impacts on Floodplains

FEMA mapped 100-year floodplain data was only available for a portion of the study area (Lubbock and Hale counties) and therefore the length of ROW within 100-year floodplains was not calculated. It is reasonable to assume a floodplain area associated with the playa lakes and various creeks/draws and their tributaries within the study area.

No construction activities are anticipated that would significantly impede the flow of water within watersheds. Engineering design should alleviate the potential of construction activities to adversely impact flood channels and proper structure placement would minimize any flow impedance during a major flood event. The construction of any of the alternative routes is not likely to significantly impact the overall function of a floodplain, or adversely affect adjacent or downstream properties. SPS will coordinate with the county floodplain administrators as necessary.

4.5.4 Impacts on Ecological Resources

4.5.4.1 Impacts on Vegetation Types

Potential impacts to vegetation would result from clearing the ROW of woody vegetation and/or herbaceous vegetation. These activities facilitate ROW access for structure construction, line stringing, and future maintenance activities of the proposed transmission line. Impacts to vegetation would be limited to the approximate 150-foot-wide ROW. Woodland vegetation removal within the ROW would be required if present. ROW clearing activities would be completed while minimizing the impacts to existing groundcover vegetation when practical. Mowing and/or shredding of herbaceous vegetation may be required within grasslands/pasturelands. Future ROW maintenance activities may include periodic mowing and/or herbicide applications to maintain the herbaceous vegetation layer within the ROW.

Clearing of trees and shrubs, or herbaceous cover may cause a degree of habitat fragmentation. The magnitude of habitat fragmentation is minimized by paralleling an existing linear feature such as a transmission line, roadway, or railway. During the route development process, consideration was given to maximize the length of the routes parallel to existing linear corridors to minimize impact woodland areas. Clearing would occur only where necessary to provide access, work space and future maintenance access to the ROW.

No federal or state listed threatened or endangered plant species were listed for the study area counties (TPWD 2016e; USFWS 2016b). TXNDD (2014) data did not indicate the presence of any rare plant communities within the study area. Construction of any of the alternative routes is not anticipated to affect any listed plant species or rare plant communities.

The lengths of each alternative route crossing upland woodlands and bottomland/riparian woodlands were interpolated from aerial photography and alternative route lengths were digitally measured for these tabulations. None of the alternative routes were identified as crossing upland woodlands or bottomland/riparian woodlands.

4.5.4.2 Impacts on Wetlands

Wetlands serve as habitat to a number of species and are often used as migration corridors for wildlife or stopover habitat and breeding habitat for many bird species. Removal of vegetation within wetlands increases the potential for erosion and sedimentation, which can be detrimental to downstream plant communities and aquatic life. Removal of woody vegetation within any wetlands crossed may be conducted by using hand-clearing methods to avoid disturbance of the soil profile and to preserve the herbaceous vegetation layer. Additionally, mitigation measures can be implemented during construction activities to further avoid and/or minimize potential impacts to wetlands. Due to the location of the study area, review of NWI mapped wetland areas indicate wetlands are typically restricted to ephemeral playa lakes. In most instances these areas could be spanned with temporary impacts limited to accessing each structure during construction. Impact minimization measures can be implemented (e.g., timber matting and access road minimization) to reduce temporary impacts if avoidance is not practical.

The temporary and/or permanent placement of fill material within jurisdictional surface waters and associated wetlands requires a permit from the USACE under Section 404 of the CWA. Streams located within the study area subject to regulation under Section 404 of the CWA have been avoided where practical, and the placement of fill material may be avoided through spanning if crossed. Playa lakes are generally considered isolated and typically not regulated by the USACE as jurisdictional wetlands. Therefore, a Preconstruction Notification under a Section 404 permit may not be required for the Project. Prior to construction, an assessment of the PUC approved route would be completed to determine the need for a Section 404 Permit based on meeting permit conditions and potential impacts to USACE jurisdictional areas. If necessary, SPS will coordinate with the USACE prior to clearing and construction to ensure compliance with Section 404 of the CWA.

NWI mapped wetlands crossed by the alternative routes are primarily comprised of freshwater emergent wetlands, ponds, and playa lakes. The alternative route lengths crossing NWI mapped wetlands and playa lakes range from 1.1 miles for Alternative Route R to 2.6 miles for Alternative Route U.

SPS proposes to implement BMPs as a component of its SWPPP to prevent off-ROW sedimentation and degradation of any wetland areas. SPS proposes to span these features; however, if emergent wetland areas are traversed equipment, matting can be used to minimize the potential temporary impacts. With SPS's use of these impact avoidance and minimization measures, none of the alternative routes are anticipated to have a significant impact on wetlands.

