ATTACHMENT 1

ENVIRONMENTAL ASSESSMENT AND ALTERNATIVE ROUTE ANALYSIS FOR THE 345 KV SPACE CITY SOLAR PROJECT IN WHARTON COUNTY, TEXAS

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December 2020

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC

345 kV Space City Solar Project
Environmental Assessment and Alternative Route Analysis

Wharton County, Texas

PROJECT NUMBER:
166612

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345 kV Space City Solar Project

PREPARED FOR: *CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC*

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HOUSTON, TEXAS

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EXECUTIVE SUMMARY

CenterPoint Energy Houston Electric, LLC ("CenterPoint Energy") proposes to construct a new 345 kilovolt ("kV") single-circuit transmission line on double-circuit capable structures located in Wharton County, Texas, that would connect EDF Renewables Development Inc.'s planned Space City Solar Interconnection Substation (29.013450 - -96.288531) located at the northeast corner of the intersection of Farm-to-Market Road ("FM") 3086 and County Road ("CR") 434 to the existing Hillje Substation (29.029634 - -96.235950) located approximately 1.7 miles west of State Highway ("SH") 71. CenterPoint Energy retained POWER Engineers, Inc. ("POWER") to prepare this Environmental Assessment and Alternative Route Analysis to support the Public Utility Commission of Texas ("PUC") application for a Certificate of Convenience and Necessity for the proposed project.

POWER, with input from CenterPoint Energy, identified the study area boundaries utilizing the two endpoints, as well as potential paralleling features and constraints. CenterPoint Energy provided the location of existing 138 kV and 345 kV transmission line corridors. Data collection was conducted to identify the environmental and land use constraints within the study area that were pertinent to the identification of preliminary transmission line segments. Data collection activities included a review of readily available data, coordination with federal and state regulatory agencies and local officials, and reconnaissance surveys from public viewpoints. POWER and CenterPoint Energy initially identified 16 geographically diverse preliminary transmission line segments. Input received from local agencies and reconnaissance surveys in conjunction with consideration of the project objectives, including geographic diversity, resulted in the identification of seven proposed alternative routes.

The potential environmental and land use impacts for each proposed alternative route were tabulated by POWER for each evaluation criteria. CenterPoint Energy provided the engineering review and estimated construction cost for each proposed alternative route. POWER compared seven proposed alternative routes and determined that Proposed Alternative Route 3 is the proposed alternative route that best addresses the requirements of the Public Utility Regulatory Act ("PURA") and the PUC Substantive Rules.

CenterPoint Energy provided input and review throughout the routing study process and agreed that Proposed Alternative Route 3 is the proposed alternative route that best addresses the requirements of the PURA and the PUC Substantive Rules.

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ACRONYMS AND ABBREVIATIONS:

AM radio	Amplitude Modulation radio
amsl	above mean sea level
BEG	Bureau of Economic Geology
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practices
B.P.	Before Present
CCN	Certificate of Convenience and Necessity
CenterPoint Energy	CenterPoint Energy Houston Electric, LLC
CFR	Code of Federal Regulations
CMP	Texas Coastal Management Program
CR	County Road
CWA	Clean Water Act
DoD	United States Department of Defense
EA	Environmental Assessment and Alternative Route Analysis
ESA	Endangered Species Act
ESSS	Ecologically Significant Stream Segment
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FM	Farm-to-Market Road
FM radio	Frequency Modulation radio
GIS	Geographic Information Systems
GLO	Texas General Land Office
HPA	high probability area
IPaC	Information for Planning and Consultation
ISD	Independent School District
kV	kilovolt
MBTA	Migratory Bird Treaty Act
ME	miscellaneous easement
NAIP	National Agriculture Imagery Program
NCED	National Conservation Easement Database
NEPA	National Environmental Policy Act
NESC	National Electrical Safety Code
NHPA	National Historic Preservation Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
NWP	Nationwide Permit
OTHM	Official Texas Historical Marker
PEM	Palustrine emergent
PFO	Palustrine forested

POWER	POWER Engineers, Inc.
Project	345 kV Space City Solar Project
PSS	Palustrine shrub-shrub
PUC	Public Utility Commission of Texas
PURA	Public Utility Regulatory Act
RHA	Rivers and Harbors Act of 1897
ROW	right-of-way
RRC	Railroad Commission of Texas
SAL	State Antiquities Landmark
SH	State Highway
SHPO	State Historic Preservation Office
Staff	PUC Staff
SWPPP	Stormwater Pollution Prevention Plan
TAC	Texas Administrative Code
TARL	Texas Archeological Research Laboratory
TASA	Texas Archeological Site Atlas
TCEQ	Texas Commission on Environmental Quality
THC	Texas Historical Commission
THSA	Texas Historical Site Atlas
TLC	Texas Land Conservancy
TNC	The Nature Conservancy
TPDES	Texas Pollution Discharge Elimination System
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
TxDOT	Texas Department of Transportation
TXNDD	Texas Natural Diversity Database
TXSDC	Texas State Data Center
US	United States
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USCB	United States Census Bureau
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
WOTUS	Waters of the United States

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1.0 DESCRIPTION OF THE PROPOSED PROJECT

1.1 SCOPE OF THE PROJECT

CenterPoint Energy Houston Electric, LLC ("CenterPoint Energy") proposes to construct a new 345 kilovolt ("kV") single-circuit transmission line on double-circuit capable structures located in Wharton County, Texas, also referred to as the 345 kV Space City Solar Project ("Project"). See Figure 1-1 for a map of the Project vicinity. The new transmission line will connect EDF Renewables Development, Inc.'s planned Space City Solar Interconnection Substation located at the northeast corner of the intersection of Farm-to-Market Road ("FM") 3086 and County Road ("CR") 434 to the existing Hillje Substation located approximately 1.7 miles west of State Highway ("SH") 71.

CenterPoint Energy retained POWER Engineers, Inc. ("POWER") to prepare this Environmental Assessment and Alternative Route Analysis ("EA") to support the application for a Certificate of Convenience and Necessity ("CCN") for the Project. This EA discusses the environmental and land use constraints identified within the study area, documents routing methodologies and public involvement, and provides an evaluation of alternative routes. This document provides information in compliance with the requirements of Section 37.056(c)(4)(A)-(D) of the Public Utility Regulatory Act ("PURA"), the Public Utility Commission of Texas ("PUC") CCN application form, and 16 Texas Administrative Code ("TAC") § 22.52 and § 25.101. The EA may also be used to support any additional local, state, or federal permitting activities that may be required for construction of the Project.

To assist POWER with the evaluation of the Project, CenterPoint Energy provided POWER with the Project endpoints, information regarding the need for the Project, CenterPoint Energy's construction practices and right-of-way ("ROW") requirements. CenterPoint Energy also provided information regarding engineering and design requirements, as well as estimated cost information associated with the proposed alternative routes.

1.2 AGENCY ACTIONS

Numerous federal, state and local regulatory agencies have rules and regulations regarding the routing process and potential impact assessment associated with construction of high voltage electrical transmission lines. This section describes the major regulatory agencies and issues that are involved in planning and permitting of transmission lines within the state of Texas. POWER solicited Project scoping comments from various regulatory agencies during the development of the EA. Records of correspondence are provided in Appendix A.

1.2.1 Public Utility Commission of Texas

The PUC regulates the routing of transmission lines in Texas under Section 37.056(c)(4)(A)-(D) of PURA. The PUC regulatory rules and guidelines for routing transmission lines include:

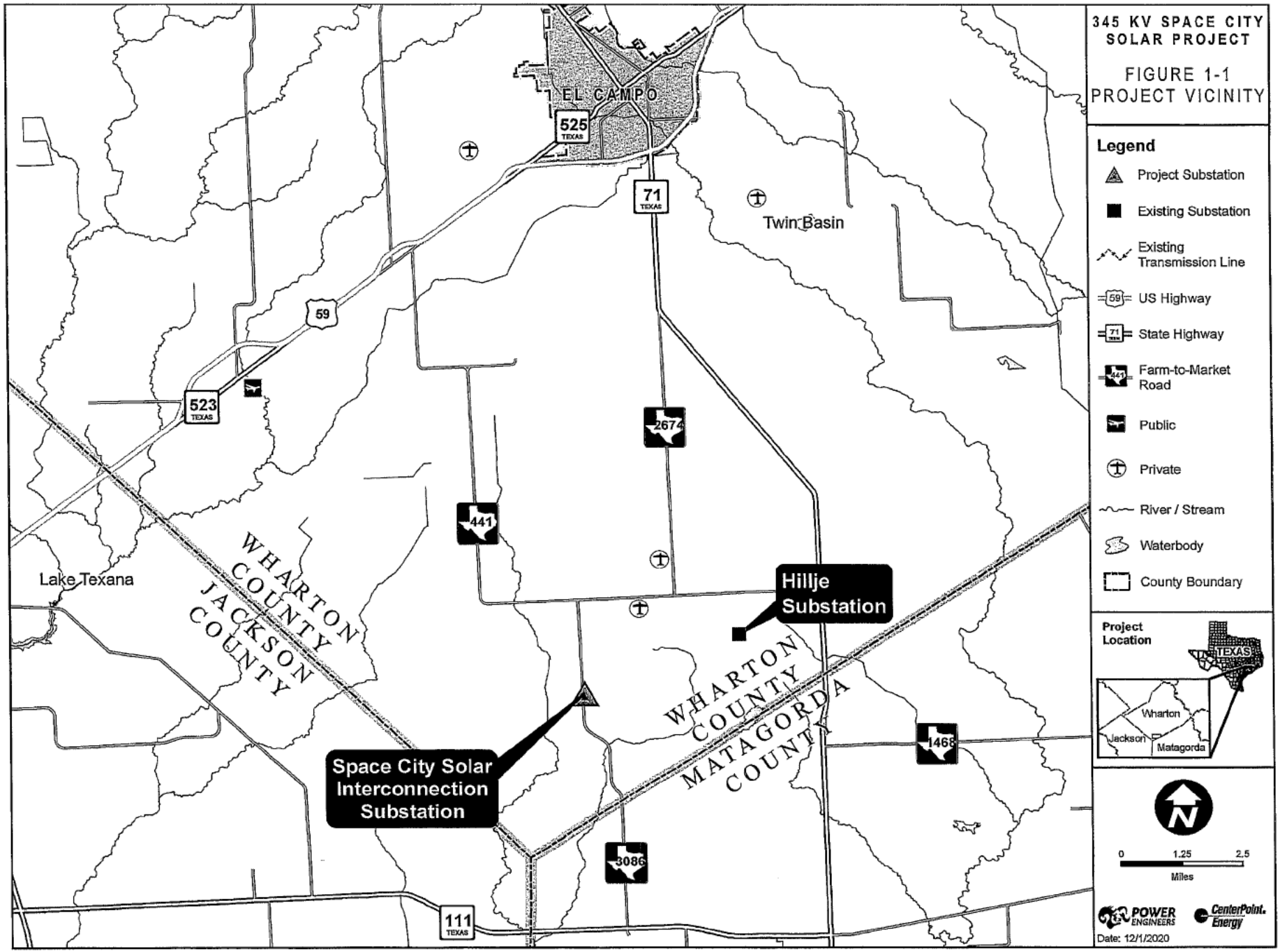
- 16 TAC § 25.101(b)(3)(B)
- 16 TAC § 22.52(a)
- Policy of prudent avoidance
- CCN application requirements

This EA has been prepared by POWER in support of CenterPoint Energy's CCN application for this Project to be filed at the PUC for approval.

1.2.2 United States Army Corps of Engineers

The United States Army Corps of Engineers ("USACE") has been directed by Congress to administer Section 10 of the Rivers and Harbors Act ("RHA") of 1899 (33 United States Code [U.S.C.] §403) and Section 404 of the Clean Water Act ("CWA") (33 U.S.C. §1344). Under Section 10 of the RHA, the USACE regulates all work or structures in or affecting the course, condition, or capacity of navigable waters of the United States ("WOTUS"). The intent of this law is to protect the navigable capacity of waters important to interstate commerce. Under Section 404 of the CWA, the USACE regulates the discharge of dredge and fill material into WOTUS, including associated wetlands. The purpose of Section 404 is to protect the nation's waters from indiscriminate discharge and to minimize the potential adverse impacts and degradation of the WOTUS and aquatic ecosystems.

Although the USACE-Galveston District does not publish a list of designated Section 10 (navigable) surface waters, based on POWER's extensive permitting experience with the USACE-Galveston District, no Section 10 surface waters are anticipated to occur within the study area. A review of the National Wetland Inventory ("NWI") maps indicated numerous emergent, scrub/shrub, and forested/shrub wetlands, which may be considered jurisdictional by the USACE, occur throughout the study area.



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Upon PUC approval of a route, additional coordination, jurisdictional wetland verifications, and permitting with the USACE-Galveston District for a Section 404 Permit may be required if the approved route is to be constructed within potential jurisdictional areas. If the facilities are constructed within jurisdictional areas, the construction of the Project may meet the conditions of Nationwide Permit ("NWP") No. 12 - Utility Line Activities. NWP 12 authorizes activities for the construction, repair and removal of utility lines and associated facilities (i.e., substations, foundations and access roads) in WOTUS, provided the general and regional conditions of the permit are met.