4.5.4.3 Impacts on Wildlife and Fisheries

The primary impacts of construction activities on terrestrial wildlife species are typically associated with temporary disturbances from construction activities, and with the removal of vegetation (habitat modification/fragmentation). Increased noise and equipment movement during construction may temporarily displace mobile wildlife species from the immediate workspace area. These impacts are considered short-term and normal wildlife movements would be expected to resume after construction is completed. Potential long-term impacts include those resulting from habitat modifications and/or fragmentation. During the routing process, POWER attempted to minimize potential habitat fragmentation by paralleling existing linear features and avoiding paralleling streams to the extent feasible.

Construction activities may impact small, immobile, or fossorial (living underground) animal species. Impacts to these species may occur due to equipment or vehicular movement on the ROW by direct impact or due to the compaction of the soil if the species is fossorial. Potential impacts of this type are not typically considered significant and are not likely to have an adverse effect on any species population dynamics.

If ROW clearing occurs during bird nesting season, potential impacts could occur within the ROW area related to migratory bird eggs and/or nestlings. Increases in noise and equipment activity levels during construction could also potentially disturb breeding or other activities of bird species nesting in areas adjacent to the ROW. SPS proposes to complete all ROW clearing and construction activities in compliance with the MBTA to avoid or minimize potential impacts.

Transmission lines can also present additional hazards to birds due to electrocutions and/or collisions. Playa lakes and other surface water features are common stop-over habitats for large numbers of migrating waterfowl, sandhill cranes, and other avian species. Measures can be implemented to minimize this risk with transmission line engineering designs. The electrocution risk to birds should not be significant since the engineering design distance between conductors, conductor to structure, or conductor to ground wire for the proposed transmission line is greater than the wingspan of any bird potentially occurring within the study area (i.e., greater than eight feet). While the conductors are typically thick enough to be seen and avoided by birds in flight, the shield wire is thinner and can present a higher risk for avian collision. This risk can be minimized by installing bird flight diverters or other marking devices on the line within high bird use areas.

Potential impacts to aquatic systems would include effects of erosion, siltation, and sedimentation. Clearing the ROW of vegetation might result in increased suspended solids in the surface waters traversed by the transmission line. Increases in suspended solids might adversely affect aquatic organisms that require relatively clear water for foraging and/or reproduction. Physical aquatic habitat loss or alteration could result wherever riparian vegetation is removed and also at temporary crossings required for access roads. Increased levels of siltation or sedimentation might also potentially impact downstream areas, primarily affecting filter feeding benthic and other aquatic invertebrates.

To avoid or minimize these impacts, SPS proposes to span all surface waters where practical. Additionally, the implementation of a SWPPP and BMPs will also minimize potential impacts. Therefore, no significant adverse impacts are anticipated to any aquatic habitats crossed or located adjacent to the ROW for any of the alternative routes.

Construction of the proposed transmission line is not anticipated to have direct adverse impacts to wildlife and fisheries within the study area. Direct impacts would be associated with the loss of habitat which is reflected in the vegetation analysis discussed above. Habitat fragmentation was minimized for all the alternative routes by paralleling existing linear features to the extent feasible. While highly mobile animals might be temporarily displaced from habitats near the ROW during the construction phase, normal movement patterns should return after Project construction is complete. Implementation of a SWPPP utilizing BMPs will minimize potential impacts to aquatic habitats.

4.5.4.4 Impacts to Threatened and Endangered Species

To determine potential impacts to threatened or endangered species, POWER reviewed several sources of information: Known element occurrence data for the study area was obtained from the TXNDD and Project scoping comments were received from TPWD (see Appendix A). Current county listings for federal and state listed threatened and endangered species and USFWS designated critical habitat locations were included in the review. POWER also utilized several published sources to review life histories and habitat requirements of listed species as previously discussed in Section 2.6.4.5.

Threatened and Endangered Plant Species

No federal or state listed plant species were listed for the study area counties (TPWD 2016e; USFWS 2016b). Construction of any of the alternative routes is not anticipated to impact any threatened or endangered plant species.

Threatened and Endangered Animal Species

None of the alternative routes cross any known occupied habitat or designated critical habitat for any federally listed animal species. Review of the TXNDD database did not indicate any previous occurrences of any federally listed species or state listed species along any of the proposed routes. No federally listed species for the study area counties are anticipated to occur or be impacted by construction of any of the alternative routes.

The state definition of "take" of state-listed species as defined in Section 1.01(5) of the TPWC includes activities associated with collecting, hooking, hunting, netting, shooting, or snaring by any means or device, and does not include an attempt to conduct such activities. The state listed species that may occur in the study area are the Palo Duro mouse and Texas horned lizard. The Palo Duro mouse is not anticipated to occur within the study area, due to a lack of suitable habitat. However, the Texas horned lizard is anticipated to occur within the study area where suitable habitat exists. If present, the Texas horned lizard may be subject to disturbance during construction activities. If this species is observed during construction activities, it will be allowed to leave the study area or be relocated off the ROW by a state-permitted individual.