1.2.3 United States Fish and Wildlife Service

The United States Fish and Wildlife Service ("USFWS") is charged with the responsibility of enforcement of federal wildlife laws and providing comments on proposed construction projects with a federal nexus under the National Environmental Policy Act ("NEPA"), 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 USFWS listed species for Wharton County. No known populations of any species protected under the ESA were identified within the study area. The lack of data does not indicate the absence of any listed species or potential habitats within the study area. Bald eagles *(Haliaeetus leucocephalus)* may occur within the study area. Although no longer protected under the ESA, bald eagles are still afforded protection by the BGEPA and MBTA.

Upon PUC approval of a route, coordination with the USFWS Texas Coastal Ecological Services Field Office may be required to determine the need for any required species-specific surveys or additional permitting under the MBTA or Sections 10 of the ESA.

1.2.4 Federal Aviation Administration

According to Federal Aviation Administration ("FAA") regulations, Title 14 Code of Federal Regulations ("CFR") Part 77.9, the construction of a transmission line requires FAA notification if a transmission tower structure height will exceed 200 feet or the height of an imaginary 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 each airport described in paragraph (d) of 14 CFR Part 77.9 having at least one runway longer than 3,200 feet, excluding heliports.

- A 50:1 slope for a horizontal distance of 10,000 feet from the nearest runway of a public or military airport described in paragraph (d) of 14 CFR Part 77.9 where its longest runway is no longer than 3,200 feet in length, excluding heliports.

- A 25:1 slope for a horizontal distance of 5,000 feet for heliport described in paragraph (d) of 14 CFR Part 77.9.

Paragraph (d) of 14 CFR Part 77.9 includes public-use airports listed in the Airport/Facility Directory (currently the Chart Supplement), public-use or military airports under construction, airports operated by a federal agency or Department of Defense ("DoD"), or an airport or heliport with at least one FAA-approved instrument approach procedure.

Notification is not required for structures that will be shielded by existing structures of a permanent and substantial nature or by natural terrain or topographic features of equal or greater height and will be located in a congested area of a city, town or settlement where the shielded structure will not adversely affect safety in air navigation.

If any of the FAA notification criteria are met for the route approved for construction, 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. The result of this notification, and any subsequent coordination with the FAA, could include changes in line design and/or potential requirements to mark and/or light the structures.

1.2.5 Military Aviation and Installation Assurance Siting Clearinghouse

The United States DoD Military Aviation and Installation Assurance Siting Clearinghouse (previously the United States DoD Siting Clearinghouse) works with industry to overcome risks to national security while promoting compatible domestic energy development. Energy production facilities and transmission projects involving tall structures, such as electrical transmission towers, may degrade military testing and training operations. The electromagnetic interference from electricity transmission lines can impact critical DoD testing activities. Title 16 TAC § 22.52 states that upon filing of the application, the DoD shall be notified and an affidavit attesting to the notification shall also be provided with the application. The DoD shall also be provided written notice of the public meeting and if a public meeting is not held, the DoD shall be noticed of the planned filing of the application prior to the completion of the routing study.

1.2.6 Texas Parks and Wildlife Department

The Texas Parks and Wildlife Department ("TPWD") is the state agency with the primary responsibility of protecting the state's fish and wildlife resources in accordance with the Texas Parks and Wildlife Code Section 12.0011(b), 64.003, 68.015 and 1.011. POWER solicited comments from the 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. POWER also reviewed the Texas Natural Diversity Database ("TXNDD") records of state-listed species occurrences and rare vegetation communities. POWER considered these during the route development process. Once the PUC approves a route, CenterPoint Energy will complete a field review of the proposed ROW to determine potential impacts to any state-listed species prior to construction. Based on these results, additional coordination with TPWD may be necessary to determine avoidance measures to state-listed threatened or endangered species, and other state regulated fish and wildlife resources.

1.2.7 Floodplain Management

Flood Insurance Rate Maps, published by the Federal Emergency Management Agency ("FEMA"), were reviewed (FEMA 2020) to determine floodplain boundaries within the study area. The mapped 100-year floodplains are associated with the larger creeks and streams or rivers within the study area. The 100-year floodplain represents a flood event that has a one percent chance of being equaled or exceeded for any given year. Construction of the proposed transmission line is not anticipated to create any significant changes in the existing topographical grades and is not anticipated to significantly alter existing flow regimes within the floodplain. Coordination with the Wharton County floodplain administrator will be completed after the PUC route approval to determine if any permits are necessary.

1.2.8 Texas Commission on Environmental Quality

The Texas Commission on Environmental Quality ("TCEQ") is the state agency with the primary responsibility for protecting the state's water quality. The construction of the Project may require a Texas Pollution Discharge Elimination System ("TPDES") General Construction Permit (TXR150000) as implemented by the TCEQ under the provisions of Section 402 of the CWA and Chapter 26 of the Texas Water Code. Construction activities will be compliant with the TXR150000 permit conditions.

1.2.9 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 CFR Part 60) or under state guidance (13 TAC § 2.26 (7-8). Chapter 26 of the TAC requires state agencies and political subdivisions of the state to

notify the Texas Historical Commission ("THC") of ground-disturbing activity on public land. POWER contacted the THC to identify known cultural resources within the study area boundary. POWER also reviewed Texas Archeological Research Laboratory ("TARL") records for known locations of archeological sites and the THC's online, restricted-access Texas Archeological Sites Atlas ("TASA") and Texas Historical Sites Atlas ("THSA") for the locations of recorded cemeteries, NRHP properties, State Antiquities Landmarks ("SALs") and Official Texas Historical Markers ("OTHMs"). Once a route is approved by the PUC, depending on a state or federal nexus, additional coordination with the THC will occur, if required, to determine the need for cultural resource surveys or additional permitting requirements. CenterPoint Energy will implement an unanticipated discovery procedure during construction activities. If artifacts are discovered during construction, activities will cease in the area of discovery and CenterPoint Energy will notify the State Historic Preservation Office ("SHPO") for additional consultation.

1.2.10 Texas Department of Transportation

The Texas Department of Transportation ("TxDOT") has been notified of the Project. If the route approved by the PUC crosses TxDOT roadways, the Project will be constructed in accordance with the rules, regulations, policies and expansion plans of TxDOT. Best Management Practices ("BMPs") will be used, as required, to minimize erosion and sedimentation resulting from the construction. Revegetation will occur within existing TxDOT ROWs 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.

1.2.11 Texas General Land Office

The Texas General Land Office ("GLO") requires a miscellaneous easement ("ME") for ROWs within any state-owned riverbeds and navigable streams (non-tidal). A ME will be required if the approved Project ROW crosses areas meeting these criteria. After PUC route approval, additional coordination with the Texas GLO may be required to determine the need for any MEs.

The Texas GLO administers the Texas Coastal Management Program ("CMP") which intends to help ensure the environmental and economic well-being of the Texas coast within the CMP boundary through proper management of coastal natural resource areas. The CMP boundary, as defined by 31 TAC § 503.1, delineates the coastal zone of Texas. The Texas CMP has federal and state project and permit action review processes to evaluate consistency with the program. The Project is not located within the coastal management zone (GLO 2020).

1.3 DESCRIPTION OF PROPOSED DESIGN AND CONSTRUCTION

1.3.1 Structure Design

CenterPoint Energy proposes to predominantly use double-circuit capable steel lattice towers with a vertical phase configuration in a 100-foot-wide ROW and transitioning to a 180-foot-wide ROW when approaching and crossing below existing transmission lines for all of the proposed alternative routes. Depending on the terrain and other considerations, such as the length of span between structures and clearance requirements needed to cross streams, wetland areas, utility crossings and roadway crossings, CenterPoint Energy may require wider ROW widths and alternative structure types (e.g., tubular steel poles or flat-tap poles). ROW widths may also vary depending on FAA determination. The exact location or extent of the different structure types and ROW widths cannot be determined until the PUC approves a route, surveys are conducted, and more detailed engineering designs are completed.

Construction of lattice towers will require drilled shaft foundations made of steel-reinforced concrete. The span length between lattice tower structures will be approximately 850 feet. Typical lattice tower height with a vertical phase configuration will have a height range of approximately 151 to 181 feet depending on terrain and required National Electrical Safety Code ("NESC") clearances (Figure 1-2).

Construction of tubular steel poles will require drilled shaft foundations made of steel-reinforced concrete. Typical steel poles will have a height range of approximately 150 to 180 feet and have a span length of approximately 850 feet (Figure 1-3).

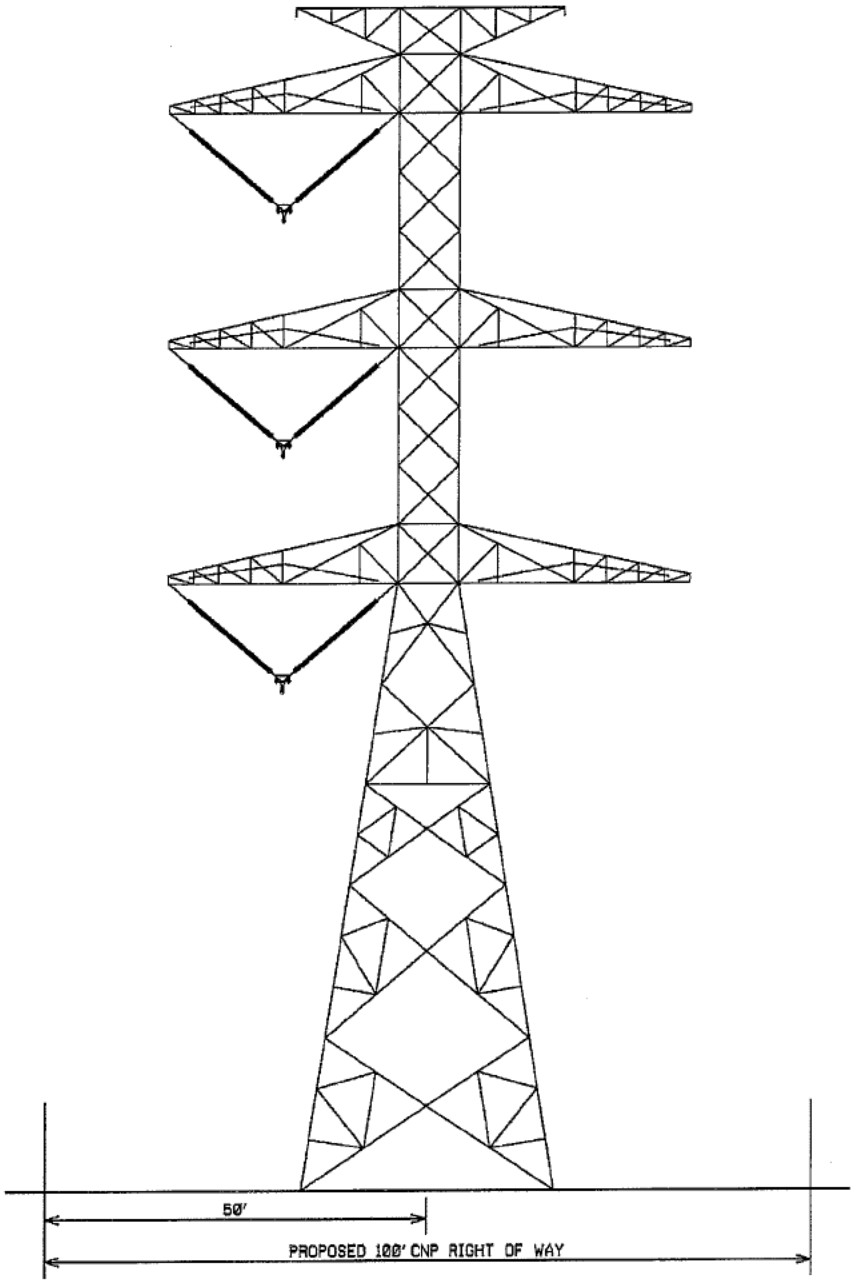
CNP proposes to use flat-tap tubular steel poles to dip under existing transmission lines. Construction of flat-tap tubular steel poles will require drilled shaft foundations made of steel-reinforced concrete. Typical single flat-tap tubular poles will have a height range of approximately 45 to 65 feet and have a span length of approximately 200 to 850 feet (Figure 1-4).

The exact range of different structure heights cannot be determined until a route is approved by the PUC, surveys are conducted, and more detailed engineering designs are completed.

1.3.2 Surveying

Surveying of the transmission line ROW is required to locate the centerline, the structure locations, obstacles above and below ground, and the edges of both new and existing ROW. Surveying will be conducted after the PUC approves a route.