None of the federally-listed species (interior least tern and whooping crane) nor the federally delisted species (the bald eagle and peregrine falcon), are anticipated to occur within the study area except as uncommon or rare non-breeding migrants. The listed species, such as the black-footed ferret and gray

wolf, are not anticipated to occur within the study area because they are believed to be extirpated from Texas. Therefore, construction activities are not anticipated to have negative impacts on these listed species.

It should be noted that pedestrian surveys for threatened and endangered species have not been completed for any of the alternative routes; therefore, suitable habitat for these species might occur within the ROW of any of the alternative routes. If necessary, a field survey for potential suitable habitat for all listed species will be completed after PUC approval of an alternative route. Additional consultation with USFWS and TPWD may also be required.

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5.0 ROUTE EVALUATION

The purpose of this study was to delineate and evaluate alternative routes for SPS's proposed transmission line in Hale, Hockley, Lubbock, Lynn,[2] Terry, and Yoakum Counties, Texas between the existing TUCO Substation and the existing Yoakum Substation. POWER completed an environmental analysis of 22 primary alternative routes (Section 4.0), the results of which are shown in Table 4-1. The environmental evaluation was a comparison of the alternative routes strictly from an environmental and land use impact viewpoint (i.e., land use, aesthetics, ecology, and cultural resources) based upon measurement of the environmental criteria (Table 2-1). POWER used this information to evaluate and rank the alternative routes and to recommend one alternative route that provides the best balance between potential impacts to land use, aesthetic, ecological, and cultural resource factors, and thus best balances the PURA and PUC routing criteria related to land use, aesthetics, ecology, and cultural resources. SPS considered this recommendation and along with engineering, construction, maintenance, and operational factors, cost estimates, and comments from agencies and the public, identified a route that best addresses the requirements of applicable portions of PURA and PUC Substantive Rules. POWER's alternative route evaluation process is discussed below.

5.1 POWER'S ENVIRONMENTAL EVALUATION

POWER used a consensus process to evaluate the potential environmental impacts of the alternative routes. POWER professionals with expertise in different environmental disciplines (land use, ecology, and cultural resources), as well as POWER's Project Manager, evaluated all of the alternative routes based on the environmental conditions present along each route. This evaluation was based on the evaluation criteria, comments received from the public, and local, state, and federal agencies, and a field reconnaissance of the study area from publicly accessible viewpoints. Each POWER technical expert independently analyzed the routes and the environmental data presented in Table 4-1 and then independently ranked the routes with respect to potential impacts within their respective discipline. The evaluators then met as a group and discussed their independent results within a consensus process. The group as a whole determined the relationship and relative sensitivity among the major land use, ecological, and cultural resource factors. The group then ranked the alternative routes based strictly upon the land use, aesthetics, ecology, and cultural resource environmental data considered.

The evaluators agreed that all of the alternative routes were viable and acceptable from an overall land use, aesthetic, ecology, and cultural resource perspectives. The evaluators each ranked the alternatives from 1st to 22nd (with 1st having the least potential impact and 22nd the greatest potential impact) from the perspective of their own area of expertise. The results of these rankings are summarized in Table 5-1.

[2] No primary alternative routes are located in Lynn County.

TABLE 5-1 POWER'S ENVIRONMENTAL RANKING OF THE ALTERNATIVE ROUTES

	RANKING				
Alternative Route	Land Use Specialist	Ecology Specialist	Cultural Resources Specialist	Project Manager	Consensus
A	12	22	21	9	16
B	6	20	14	10	9
C	8	21	22	7	8
D	4	3	21	2	2
E	13	18	8	12	12
F	2	7	19	3	3
G	9	15	7	6	6
H	3	13	2	4	4
I	16	19	13	13	11
J	19	11	16	14	18
K	14	5	18	11	17
L	1	1	20	1	1
M	5	8	9	5	5
N	7	16	15	15	15
O	10	10	5	8	7
P	17	2	3	16	10
Q	15	9	4	18	14
R	20	4	6	22	21
S	18	17	12	19	19
T	11	14	1	17	13
U	21	12	10	20	20
V	22	6	11	21	22

The land use evaluation placed the greatest importance on the length paralleling existing transmission lines, length paralleling existing compatible ROW, and length paralleling apparent property lines. Secondary evaluation criteria included overall length of the route and the number of habitable structures located within 500 feet of the proposed ROW centerline. The land use specialist ranked Alternative Routes L, F, and H as having the least potential land use impact and Alternative Routes V, U and R, as having the greatest potential land use impact.

The ecological evaluation was based primarily on the total length of each route, length parallel to existing transmission lines, and percent parallel to other linear features to reduce fragmentation. The length across NWI mapped wetlands and the number of stream crossings, were secondary considerations. The ecologist ranked Alternative Routes L, P, and D as having the least potential ecological impact and Alternatives Route A, C, and B as having the greatest potential ecological impact.

The cultural resources evaluation was based on the number of archeological sites crossed by and located within 1,000 feet of the alternative routes, and the amount of HPA crossed by the alternative routes. Because Alternative Routes T, H, and P cross no recorded archeological sites, and cross relatively short lengths of HPA, they were identified as the alternative routes with the least potential impact from a cultural resources perspective. Alternative Routes K, F, L, D, and C, each cross one recorded archeological site and cross relatively high amounts of HPA, so are ranked as having the greatest potential impact from a cultural resources perspective.

The POWER Project Manager also ranked the alternative routes, considering all of the evaluation criteria. Given the nature of the study area, paralleling of existing ROW/apparent property lines, the overall length of the alternative route as well as proximity to habitable structures were considered key factors. Potential impact avoidance and minimization measures typically employed during the construction of a new transmission line (e.g., whether a feature could be spanned to minimize potential impacts) were also taken into account. Alternative Routes L, D and F were selected by the POWER Project Manager as the best-balanced routes considering all the evaluation criteria reviewed.

Based on group discussion of the relative value and importance of each set of criteria (land use, ecology, and cultural resources) for this specific project, it was the consensus of the POWER evaluators that the total length of the route, length paralleling existing compatible ROWs, and the number of habitable structures within 500 feet of each route centerline would be considered the primary key factors in their selection of the route that best meets the criteria of PURA and PUC Substantive Rules. Secondary evaluation criteria included the length of each route crossing croplands, length of route within HPA for cultural resources and number of stream crossings.

Based on these criteria, the group selected Alternative Route L as the alternative route that best addresses PURA and PUC environmental routing criteria and then agreed on ranking the remaining alternative routes. The next top four alternative routes, Alternative Routes D, F, H, and M (in order of ranking), were determined to have the least potential cumulative impacts. The ranking of the alternative routes is presented in Table 5-1. All the geographically diverse alternative routes are considered viable acceptable routes.

POWER's recommendation of Alternative Route L as the route that best balances the PURA and PUC routing criteria related to land use, aesthetics, ecology, and cultural resources, is supported by the following evaluation criteria. Alternative Route L:

- Has the shortest overall length.
- Runs parallel to existing compatible corridors and apparent property boundaries (excluding pipelines) for approximately 92 percent of its length.
- Has the longest length of ROW parallel to existing transmission lines.
- Has no length of ROW across known habitat of federally listed endangered or threatened species.
- Crosses no parks/recreational areas.
- Has no cemeteries within 1,000 feet of the ROW centerline.
- Has no heliports within 5,000 feet of the ROW centerline.
- Has no commercial AM radio transmitters located within 10,000 feet of the ROW centerline.
- Has no length of ROW through upland woodlands.
- Has no length of ROW through bottomland/riparian woodlands.
- Has no length of ROW across open water (lakes, ponds).
- Has no river crossings.
- Has no crossings of National Register of Historic Places listed properties.
- Has no additional National Register of Historic Places listed properties within 1,000 feet of ROW centerline.

POWER's Project Director reviewed all of the data and evaluations produced by the Project Manager and task managers and concurred with the rankings and recommendations for the alternative routes.

Therefore, based upon its evaluation of this Project and its experience and expertise in the field of transmission line routing, POWER recommends Alternative Route L from an overall environmental perspective and the remaining routes as alternatives. Considering all pertinent factors, it is POWER's opinion that Route L best addresses the criteria related to land use, aesthetics, ecology, and cultural resources, specified in PURA § 37.056(c)(4) and the PUC Substantive Rules, and that the remaining routes or other combinations of proposed links are acceptable alternatives.

5.2 ROUTE SELECTION

Following POWER's review of the 22 primary alternative routes, SPS undertook a further evaluation to consider the reliability, constructability, operation, maintenance, and the cost to construct each alternative route. The final evaluation by the SPS Project team resulted in the identification of Alternative Route L as the route that SPS believes best addresses the requirements of PURA and PUC Substantive Rules for reasons including those identified above by POWER, and because it is the least expensive route based on estimated costs, has the 4th fewest habitable structures within 500 feet of the centerline, and has the 3rd fewest number of transmission line crossings. While all proposed alternative routes and combinations of links comprising those routes are viable and constructible, both SPS and POWER believe that Alternative Route L best addresses the requirements of PURA and PUC Substantive Rules.

6.0 LIST OF PREPARERS

This EA was prepared for SPS by POWER. A list of the POWER employees with primary responsibilities for the preparation of this document is presented below.

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