151' to 181' Typical Structure Height



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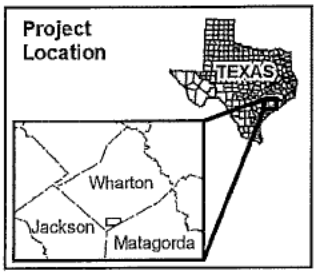

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FIGURE 1-2
TYPICAL 345 KV DOUBLE-CIRCUIT CAPABLE VERTICAL STEEL TOWER WITHIN NEW ROW

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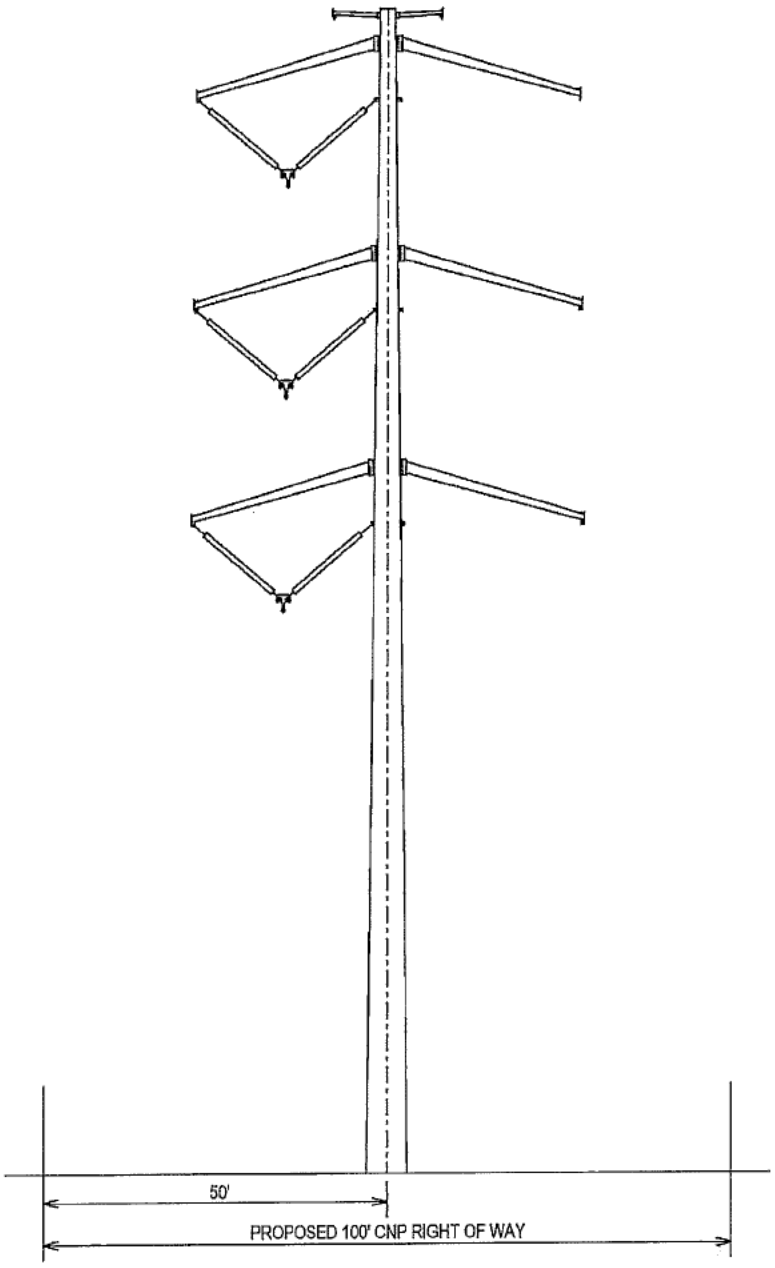
150' to 180' Typical Structure Height



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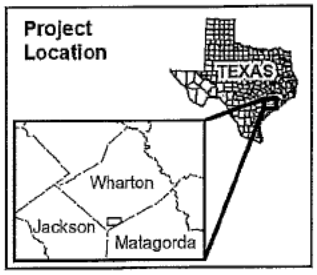

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FIGURE 1-3
TYPICAL 345 KV DOUBLE-CIRCUIT CAPABLE VERTICAL STEEL POLE WITHIN NEW ROW

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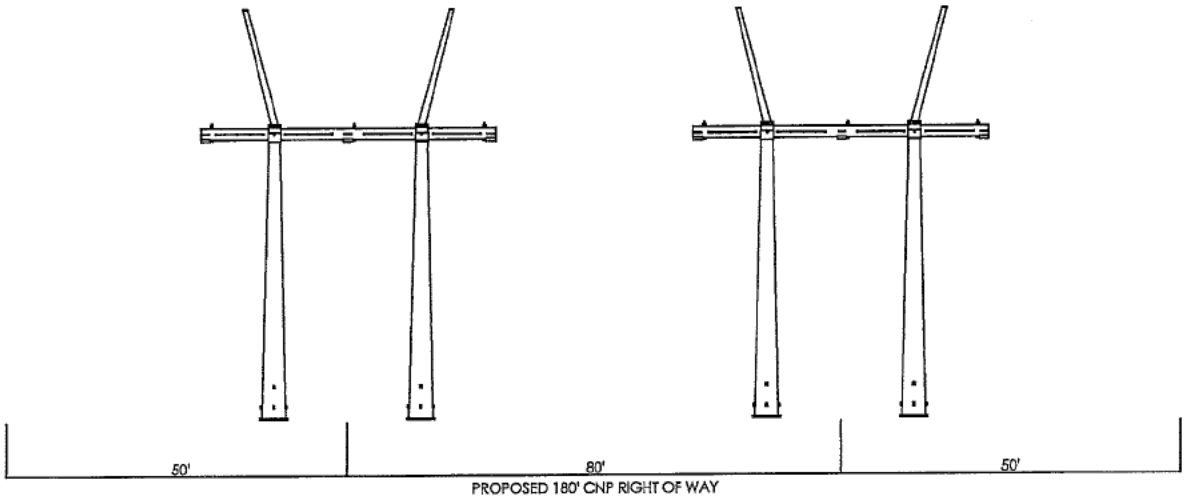
45' to 65' Typical Structure Height



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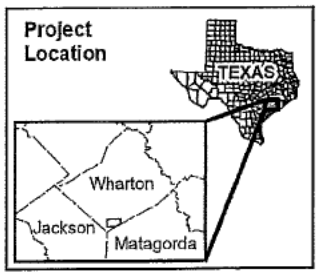

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FIGURE 1-4
TYPICAL 345 KV SINGLE-CIRCUIT HORIZONTAL FLAT TAP STEEL POLE WITHIN NEW ROW

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1.3.3 Clearing

Tree and shrub clearing may be needed in areas where new ROW is acquired. If a Stormwater Pollution Prevention Plan ("SWPPP") is required, it will be implemented along the approved route prior to the start of clearing. Mechanized cutters and hand tools will be used to remove impeding vegetation to ground level.

1.3.4 Structure Placement

Specialized wide-track vehicles, tractor trailers and line trucks with trailers will be used to transport construction materials along the ROW to the structure locations. Typically, the concrete foundations will be installed before the steel lattice towers or steel poles are erected to allow the foundations to cure and reach adequate strength.

Steel pole sections will be delivered to the site location shortly before the poles are ready to be set. A large crane would then set the pole sections onto the foundation. The steel lattice towers will be delivered in bundles and set next to the proposed structure location shortly before structure erection. The towers will be assembled on-site and a crane will be used to set the sections onto the previously installed foundations.

1.3.5 Conductor and Static Wire Installation

Once the structures have been erected, the stringing and clipping-in of conductors and static wires will begin. Outages are not anticipated during the conductor and static wire installation. Each road crossing will have temporary guard structures and/or conductor shields installed for public and laborer protection while stringing in the new conductors. Existing transmission and distribution circuits will have temporary guard structures and/or conductor shields installed for public and laborer protection while stringing in the new conductors.

1.3.6 Cleanup

Cleanup operations will be performed as construction activities are completed. Cleanup includes removal of debris, unused materials and trash. Any necessary soil stabilization and reestablishing of vegetation cover will also occur during cleanup, following the procedures dictated in the SWPPP, if required. Pre-construction contours will also be restored following construction.

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2.0 DESCRIPTION OF THE STUDY AREA

POWER identified the study area boundary, considering the identified endpoints: CenterPoint Energy's existing Hillje Substation and EDF Renewables Development Inc.'s planned Space City Solar Interconnection Substation. The study area boundary is depicted in Figure 2-1.

The study area was defined to provide an area large enough to develop an adequate set of geographically diverse alternative routes. The eastern study area boundary is defined by the location of the Hillje Substation and is located west of SH 71. The western study area boundary is defined by the planned location of the Space City Solar Interconnection Substation and parallels the west side of CR 307. The northern study area boundary parallels FM 441. The southern study area boundary is defined by the Wharton and Matagorda County line; a portion of the boundary parallels the southern side of CR 330. The study area boundaries are defined to provide adequate room for the development of a set of geographically diverse routing alternatives east to west, and the need to minimize potential land use conflicts within the study area.

To describe the environmental setting of the study area, land use and environmental resource data was collected for community values and environmental integrity.

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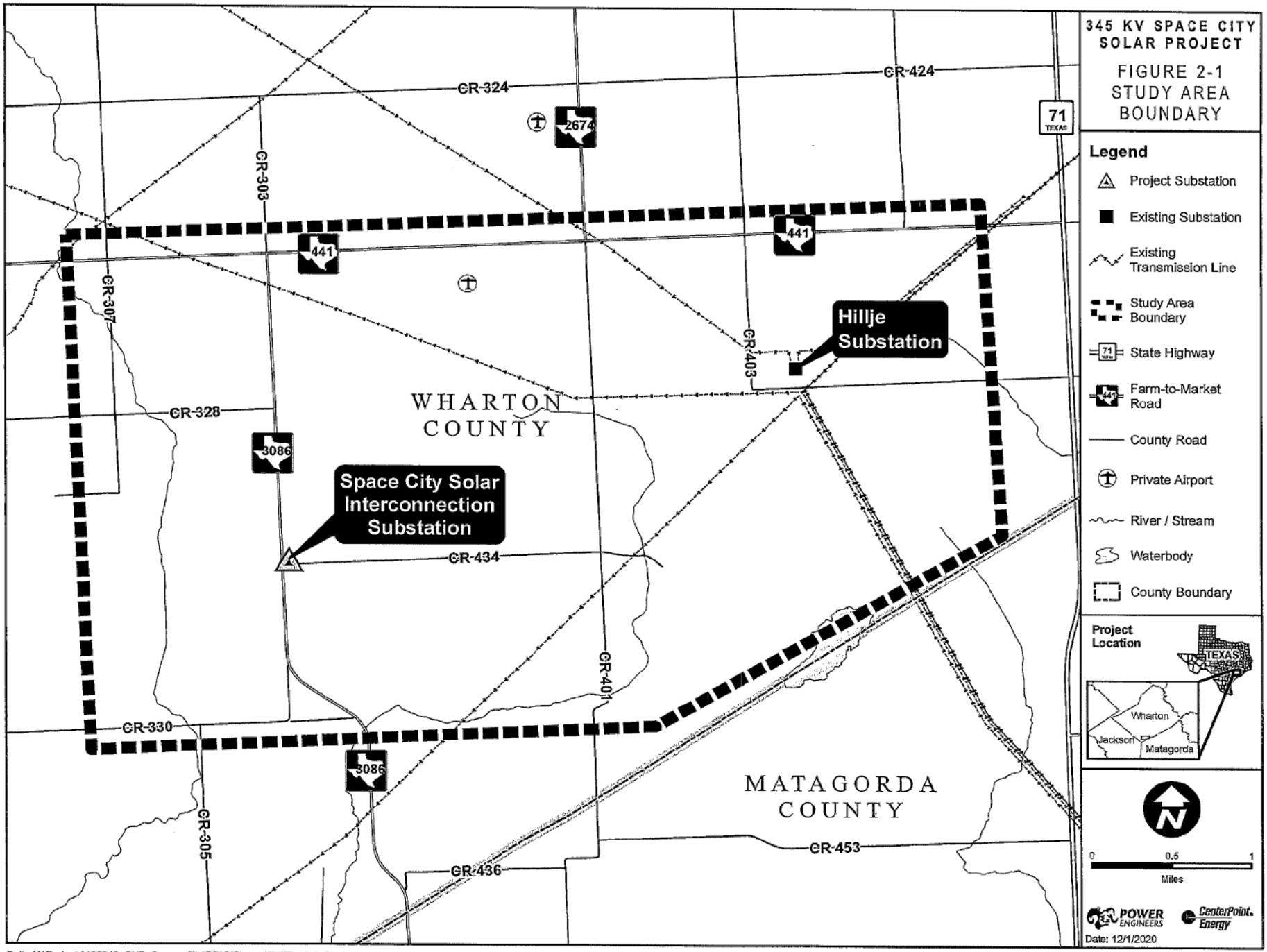

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2.1 COMMUNITY VALUES

The term "community values" has not been formally defined for regulatory purposes by the PUC but is included as a consideration for transmission line certification under Section 37.056(c)(4)-(A-D) of PURA. In several dockets, the PUC has used the following as a working definition: "the term 'community values' may be interpreted as a shared appreciation of an area or other natural resource by a national, regional or local community." The PUC CCN application requires information related to the following items that may provide indications of community value impacts:

- Public meeting or public open house required by 16 TAC § 22.52.
- Approval or permits required from other governmental agencies.
- Brief description of the area traversed.
- Habitable structures within 500 feet of the centerline for a 345 kV transmission line.
- Amplitude Modulation ("AM") radio, Frequency Modulation radio ("FM radio"), microwave and other electronic installations in the area.
- FAA-registered airstrips, private airstrips and heliports located in the area.
- Irrigated pasture or croplands utilizing center-pivot or other traveling irrigation systems.

POWER collected this information and evaluated the study area for community values that may be of importance to a particular community. Examples of a particular community value would be avoidance of a park or recreational area, historical or archeological site or a scenic vista, which can be related to aesthetics. Community values data were collected for land use, recreational and park areas and historical and aesthetic values. Recreational and park areas and historical and aesthetic values are further discussed in more detail in Sections 2.2 and 2.3. POWER also mailed consultation letters to local officials to obtain insight into community values from appointed and elected officials.

2.1.1 Land Use

Land jurisdiction is defined as the control maintained by major landholders or land managers. Jurisdiction does not necessarily represent ownership. Potential conflicts could arise from crossing jurisdictional boundaries that were evaluated in this study. For example, a 345 kV transmission line crossing publicly held land may cause a conflict with ongoing planning processes or a land management plan. Land jurisdictions were identified and delineated primarily from geographic information system ("GIS") metadata (National Agricultural Imagery Program ["NAIP"] 2018; PLATTS 2020; Wharton County Appraisal District 2020).

Existing land data collected included urban and residential areas, agriculture, oil and gas facilities, planned land use, transportation, aviation, utilities and communication towers. The primary sources of land use information were obtained from interpretation of aerial photographs, United States Geological Survey ("USGS") topographical maps and field reconnaissance surveys. In addition, the economic and demographic characteristics within the study area counties were gathered and are further discussed under Socioeconomics in Section 2.1.2.

2.1.1.1 Urban and Residential Areas

The urban and residential classification 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 institutional, commercial and industrial land uses.

The PUC definition of a habitable structure was used for this routing study. 16 TAC § 25.101(a)(3) defines habitable structures as "structures 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 and related structures, mobile homes, apartment buildings, commercial structures, industrial structures, churches, hospitals, nursing homes and schools." Habitable structures were identified using aerial photographs (NAIP 2018) supplemented with readily available websites with aerial imagery, including Google Earth, Bing and reconnaissance surveys from public points of view (Google Earth 2020).

Low, Medium and High Intensity developed areas were identified using aerial photograph interpretation and reconnaissance surveys. These classifications are described below:

- **Low Intensity** areas typically include rural settings with single-family housing units.
- **Medium Intensity** areas typically include single-family housing units that are grouped in residential subdivisions and may include peripheral commercial structures.
- **High Intensity** areas include highly developed areas where people reside or work in high numbers. Examples include apartment complexes and commercial or industrial parks.

The study area is generally located between the City of El Campo in Wharton County and the Town of Midfield in Matagorda County. Existing developments include industrial, residential and commercial developments concentrated along major roadway corridors, including FM 441 and FM 3086. No

developed medium intensity areas or high intensity areas were identified in the study area. The study area is defined by low intensity development; single family residences are scattered throughout the study area.

Schools

The study area is located within the El Campo Independent School District ("ISD") and Louise ISD. No schools were identified within the study area (Texas Education Agency 2020).

2.1.1.2 Planned Land Use

The planned land use component identifies objectives and policies regarding land use goals and plans, including conservation easements, managed lands and proposed developments. Cities and counties typically prepare comprehensive land use plans to provide strategic direction for an individual city or county. The website for Wharton County was reviewed and correspondence was submitted to county officials to identify any planned land use conflicts. No comprehensive land use plans were identified within the study area.

Conservation Easements

A conservation easement is a restriction that 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 or 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 owner's allowances for additional developments on the land. The land trusts facilitate the easement and ensure compliance with the specified terms and conditions.

A review of non-governmental groups (e.g., National Conservation Easement Database ["NCED"], The Nature Conservancy ["TNC"] and Texas Land Conservancy ["TLC"]) that are land trusts and hold databases for conservation easements within Texas indicated there were no conservation easements within the study area (NCED 2020; TNC 2020; TLC 2020).

2.1.1.3 Agriculture

The agriculture classification represents a combination of irrigated and non-irrigated cultivated row crops, which are primarily corn, cotton, hay and sorghum. Agricultural areas are further divided into pasture and cultivated crops based on aerial photography interpretation and reconnaissance surveys. Pasture areas are typically comprised of grasses, legumes or grass-legume mixtures planted for livestock grazing, or the

production of seed or hay crops, typically on a perennial cycle. Cultivated crops are areas used to produce annual row crops and perennial woody crops, such as orchards and vineyards.

Agriculture has a significant influence on the economy throughout Texas; and Wharton County has an active agricultural sector. According to the United States Department of Agriculture's ("USDA") National Agricultural Statistics Service's 2017 Census of Agriculture, the total market value for agricultural products sold within Wharton County was $208,540,000, a decrease of 44 percent over the 2012 market value. Crop sales accounted for a majority of agricultural sales in Wharton County. The number of farms in Wharton County decreased from 1,553 in 2012 to 1,500 in 2017 (a three percent change) (USDA 2012 and 2017). Detailed agricultural information for Wharton County is provided in Table 2-1.

TABLE 2-1 AGRICULTURE

COUNTY	TOTAL MARKET VALUE OF AGRICULTURAL PRODUCTS			DISTRIBUTION OF PRODUCTS (2017)		NUMBER OF FARMS		
	2012	2017	Change	Crop Sales	Livestock Sales	2012	2017	Change
Wharton County	$373,637,000	$208,540,000	-44%	86%	14%	1,553	1,500	-3%

Source: USDA 2012 and 2017.

2.1.1.4 Oil and Gas Facilities

Oil and gas well data was obtained from the Railroad Commission of Texas ("RRC") (RRC; 2020a) which provided a GIS layer for existing oil and gas wells, pipelines, and supporting facilities. Oil and gas well data point categories were reviewed and included the following types: permitted locations, oil, gas, oil and gas, injection/disposal, and sidetrack well surface locations. The 2020 RRC dataset along with aerial photograph interpretation and field reconnaissance were used to identify and map existing oil and gas related facilities. Several pipelines were identified throughout the central portion of the study area. Several oil and gas wells were identified within the northwest portion of the study area.

2.1.1.5 Transportation/Aviation/Utilities

Transportation

Federal, state, and local roadways were identified using TxDOT county transportation maps, Texas Natural Resources Information System data, and field reconnaissance surveys. The roadway transportation system within the study area does not include any Interstate Highways, United States Highways ("US Hwys") or SHs. Roadways located within the study area included: FM 441 and FM 3086,

CR 403, CR 401, CR 434, CR 330, CR 328, and CR 307. Numerous local roads (paved and unpaved) were also identified in the study area (TxDOT 2020a).

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. The TxDOT Project Tracker indicates that there are two road restoration projects and one seal coat project located within the study area. The two road restoration projects are on FM 441 and FM 3089 and "construction is underway or begins soon." The seal coat project is located on FM 441 and "construction is underway or begins soon" (TxDOT 2020b).

There were no railroads identified within the study area (TxDOT 2020a; USDOT 2020).

Aviation

POWER reviewed the Houston Sectional Aeronautical Chart (FAA 2020a) and the Chart Supplement for the South Central US (formerly the Airport/Facility Directory) (FAA 2020b) to identify FAA registered facilities within the study area or within the FAA notification criteria buffer distance subject to notification requirements listed in 14 CFR Part 77.9. Facilities subject to notification requirements listed in 14 CFR Part 77.9 include public-use airports listed in the Airport/Facility Directory (currently the Chart Supplement[1]), public-use or military airports under construction, airports operated by a federal agency or DoD, or an airport or heliport with at least one FAA-approved instrument approach procedure.

The Chart Supplement for the South Central US used in conjunction with the Houston Sectional Aeronautical Chart contains all public-use airports, seaplane bases and public-use heliports, military facilities, and selected private-use facilities specifically requested by the DoD for which a DoD Instrument Approach Procedure has been published in the US Terminal Procedures Publication.

No public-use or military FAA registered airports were identified within the study area (FAA 2020a and 2020b).

No public-use heliports or heliports with an instrument approach procedure are listed for the study area in the Chart Supplement for the South Central US (FAA 2020a and 2020b).

[1] The Chart Supplement for the South Central US used in conjunction with the Houston Sectional Aeronautical Chart contains all public-use airports, seaplane bases and public-use heliports, military facilities, and selected private-use facilities specifically requested by the DoD for which a DoD Instrument Approach Procedure has been published in the US Terminal Procedures Publication.

In addition, POWER also reviewed the FAA database (FAA 2020c), USGS topographic maps and recent aerial photography, and conducted field reconnaissance from publicly accessible areas to identify private-use airstrips and private-use heliports not subject to notification requirements listed in 14 CFR Part 77.9. One private-use airstrip was identified in the northern portion of the study area, no private-use heliports were identified within the study area.

Utilities

Utility features reviewed include existing electrical transmission lines, distribution lines, pipelines, water and gas/oil wells, and water and gas/oil storage tanks. Data sources used to identify existing electrical transmission and distribution lines include utility company and regional system maps, aerial imagery, USGS topographic maps, additional available planning documents, and field reconnaissance surveys. Transmission lines identified include one 138 kV transmission line and eight 345 kV transmission lines within the study area. Distribution lines are prevalent throughout the developed portions of the study area and were mapped.

In addition, several domestic, industrial and irrigation water wells are located throughout the study area. No public wells were identified within the study area (Texas Water Development Board ["TWDB"] 2020c).

2.1.1.6 Communication Towers

Review of the Federal Communication Commission ("FCC") database indicated that no AM radio transmitters are located within the study area. The FCC did indicate that there are three FM radio transmitters/microwave towers/other electronic installations within the study area (FCC 2020).

2.1.2 Socioeconomics

The following is a description of the socioeconomic patterns related to population and employment in Wharton County, Texas. The trend analysis is based upon the most recent United States Census Bureau ("USCB") information for the years 2000 and 2010 (USCB 2010 and 2020).

2.1.2.1 Population Trends

Wharton County experienced a population increase of 0.2 percent, between 2000 and 2010. By comparison, population at the state level increased by nearly 21 percent from 2000 to 2010 (USCB 2010 and 2020).

According to Texas State Data Center ("TXSDC") projections, Wharton County is projected to experience population growth during the next 20 years then experience a decline as the population shrinks the following 10 years. In Wharton County, the population is projected to increase from 2010 to 2020 and 2020 to 2030 by 1.6 percent and 0.9 percent, respectively, then decrease from 2030 to 2040 by 1.3 percent. By comparison, the population of Texas is expected to experience population increases of 18.0 percent, 17.6 percent and 16.6 percent over the next three decades, respectively (TXSDC 2018). Table 2-2 presents the past population trends and projections for Wharton County and for the state of Texas.

TABLE 2-2 POPULATION TRENDS

STATE / COUNTY	PAST		PROJECTED		
	2000	2010	2020	2030	2040
Texas	20,851,820	25,145,561	29,677,668	34,894,452	40,686,496
Wharton County	41,188	41,280	41,941	42,321	41,751

Sources: USCB 2010 and 2020; TXSDC 2018.

2.1.2.2 Employment

From 2010 to 2018, the civilian labor force in Wharton County saw a decrease of 3.4 percent (693 people). By comparison, the civilian labor force at the state level grew by 14.8 percent (1,765,783 people) over the same time period (USCB 2010 and 2018). Table 2-3 presents the civilian labor force for Wharton County and the state of Texas for the years 2010 and 2018.

Between 2010 and 2018, the unemployment rate for Wharton County decreased from 6.0 percent in 2010, to 5.2 percent in 2018. By comparison, the state of Texas also experienced a decrease in the unemployment rate over the same period. The state's unemployment rate decreased from 7.0 percent in 2010 to 5.4 percent in 2018 (USCB 2010 and 2018). Table 2-3 presents the employment and unemployment data for Wharton County and the state of Texas for the years 2010 and 2018.

TABLE 2-3 CIVILIAN LABOR FORCE AND EMPLOYMENT

STATE/COUNTY	2010	2018
Texas		
Civilian Labor Force	11,962,847	13,728,630
Employment	11,125,616	12,985,624
Unemployment	837,231	743,006
Unemployment Rate	7.0%	5.4%

TABLE 2-3 CIVILIAN LABOR FORCE AND EMPLOYMENT

STATE/COUNTY	2010	2018
Wharton County		
Civilian Labor Force	20,542	19,849
Employment	19,308	18,808
Unemployment	1,234	1,041
Unemployment Rate	6.0%	5.2%

Source: USCB 2010 and 2018.

2.1.2.3 Leading Economic Sectors

The major occupations that employed the most people in Wharton County in 2018 are those occupations listed under the category of management, business, science and arts, followed by the category of sales and office (USCB 2018). Table 2-4 presents the number of persons employed in each occupation category during 2018 in Wharton County.

TABLE 2-4 OCCUPATIONS IN WHARTON COUNTY

OCCUPATION	WHARTON COUNTY
Management, business, science and arts	4,837
Service	3,534
Sales and office	3,849
Natural resources, construction and maintenance	3,314
Production, transportation and material moving	3,274

Source: USCB 2018.

In 2010 and 2018, the industry groups that employed the most people in Wharton County were educational services, health care and social assistance. Table 2-5 presents the number of persons employed in each of the industries in Wharton County for the years 2010 and 2018.

TABLE 2-5 INDUSTRIES IN WHARTON COUNTY

INDUSTRY GROUP	WHARTON COUNTY	
	2010	2018
Agriculture, forestry, fishing and hunting and mining	2,252	2,101
Construction	2,211	1,693
Manufacturing	1,928	1,958
Wholesale trade	657	670

TABLE 2-5 INDUSTRIES IN WHARTON COUNTY

INDUSTRY GROUP	WHARTON COUNTY	
	2010	2018
Retail trade	2,116	2,514
Transportation and warehousing and utilities	1,192	859
Information	178	176
Finance and insurance and real estate and rental and leasing	832	753
Professional, scientific and management and administrative and waste management services	939	1,169
Educational services and health care and social assistance	4,376	4,324
Arts, entertainment and recreation and accommodation and food services	1,032	1,005
Other services, except public administration	970	838
Public administration	625	748

Source: USCB 2010 and 2018.

2.2 RECREATIONAL AND PARK AREAS

Recreational, park and preservation areas were identified through state, federal and local agency websites, county documents and reconnaissance surveys. This category primarily includes existing areas that are:

- Dedicated as park land or open space by a governmental body, organized group, club or church;
- Recognized as nationally or regionally significant preservation or recreation areas; or
- Formally designated unique or undisturbed natural areas.

Federal and state databases searches 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 parks or recreational areas.

2.2.1 National/State/County/Local Parks

No national or state parks were identified within the study area (National Park Service ["NPS"] 2020a; TPWD 2020a).

No local parks were identified within the study area (Wharton County 2020).

The Lost Prong Wildlife Management Association is located within the southwestern portion of the study area. The Lost Prong Wildlife Management Association is a group of private landowners who agree to

manage their properties for wildlife benefit through the recommendation and coordination of TPWD (TPWD 2020g).

Additional recreational opportunities, including hunting and fishing, may occur on private properties within the study area. However, these are not typically considered to be open to the general public.

2.2.2 Wildlife Viewing Trails

A review of the TPWD Great Texas Wildlife Trails Great Texas Coastal Birding Trail – Central Texas Coast indicated that there are no trails located within the study area (TPWD 2020b).

2.3 HISTORICAL AND AESTHETIC VALUES

Section 37.056(c)(4)(C) 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 should be listed, mapped, and their distances from the centerline of the route documented in the application filed for consideration. Archeological sites within 1,000 feet of a route 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 preservation of the state's significant cultural resources. The THC, working in conjunction with the TARL, maintains records of previously recorded cultural resource sites as well as records of previous field investigations. Information from the THC's Restricted Online Archeological Sites Atlas was acquired in addition to GIS shapefiles from TARL to identify and map locations of previously recorded cultural (archeological and historical) resources within the study area.

Together, archeological and historical sites are often referred to as cultural resources. Under the NPS' 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, historical resources, and 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., burned rock

middens, stone tools, petroglyphs, house foundations, bottles). Archeological resources can date to either prehistoric times or the historic era.

- Historical 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 by the THC and may be recognized with an OTHM. Other cemeteries may also be documented as part of the THC's Record, Investigate, and Protect program.

2.3.1 Cultural Background

The Project area is located within the Southeast Texas archeological region (Patterson 1995; Story et al. 1990; Perttula 2004), which is located within the THC's Eastern Planning Region and Central & Southern Planning Region (Mercado-Allinger et al. 1996) (Figure 2-2).

2.3.2 Prehistoric

Generally, the sequence of recognized pre-European contact archeological manifestations in southeast Texas has been divided into three periods: Paleoindian, Archaic, and Late Prehistoric or Ceramic periods. These cultural periods are roughly equivalent to broad patterns of environmental change, described by Aten (1983). These patterns are the Late Glacial (12,000-9,000 years before present ["B.P."]), post-Pleistocene adaptations that resulted in a shift in economic orientation and an increasing population (9,000-3,000 B.P.), and, lastly, essentially modern environmental conditions which developed approximately 3,000 B.P. Ricklis (2004) proposes a prehistoric cultural sequence for southeast Texas consisting of four occupational periods: Paleoindian (ca. 11,500 to 8,000 B.P.), Archaic (ca. 8,000 to 1,500 B.P. [inland], 5,000-2,220 B.P. [coastal]), and the Ceramic Period (ca 2,000 to 300 B.P.).

2.3.2.1 Paleoindian Period

The earliest well-established human occupations of North America are referred to as Paleoindian. Isolated Paleoindian chipped stone projectile points, typed as Clovis, have been found on the upper Texas coast in surficial or mixed contexts (Hester 1980; Patterson 1980; Wheat 1953). Story et al. (1990) summarized the distribution and context of Paleoindian remains in southeast Texas and found that, except for well inland of the modern coastline, Paleoindian artifacts on the upper Texas coast are from disturbed or secondary contexts.

N

0 30 60 120 180 240

Miles

Source: Mercado- Allinger et. al., 1996

Legend

Cultural Resource Planning Region Boundary

County Boundary

345 KV SPACE CITY SOLAR PROJECT

FIGURE 2-2

LOCATION OF THE STUDY AREA IN RELATION TO THE CULTURAL RESOURCE PLANNING REGIONS OF TEXAS

POWER ENGINEERS

CenterPoint Energy

Date: 12/1/2020

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Aten (1983:116-117) estimates that during the Paleoindian period, the coastline of the Gulf of Mexico was between 30 and 40 kilometers seaward of its present location. Woodlands apparently covered much of the upper Texas coast and probably extended onto the now submerged continental shelf. Most of the archeological sites dating to this period may lie offshore, be deeply buried in the terraces of major streams, or have been obliterated by Holocene erosion (Abbot 2001; Hester 1980). Because such limited data exist for the Paleoindian period in this area, only certain assumptions can be made regarding Paleoindian cultural development in the region. The presence of large projectile points suggests that hunting large mammals was undoubtedly an important component of the subsistence strategy, although a collection of readily available plant foods probably also contributed to the diet (Collins 2002). Environmental changes that brought about the extinction or dislocation of Rancholabrean megafauna triggered a shift away from Paleoindian adaptations toward a broad-based subsistence orientation termed Archaic (Aten 1983; Willey and Phillips 1958).

2.3.2.2 Archaic Period

Probably the most prominent characteristic of the Archaic period is that it epitomizes the foraging lifestyle. The Archaic period on the upper Texas coast is marked by sea-level rise and climatic fluctuation in the middle to late Holocene, from ca. 9,000 to 1,850 B.P. (Aten 1983). Ricklis (2004) frames the Archaic period in southeast Texas in terms of inland and coastal adaptations. Inland, the Archaic period generally extended from 8,000 to 1,500 years ago. Numerous sites dating to this period have been found along primary streams throughout the region and contain stone projectile points that are diverse and reduced in size from the earlier Paleoindian period. These dart points also tend to be made of poorer quality local resources suggesting reduced group mobility and tighter group territories. A lack of faunal and botanical remains at inland archeological sites precludes inferring more than a generalized hunting and gathering subsistence system.

Well-established cemeteries also appear in the archeological record of inland southeast Texas by the middle Archaic (ca. 6,000-3,000 B.P.) (Ricklis 2004; Story 1985), Excavation of 41AU36 on the lower Brazos River revealed a cemetery in use from the middle Archaic through the early Ceramic period (Hall 1981). By the late Archaic (ca. 3,000-1,500 B.P.), cemeteries have increased substantially in size and most burials contain a diverse array of grave goods (Ricklis 2004). Story (1985) suggests that the abundance of cemeteries on the western margin of the coastal prairie zone indicates increased territoriality amongst groups in response to an ever-increasing population. Hall (2000) posits that highly productive environments such as river valley bottoms and the floodplains of major streams were home to an

aggregate of resources that were predictable, concentrated, and fixed on the landscape. Such resources allowed late Archaic groups to operate within smaller, more exclusive territories.

The Archaic period on the upper Texas coast extended from about 5,000 to 2,200 years ago (Ricklis 2004). However, very few intact early Archaic components are known from this region, and Aten (1983) and Story (1985) suggest the inland margin of the coastal plain may have been occupied more intensely than the coast as sea levels rose during the early Archaic. The coastline reached its current location between 7,000 and 5,000 B.P. (Aten 1983) and the earliest known shell middens in the area date to this period (Howard et al. 1991). Coastal Archaic sites that have been tested or excavated near the modern shoreline generally consist of shell-bearing sites with lithic tools and debitage, shell and bone tools, and the bones of fish, mammals, and reptiles (Story 1985).

Beginning around 3,000 years ago, subsistence systems increasingly focused on coastal zone resources (Aten 1983; Story et al. 1990), following the establishment of relatively stable sea levels and essentially modern, highly productive estuaries (Ricklis 2004). Aten (1979 and 1983) hypothesized the establishment of seasonal rounds, including regular movements from littoral to inland areas during the late Archaic. Historic native groups have been demonstrated to move in a yearly round from small, dispersed band-sized or less groups during the warm seasons to aggregated villages during the colder months (Aten 1979; Newcomb 1961).

2.3.2.3 Ceramic Period

Pottery first appeared in southeast Texas along the coast around 2,000 years ago ushering in the Early Ceramic period. Based on stylistic elements and the progressively earlier dated occurrences moving eastward, ceramic technology arrived in the region via diffusion from Louisiana or the Lower Mississippi River Valley, suggesting an increasing interregional influence from neighboring groups (Aten 1979; Ricklis 2004). There were no apparent major shifts in lifeways during the early years after pottery was introduced. The contents of shell-bearing sites along the upper Texas coast during the Early Ceramic period vary little from the late Archaic shell middens, except for the addition of pottery and a few evolving dart point types, primarily Gary and Kent types (Ricklis 2004). Discrete cemeteries located close to major streams continue to enforce the notion of well-established group territories in response to increasing populations first evident during the Archaic (Aten 1983). Ceramics appeared in inland southeast Texas several centuries later (Aten 1979: 425) and most likely disseminated from the coastal zone where sandy-paste wares had become commonplace (Ricklis 2004).

Around 1,300 B.P., small, light, straight and expanded stem arrow points began to appear in archaeological assemblages, indicating the introduction of the bow and arrow – a hallmark of the Late Ceramic Period, often referred to as the Late Prehistoric period, in southeast Texas. Findings at the Mitchell Ridge site on Galveston Island suggest that the Late Ceramic period in the region can be divided into two sub-periods. The initial Late Prehistoric is associated with the introduction of the bow and arrow as evidenced primarily by the presence of Scallorn arrow points. The end of the Late Ceramic period in southeast Texas correlates with changes taking place throughout much of Texas. These changes include the appearance of bison bone in archaeological assemblages around 700 to 800 years ago in association with a variety of stone tools. Stone tools associated with the appearance of bison include Perdiz arrow points, thin bifacial knives, expanded base drills and perforators, and unifacial end scrapers. The occurrence of bison bone with these tools suggests a significant shift towards reliance on bison and other large game hunting and the processing of meat and hides (Ricklis 2004).

Ceramics in the region continued to evolve during the Late Prehistoric period. Grog and bone tempering are introduced and decorative elements become more elaborate. The change in external design elements along the upper Texas coast reflects those of various types of the Coles Creek-Plaquemine sequence occurring in coastal Louisiana and the Lower Mississippi River Valley, suggesting a continued interaction with groups from the east (Ricklis 2004).

2.3.3 Post-contact

European contact in the region began in the early sixteenth century with the landing of Cabeza de Vaca and his ill-fated party on the Texas coastline in 1528. It is believed that his party crossed Oyster Creek, Old Caney Creek, and the Brazos and San Bernard rivers in their quest for provisions. More long-term contacts resulting from permanent European settlement did not directly impact aboriginal lifeways in southeast Texas until the early eighteenth century (Patterson 1995), although diseases introduced by explorers and early traders had begun to affect Native American populations in Texas by the sixteenth century (Ewers 1974). Spanish sources from this period identify the natives of the central Texas coast as members of the Karankawa (Lipscomb 2013). Skirmishes with colonists resulted in the expulsion of most of the native population to the area south of the Rio Grande by 1850 (Hudgins 2020).

Intensified settlement of Wharton County began in the late 1820s, mostly from the southern states of the United States, and was first concentrated around the San Bernard River, Peach Creek, and Caney Creek as the Colorado River was prone to flooding (Hudgins 2020). During this period, the Mexican government had outlawed slavery, although many settlers continued the slave-based economic system of their

homelands. Later, prairies in the western portions of Wharton County were settled by Europeans who operated small subsistence farms and raised livestock with little or no slave labor (Hudgins 2020).

Following Texas' independence from Mexico in 1836, settlement of the region remained largely dispersed, although postal stations were established throughout the county facilitating communication (Hudgins 2020). After the Mexican War and Texas' subsequent annexation by the United States in 1846, the current boundaries of Wharton County were formed from portions of Matagorda, Jackson, and Colorado Counties. Wharton, the county seat was established on the northeast bank of the Colorado River in the east central portion of the county (Hudgins 2020).

Wharton County continued to resemble parts of the Deep South during the Antebellum period and eventually voted overwhelmingly for secession prior to the Civil War (Hudgins 2020). In 1850, the census recorded a population of 1,752, 70 percent of which were slaves. Eight years later the slave population had increased to 2,181 out of a total population of 2,861. In 1860, there were 16,784 acres of cultivated land in Wharton County, primarily subsumed into large plantations supported by the intensification of slave labor. Sugar cane was Wharton County's most widely produced crop, and prior to the Civil War, the county had both the largest plantation and largest sugar mill in Texas (Hudgins 2020). Wharton County and its neighboring counties became known as the "Texas sugar bowl." While no fighting occurred in Wharton County during the Civil War, the local economy was nonetheless upended after the war, and plantations were converted to cattle ranges (Hudgins 2020).

After the Civil War, black residents advanced within local politics and private industry, albeit briefly. Government positions including county commissioner, county and district clerk, and county school board seats were filled by prominent black citizens and black-owned newspapers were established in 1887 and 1897. Black-owned businesses were common around the courthouse square of Wharton until the 1930s when the legislation of racial segregation led to separate black commercial districts and a decline in their economic conditions. Racial tension promoted by organizations like The White Man's Union persisted as late as the 1950s furthering the economic decline of black citizens in the region (Hudgins 2020).

After the war stagnated the Wharton County economy, railroad development and affordable land prices in the 1880s led to growth in the county, attracting immigrants including Swedes, Danes, Germans, and Czechs, although most moved on to California or elsewhere failing to find successful enterprises to support them. The town of Danevang, near the Study Area to the northeast, was a successful cotton producing settlement established in 1894 and continues to celebrate its Danish heritage (Davis 2020). The Antebellum plantation system was replaced by cattle ranging, attracting Mexican settlers to the area. The

economy was further diversified with the introduction of Japanese immigrants and the cultivation of rice. Innovations such as deep-water wells, irrigation, and chemical fertilizers helped sustain these farmers despite depleted soils. In 1900, cotton seed milling became the county's first major industry. By 1930, farm tenancy peaked, but with the economic downturn of the Great Depression many residents turned to the Work Projects Administration, a federal program that employed many citizens across the US. Despite these construction projects, the population and economy of Wharton suffered through the Great Depression, and the first sustained growth in Wharton County began in the 1970s. The county's most lucrative products continue to be cattle, rice, and cotton, although agricultural fields are giving way to the sprawl of nearby Houston (Hudgins 2020).

2.3.4 Previous Investigations

Two professional cultural resource management investigations have been undertaken within the study area. Both were in advance of a pipeline during which sites 41WH105 and 41WH106 were recorded (Poche et al. 2012; Handly 2012).

2.3.5 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 8, 2020, GIS shapefiles were acquired from TARL to identify and map the locations of previously recorded archeological resources within the study area. Descriptive data pertaining to archeological sites and surveys were obtained from TASA in September 2020. No SALs, NRHP properties, Historic Texas Cemeteries, or OTHMs are recorded within the study area according to data obtained from the TASA (THC 2020a) and the THSA (THC 2020b). The TASA, THSA, and USGS topographic maps were reviewed in order to identify cemeteries within the study area. TxDOT's historic bridges database was reviewed to identify bridges that are listed or determined eligible for listing on the NRHP within the study area (TxDOT 2020c). At the national level, the NRHP database (NPS 2020b) and NPS websites for National Historic Landmarks (NPS 2020c) and National Historic Trails (NPS 2020d) were reviewed.

The review of the TASA and TARL data indicates that four previously identified archeological sites have been recorded in the study area. Review of the NRHP database indicated that no NRHP properties are within the study area. In addition, no SALs, NRHP-listed or determined-eligible bridges, or National Historic Trails are recorded within the study area. The results of the record search are summarized in Table 2-6.

TABLE 2-6 CULTURAL RESOURCES RECORDED WITHIN THE STUDY AREA

RECORDED ARCHEOLOGICAL SITES	STATE ANTIQUITIES LANDMARKS	NRHP-LISTED PROPERTIES	CEMETERIES	OTHM
4	0	0	0	0

Source: THC 2020a and 2020b.

Of the four archeological sites recorded in the study area, one site is prehistoric in age and three are historic (Table 2-7). Site 41WH106 is the prehistoric site and consists of a single projectile point fragment observed on the ground surface. The site has not been formally assessed for NRHP listing, although it was recommended as ineligible for the NRHP by the site recorder (THC 2020b).

Sites 41WH105, 41WH131, and 41WH146 are historic in age. Site 41WH105 is a surface scatter of domestic artifacts. Site 41WH131 is a farmstead consisting of a scatter of domestic artifacts and the remains of a driveway. Site 41WH146 is a scatter of historic ceramics observed on the ground surface. These sites have not been formally assessed for NRHP listing, though the site recorders recommended they are ineligible (THC 2020b).

TABLE 2-7 ARCHEOLOGICAL SITES RECORDED WITHIN THE STUDY AREA

TRINOMIAL	ELIGIBILITY DETERMINATION	PERIOD	DESCRIPTION
41WH105	undetermined	Historic	domestic artifact scatter
41WH106	undetermined	Prehistoric	one prehistoric projectile point fragment
41WH131	undetermined	Historic	domestic artifact scatter and remnants of a driveway
41WH146	undetermined	Historic	scatter of historic ceramics

Notes: THC 2020b

Review of previously recorded cultural resource site data indicates that the study area has not been examined entirely during previous archeological and historical investigations. Consequently, the review of records does not include all possible cultural resources sites within the study area. To further assess and avoid potential impacts to cultural resources, high probability areas ("HPAs") for prehistoric archeological sites were defined during the route analysis process. Within the study area, the prehistoric HPAs typically occur near streams and on terraces overlooking permanent sources of water, including Carancahua Creek, East Carancahua Creek, Moccasin Creek, and natural stretches of Willow and Juanita Creeks that have not been redirected for irrigation.

Historic age resources are also likely to be found near water sources. However, they will also occur in proximity to primary and secondary roads which provide access to the sites. Buildings and cemeteries are also more likely to be located within or near historic communities. Review of the historic topographical USGS 7.5-minute Danevang (USGS 1951 and 1976), El Campo SE (USGS 1965 and 1981), Francitas (USGS 1952, 1973, and 1995), and Midfield (USGS 1952 and 1976) quadrangles show numerous structures within the study area.

2.3.6 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 located within the study area. For the purposes of this study, the term aesthetics is defined by POWER to include the subjective perception of natural beauty in a landscape and measurement of an area's scenic qualities. The visual inventory was conducted by describing the regional setting and determining the viewer sensitivity ratings. 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 considered the following criteria that combine to give an area its aesthetic identity:

- Land form and topography (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
- Overall uniqueness of the scenic environment compared with the larger region

The study area is primarily rural with the land use being predominately cropland and pastureland/rangeland. The majority of the study area has been impacted by land improvements associated with agriculture, oil and gas activities and various utility corridors. Overall, the study area viewscape consists of open pastureland with woodland areas located along fence lines and streams.

No known outstanding aesthetic resources, designated views, designated scenic roadways or unique visual elements were identified from the literature review or from reconnaissance surveys of the study area (America's Scenic Byways 2020). The study area is located within the Texas Independence Trail Region; however, there are no sites designated of interest located within the study area (THC 2020c).

A review of the NPS website did not identify any National Wild and Scenic Rivers Systems, National Parks, National Monuments, National Historic Sites, National Historic Landmarks, National Historic Trails or National Battlefields within the study area (National Wild and Scenic Rivers Systems 2020; NPS 2020d and 2020e).

Based on these criteria, the study area exhibits a moderate degree of aesthetic quality for the region. The majority of the study area maintains the appearance of a rural community. Although some portions of the study area are visually appealing, the overall aesthetic quality of the study area is not distinguishable from that of adjacent areas within the region.

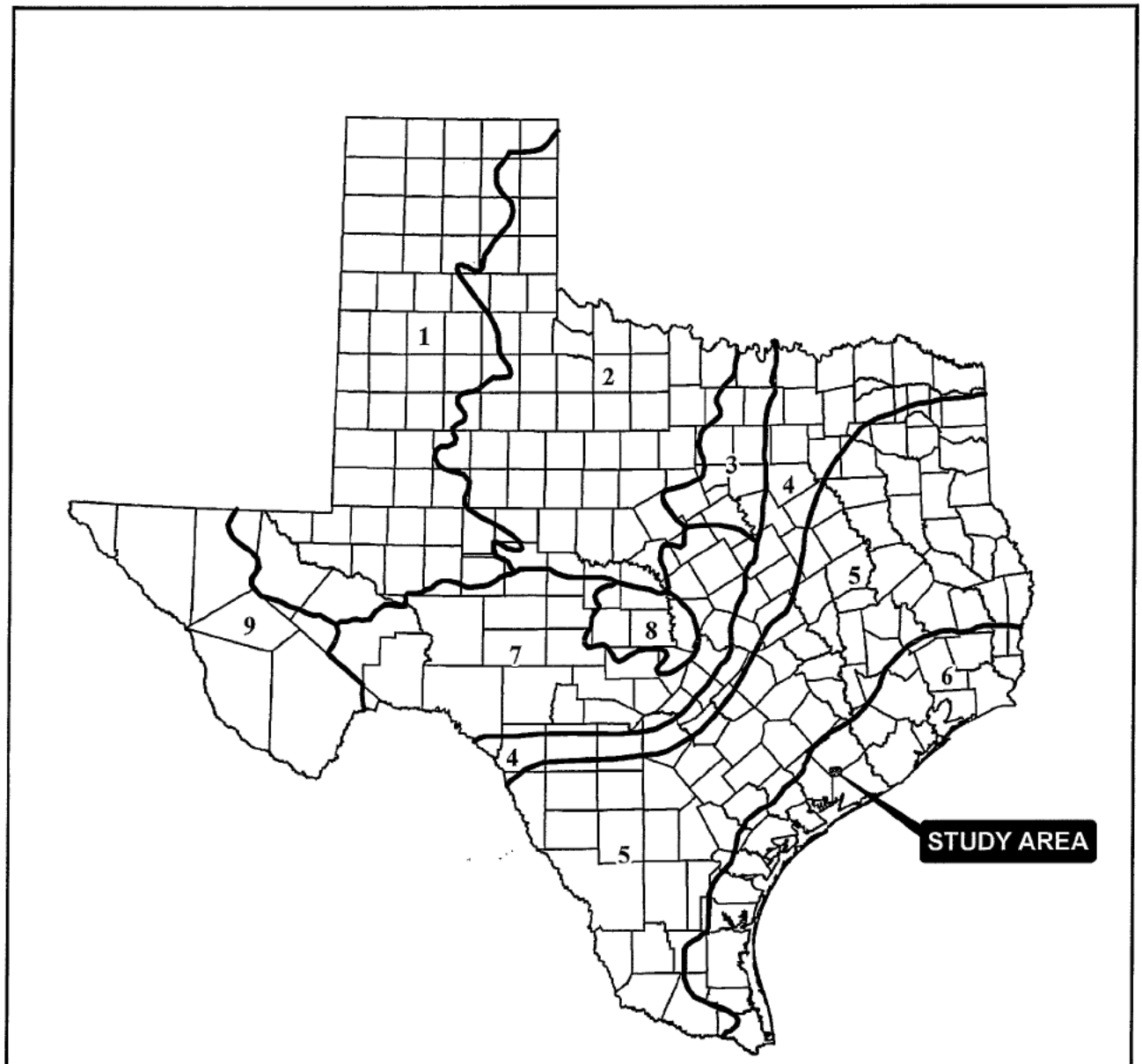
For this study, the potential visual impacts considered for the Project were limited to line-of-sight views within the immediate foreground (one-half mile, unobstructed) from points located on federal and state highways, FM roads and recreational and park areas.

2.4 ENVIRONMENTAL INTEGRITY

Resource inventory data for the study area were collected for physiography, geology, soils, surface waters, wetlands and ecological resources. These data were mapped within the study area utilizing GIS. Additional data collection activities included file and record reviews with various state and federal regulatory agencies, review of published literature, and review of various maps and aerial imagery.

2.4.1 Physiography and Geology

As shown in Figure 2-3, the study area is located within the Coastal Prairies Sub-province of the Gulf Coastal Plains Physiographic Province. The Coastal Prairies landscape is nearly level with deltaic sand and mud bedrock types with elevations ranging from sea level to 300 feet above mean sea level ("amsl") (BEG 1996). Within the study area, elevations range between approximately 60 feet amsl near named surface waters and 70 feet amsl in the north-central portion (USGS 2019).



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

345 KV SPACE CITY SOLAR PROJECT

FIGURE 2-3

LOCATION OF THE STUDY AREA IN RELATION TO THE PHYSIOGRAPHIC REGIONS OF TEXAS

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The major geologic formation underlying the study area is the Quaternary-aged Beaumont Formation. The Beaumont Formation is approximately 100 feet thick and comprised of moderately drained clayey sand and silt. Topographical relief is a mostly level matrix of poorly defined meanderbelts, smooth backswamp deposits, and natural levees covered with pimple (mima) mounds. Backswamp deposit areas are dominantly comprised of poorly drained clay and mud with high shrink-swell potential (BEG 1979).

2.4.1.1 Geological Hazards

Several potential geologic hazards affecting the construction and operation of a transmission line were evaluated within the study area. Hazardous areas reviewed included oil and gas wells, normal faults, active or historical mining locations, aggregate operations, and potential subsurface contamination.

Numerous abandoned and plugged oil/gas well locations are mapped throughout the study area, with the majority occurring in the northwest corner. Five active oil/gas well locations are mapped in the northwest corner of the study area (RRC 2020a). No normal faults (BEG 1979), active (RRC 2020b, 2020c, and 2020d) or historical mining locations (RRC 2016), or aggregate operations (TCEQ 2020a; USGS 1951, 1952, and 1965) were identified as potentially occurring within the study area.

Subsurface contamination from previous commercial activities or dumps/landfills may require additional considerations during routing and/or may create a potential hazard during construction activities. No subsurface contamination sites, including state or federal superfund sites (United States Environmental Protection Agency ["USEPA"] 2020a; TCEQ 2020b) and landfills (TCEQ 2020c) were identified within the study area.

2.4.2 Soils

2.4.2.1 Mapped Soil Units

The Natural Resources Conservation Service ("NRCS") (2020) Web Soil Survey data was reviewed to identify and characterize mapped soils within the study area. Soil map units represent a collection of delineated areas defined and named the same in terms of their soil components (e.g., series). Mapped soils within the study area are listed in Table 2-8, including a brief description of the soil unit, landform of occurrence, and hydric and prime farmland classification status.

TABLE 2-8 MAPPED SOIL UNITS WITHIN THE STUDY AREA

MAP UNIT NAME	LANDFORM	HYDRIC STATUS	PRIME FARMLAND
Bernard-Edna complex, 0 to 1 percent slopes	Flats	No	Yes
Cieno soils, frequently ponded	Closed depressions	Yes	No
Dacosta sandy clay loam, 0 to 1 percent slopes	Flats	No	Yes
Edna loam, 0 to 1 percent slopes	Flats	No	Yes, of statewide importance
Edna-Cieno frequently ponded complex, 0 to 1 percent slopes	Flats	Yes	Yes, of statewide importance
Lake Charles clay, 0 to 1 percent slopes	Talf	No	Yes
Texana-Cieno frequently ponded complex, 0 to 1 percent slopes	Ridges	Yes	Yes, of statewide importance

Source: NRCS 2020.

2.4.2.2 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 horizons. 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 2020).

Within the study area, the following mapped soil units contain major soil components classified as hydric: Cieno soils, frequently ponded; Edna-Cieno frequently ponded complex, 0 to 1 percent slopes; and Texana-Cieno frequently ponded complex, 0 to 1 percent slopes (Table 2-8). Map soil units dominantly comprised of hydric soils may contain minor components of non-hydric soils in higher positions on the landform, and map units that are dominantly comprised of non-hydric soils may contain minor components of hydric soils in lower positions on the landform. According to NRCS (2020) Web Soil Survey data for the study area, minor hydric soil components occur within the soil map units dominated by non-hydric soils.

2.4.2.3 Prime Farmland Soils

The Secretary of Agriculture, within U.S.C. §7-4201(c)(1)(A), defines prime farmland soils as those soils that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. They 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. Soils designated as farmland of statewide importance are potential prime farmlands with soils that meet most of the requirements of prime farmland

but fail due to the absence of sufficient natural moisture or water management facilities. The USDA would consider these soils as prime farmland if water management facilities were installed and these soils are incorporated in Table 2-8. According to NRCS (2020) Web Soil Survey data for the study area, there are multiple mapped soil units designated as prime farmland soil and as farmland of statewide importance within the study area.

Transmission line projects are typically not subject to requirements of the Farmland Protection Policy Act, unless they are associated with federal funding. Additionally, transmission line construction is not typically considered a conversion of prime farmlands as the area can still be used for farming after construction is complete.

2.4.3 Water Resources

Information on water resources within the study area were obtained from a variety of sources including the USEPA, the National Hydrography Dataset, TWDB, aerial photography, USGS topographic maps, field reconnaissance surveys and aerial imagery.

2.4.3.1 Surface Water

The study area is located entirely within the Colorado-Lavaca River Basin (TWDB 2020a). Mapped surface waters within the study area include East Carancahua Creek, Moccasin Creek, Juanita Creek, Willow Creek, and one unnamed pond located in the southeast portion of the study area (USEPA 2020b). During an initial field survey, several unmapped small tributaries and ditches were observed along roads and dissecting fields throughout the study area. Several small ponds were also observed near the east and north boundaries of the study area. Most surface waters generally flow in a south to southeast direction (USGS 2020).

2.4.3.2 Ground Water

The major ground water aquifer mapped within the study is the Gulf Coast Aquifer system (TWDB 2020b). The Gulf Coast Aquifer system parallels the Gulf of Mexico coastline from Louisiana to the Mexico border. It consists of several aquifers, including the Jasper, Evangeline, and Chicot aquifers, and is composed of discontinuous sand, silt, clay, and gravel beds. The maximum total sand thickness of the Gulf Coast Aquifer is approximately 700 feet within its southern extent. Water quality varies with depth and locality with water quality declining towards the south, where total dissolved solids range from 1,000 to more than 10,000 milligrams per liter with high levels of naturally occurring radionuclides. Aquifer productivity decreases in the southern extent (George et al. 2011). No minor aquifers are mapped within

the study area. Seventeen private water wells are mapped and scattered across the study area. No public water supply wells (TWDB 2020b) or natural springs (TWDB 1975 and 2020b) are mapped within the study area.

2.4.3.3 Special Status Waters

Under 31 TAC § 357.8, the TPWD has designated Ecologically Significant Stream Segments ("ESSS") based on habitat value, threatened and endangered species, species diversity, and aesthetic value criteria. Review of TPWD (2020c and 2020d) data did not indicate the presence of designated ESSS within the study area.

In accordance with Section 303(d) and 304(a) of the CWA, the TCEQ identifies impaired 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 total maximum daily load. Review of the TCEQ (2020c and 2020d) Texas Integrated Report of Surface Water Quality did not indicate any impaired surface waters within the study area.

2.4.3.4 Floodplains

The 100-year floodplain (one percent flood or base flood) represents the area in which a flood event has a one percent chance of being equaled or exceeded for any given year. FEMA 100-year floodplain data are mapped along East Carancahua Creek, Moccasin Creek, Juanita Creek, Willow Creek, and the unnamed pond located in the southeast (FEMA 2020).

2.4.3.5 Future Surface Water Developments

A review of the 2017 Texas State Water Plan (TWDB 2017), 2021 Region K Water Plan (Lower Colorado Regional Water Planning Group 2020a and 2020b), and 2021 Regional Water Plan (Lavaca Regional Water Planning Group 2020) for Region P did not indicate any proposed or potential new surface water development projects within the study area.

2.4.4 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. All biological resource data for the study area were mapped utilizing GIS.

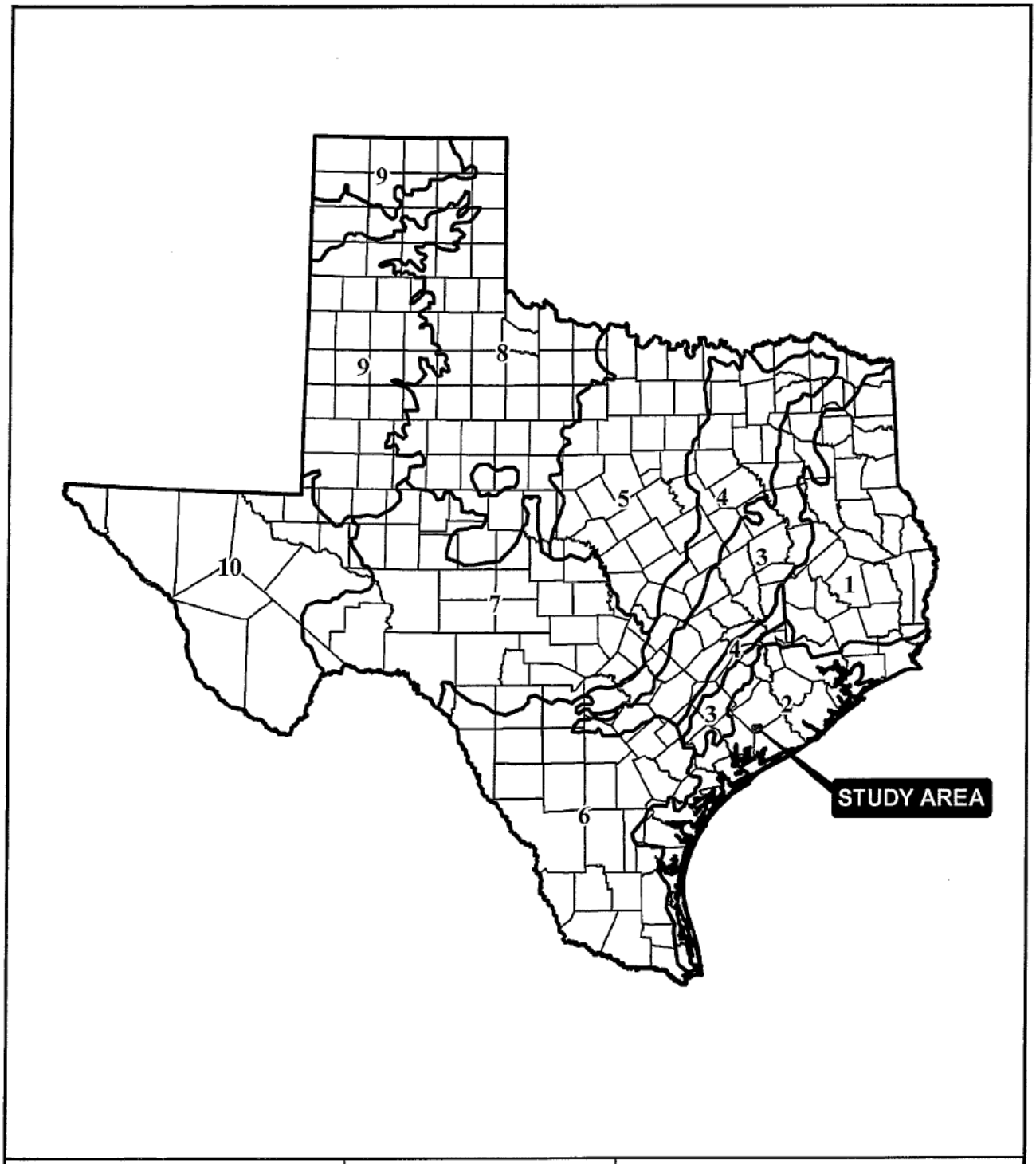
2.4.4.1 Ecological Region

The study area lies within the Western Gulf Coastal Plain Level III Ecoregion and Northern Humid Gulf Coastal Prairies Level IV Ecoregion (USEPA 2013). The Western Gulf Coastal Plain is generally 50 to 90 miles wide and located adjacent to the Gulf of Mexico. The distinguishing characteristic of this ecoregion is its relatively flat topography dominated by open grassland vegetation communities. Further inland from the coast, vegetation transitions to forest or savanna-like vegetation communities. A high percentage of the Western Gulf Coastal Plain has been converted to croplands and rangelands due to its naturally open landscape (Griffith et al. 2007).

The Northern Humid Gulf Coastal Prairies ecoregion occurs as a discontinuous band along the northern half of the Texas coast, stretching from Victoria and Calhoun counties, eastward to Orange and Jefferson counties. This ecoregion has a gently sloping flat terrain and is wetter than coastal prairie regions located on the southern Gulf Coast. Soils are poorly drained sand, silt and clay that primarily support herb-dominated tallgrass prairie vegetation. The terrain is generally flat and gently sloping coastward. Historically, much of this region was covered in tallgrass prairie and scattered oak mottes. Today, this region has been almost entirely converted into cropland, rangeland or developed for urban or industrial land use. A network of drainage canals, stream channelization and levees also exist in many areas (Griffith et al. 2007).

2.4.4.2 Vegetation Types

The study area is mapped within the Gulf Prairies and Marshes vegetational area of Texas (Gould et al. 1960) (see Figure 2-4). Review of the TPWD (2020e) Texas Ecosystem Analytical Mapper indicates that major vegetation types within the study area include Row Crops, Gulf Coast: Coastal Prairie, and Native Invasive: Huisache Woodland or Shrubland.



N

0 30 60 120 180 240

Miles

Source: Gould, et. al., 1960.

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

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FIGURE 2-4

LOCATION OF THE STUDY AREA IN RELATION TO THE VEGETATIONAL AREAS OF TEXAS

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Gulf Coast: Coastal Prairie

Gulf Coast: Coastal Prairie is a mid-to tall-grass prairie type characterized by a level to gently rolling landscape with a microtopography of depressions and mima/pimple mounds. Typical plant species present within this vegetation type include black-eyed Susan (*Rudbeckia hirta)*, broomsedge bluestem (*Andropogon virginicus*), gayfeathers (*Liatris* spp.), green milkweed (*Asclepias viridis*), Gulf muhly (*Muhlenbergia capillaris*), Indiangrass (*Sorghastrum nutans*), little bluestem (*Schizachyrium scoparium*), low wild petunia (*Ruellia humilis*), meadow pink (*Sabatia campestris*), Mexican hat (*Ratibida columnifera*), narrowleaf sumpweed (*Iva angustifolia*), narrowleaf sunflower (*Helianthus angustifolius*), partridge pea (*Chamaecrista fasciculata*), sideoats grama (*Bouteloua curtipendula*), smallhead doll's daisy (*Boltonia diffusa*), snow-on-the-prairie (*Euphorbia bicolor*), switchgrass (*Panicum virgatum*), Texas wintergrass (*Nassella leucotricha*), western ragweed (*Ambrosia psilostachya*), wild indigos (*Baptisia* spp.), and yellow neptunia (*Neptunia lutea*) (TPWD 2020e).

Native Invasive: Huisache Woodland or Shrubland

Native Invasive: Huisache Woodland or Shrubland is a broadly defined vegetation community representing areas in the Coastal Prairie region that have been formerly cropped or heavily grazed. It is typically dominated by blackbrush acacia (*Vachellia rigidula*), granjeno (*Celtis ehrenbergiana*), huisache (*Acacia farnesiana*), honey mesquite (*Prosopis glandulosa*), live oak (*Quercus virginiana*), Macartney rose (*Rosa bracteata*), and sugar hackberry (*Celtis laevigata*) (TPWD 2020e).

2.4.4.3 Wetlands

Mapped wetlands information was incorporated for the study area from the USFWS (2020a) NWI database. 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). These maps are typically conservative estimates of wetlands, primarily because the hydrology of the area has likely been modified by ground disturbing activities, such as farming, channelized streams, and installation of levees and drainages. Review of NWI data indicated numerous wetlands mapped throughout the study area with wetland types including freshwater palustrine emergent ("PEM"), palustrine forested ("PFO"), and palustrine scrub/shrub ("PSS") (USFWS 2020a). Unmapped wetlands may also occur in association with surface drainages or depressions within the study area.

PEM wetlands are mapped sporadically throughout the northwest, central, and east portions of the study area. PEM wetlands are characterized as shallow water areas dominated by rooted herbaceous hydrophytes. Within the study area plant species potentially occurring in PEM wetlands may include California bulrush (*Schoenoplectus californicus*), Olney bulrush (*Schoenoplectus americanus*), American

bulrush (*Schoenoplectus pungens*), spikerushes (*Eleocharis* spp.), flatsedges (*Cyperus* spp.), cattails (*Typha domingensis*), white-topped sedges (*Rhynchospora* spp.), crowngrass (*Paspalum* spp.), vine mesquite (*Panicum obtusum*), Gulf cordgrass (*Spartina spartinae*), giant cutgrass (*Zizaniopsis miliaceae*), water hyacinth (*Eichhornia crassipes*), arrowhead (*Sagittaria* spp.), pickerelweed (*Pontederia cordata*), pennyworts (*Hydrocotyle* spp.), water lilies (*Nymphaea* spp.), and duckweeds (*Lemna* spp.) (Chadde 2012a).

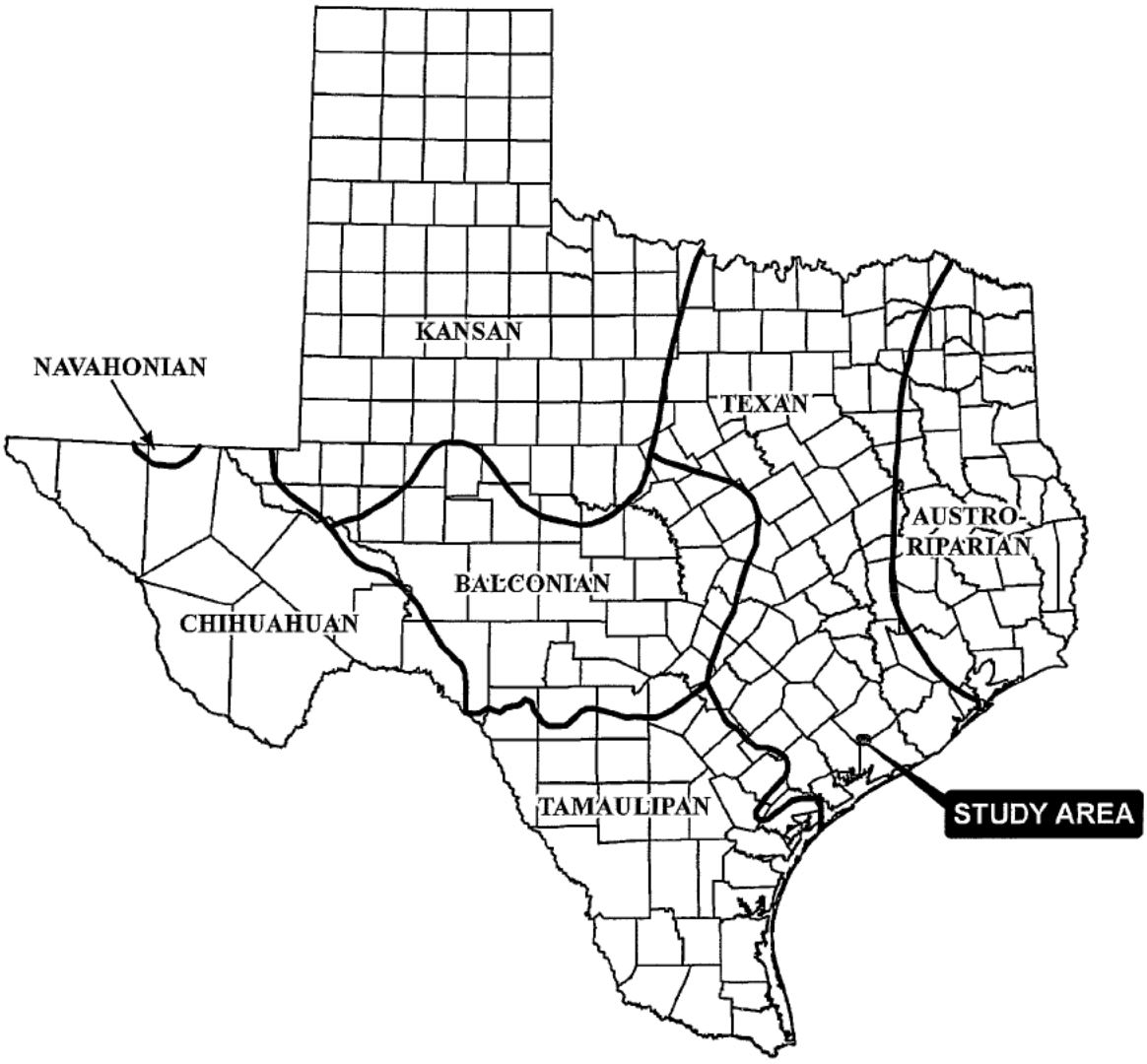
Three PFO wetlands are mapped near stream features within the study area, with one located in the southwest corner and two located in the northeast corner. PFO wetlands are wetland areas dominated by hydrophytic trees that constitute 30 percent or greater of the aerial vegetation coverage. Within the study area plant species potentially occurring in PFO wetlands may include black willow (*Salix nigra*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), water hickory (*Carya aquatica*), pecan (*C. illinoinensis*), cedar elm (*Ulmus crassifolia*), Chinese tallow (*Triadica sebifera*), sugar hackberry, common buttonbush (*Cephalanthus occidentalis*), and swamp privet (*Forestiera acuminata*) (Chadde 2012b).

PSS wetlands are predominantly mapped within the central portion of the study area. PSS wetlands are wetland areas dominated by hydrophytic trees and shrubs that constitute less than 30 percent of the aerial vegetation coverage. Within the study area plant species potentially occurring in PSS wetlands may include black willow, common buttonbush, swamp privet, Chinese tallow, and poisonbean (*Sesbania drummondii*) (Chadde 2012b).

2.4.4.4 Wildlife and Fisheries

Wildlife

The study area is located within the Texan Biotic Province (see Figure 2-5) as described by Blair (1950). The following sections list species that may occur in and characterize the faunal diversity of the study area today.



0 30 60 120 180 240

Miles

Source: Blair, 1950, modified

Legend

Biotic Province Boundary

County Boundary

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FIGURE 2-5

LOCATION OF THE STUDY AREA IN RELATION TO THE BIOTIC PROVINCES OF TEXAS

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Amphibians

Amphibian species (frogs, toads, salamanders) that may occur within the study area are listed in Table 2-9. Frogs and toads may occur in all vegetation types and salamanders are typically restricted to moist hydric habitats (Dixon 2013).

TABLE 2-9 AMPHIBIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Frogs/Toads	
American bullfrog	*Lithobates catesbeianus*
Cope's gray tree frog	*Dryophytes chrysoscelis*
Crawfish frog	*Lithobates areolatus*
Eastern narrow-mouth toad	*Gastrophryne carolinensis*
Gray tree frog	*Dryophytes versicolor*
Great Plains narrow-mouthed toad	*Gastrophryne olivacea*
Green frog	*Lithobates clamitans*
Green tree frog	*Dryophytes cinereus*
Gulf Coast toad	*Incilius nebulifer*
Hurter's spadefoot toad	*Scaphiopus hurterii*
Northern cricket frog	*Acris crepitans*
Pickerel frog	*Lithobates palustris*
Southern leopard frog	*Lithobates sphenocephalus*
Spotted chorus frog	*Pseudacris clarkii*
Squirrel tree frog	*Dryophytes squirellus*
Upland chorus frog	*Pseudacris feriarum*
Woodhouse's toad	*Anaxyrus woodhousii*
Salamanders/Newts	
Eastern newt	*Notophthalmus viridescens*
Small-mouthed salamander	*Ambystoma texanum*
Eastern tiger salamander	*Ambystoma tigrinum*
Western lesser siren	*Siren intermedia*

Source: Dixon 2013.

Reptiles (turtles, lizards and snakes) that may typically occur in the study area are listed in Table 2-10. These include those species that are more commonly observed near water (i.e., aquatic turtles) and those that are more common in terrestrial habitats (Dixon 2013).

TABLE 2-10 REPTILIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Turtles	
Eastern box turtle	*Terrapene carolina*
Eastern mud turtle	*Kinosternon subrubrum hippocrepis*
Eastern musk turtle	*Sternotherus odoratus*
Eastern snapping turtle	*Chelydra serpentina*
Ornate box turtle	*Terrapene ornata ornata*
Pallid spiny softshell	*Apalone spinifera pallida*
Red-eared pond slider	*Trachemys scripta elegans*
Smooth softshell	*Apalone mutica*
Yellow mud turtle	*Kinosternon flavescens*
Crocodilians	
American alligator	*Alligator mississippiensis*
Lizards	
Broad-headed skink	*Eumeces laticeps*
Brown anole	*Anolis sagrei*
Common spotted whiptail	*Cnemidophorus gularis*
Eastern six-lined race runner	*Cnemidophorus sexlineatus*
Five-lined skink	*Eumeces fasciatus*
Green anole	*Anolis carolinensis*
Little brown skink	*Scincella lateralis*
Mediterranean gecko	*Hemidactylus turcicus*
Northern fence lizard	*Sceloporus undulatus hyacinthinus*
Prairie skink	*Eumeces septentrionalis obtusirostris*
Slender glass lizard	*Ophisaurus attenuatus*
Texas spiny lizard	*Sceloporus olivaceus*
Snakes	
Blotched water snake	*Nerodia erythrogaster*
Broad-banded water snake	*Nerodia fasciata confluens*
Canebrake rattlesnake	*Crotalus horridus*
Checkered garter snake	*Thamnophis marcianus*
Diamond-backed water snake	*Nerodia rhombifer rhombifer*
Eastern garter snake	*Thamnophis sirtalis sirtalis*
Eastern hog-nosed snake	*Heterodon platirhinos*
Eastern yellow-bellied racer	*Coluber constrictor flaviventris*

TABLE 2-10 REPTILIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Flat-headed snake	*Tantilla gracilis*
Graham's crayfish snake	*Regina grahamli*
Louisiana milk snake	*Lampropeltis gentilis*
Marsh brown snake	*Storeria dekayi*
Mississippi green water snake	*Nerodia cyclopion*
Prairie king snake	*Lampropeltis calligaster calligaster*
Pygmy rattlesnake	*Sistrurus miliarius streckeri*
Rough earth snake	*Haldea striatula*
Rough green snake	*Opheodrys aestivus*
Southern copperhead	*Agkistrodon contortrix contortrix*
Speckled king snake	*Lampropeltis holbrooki*
Texas coral snake	*Micrurus tener*
Texas glossy snake	*Arizona elegans arenicola*
Texas rat snake	*Pantherophis obsoleta lindheimeri*
Western coachwhip	*Masticophis flagellum testaceus*
Western cottonmouth	*Agkistrodon piscivorus leucostoma*
Western diamond-backed rattlesnake	*Crotalus atrox*
Western mud snake	*Farancia abacura reinwardti*
Western ribbon snake	*Thamnophis proximus proximus*

Source: Dixon 2013.

Birds

Numerous bird species may occur within the study area and include year-round residents and summer, and/or winter migrants as shown in Table 2-11. Additional transient bird species may migrate within or through the study area in the spring and fall and/or use the area to nest (spring/summer) or overwinter. The likelihood for occurrence of each species will depend upon suitable habitat and season.

TABLE 2-11 BIRD SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
ACCIPITRIFORMES: Accipitridae				
Broad-winged hawk	*Buteo platypterus*		X	
Cooper's hawk	*Accipiter cooperii*			X
Harris's hawk	*Parabuteo unicinctus*	X		

TABLE 2-11 BIRD SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME	RESIDENT	SUMMER	WINTER
Mississippi kite	*Ictinia mississippiensis*		X	
Northern harrier	*Circus cyaneus*			X
Red-tailed hawk	*Buteo jamaicensis*	X		X
Sharp-shinned hawk	*Accipiter striatus*			X
Swainson's hawk	*Buteo swainsoni*		X	
White-tailed hawk	*Geranoaetus albicaudatus*	X		
White-tailed kite	*Elanus leucurus*	X		
ACCIPITRIFORMES: Cathartidae				
Black vulture	*Coragyps atratus*	X		
Turkey vulture	*Cathartes aura*	X		
ACCIPITRIFORMES: Pandionidae				
Osprey	*Pandion haliaetus*			X
ANSERIFORMES: Anatidae				
American wigeon	*Anas americana*			X
Black-bellied whistling-duck	*Dendrocygna autumnalis*	X		
Blue-winged teal	*Anas discors*			X
Bufflehead	*Bucephala albeola*			X
Canvasback	*Aythya valisineria*			X
Gadwall	*Anas strepera*			X
Greater white-fronted goose	*Anser albifrons*			X
Green-winged teal	*Anas crecca*			X
Lesser scaup	*Aythya affinis*			X
Mallard	*Anas platyrhynchos*	X		X
Northern pintail	*Anas acuta*			X
Northern shoveler	*Anas clypeata*			X
Redhead	*Aythya americana*			X
Ring-necked duck	*Aythya collaris*			X
Ruddy duck	*Oxyura jamaicensis*			X
Snow goose	*Chen caerulescens*			X
Wood duck	*Aix sponsa*	X		X
APODIFORMES: Apodidae				
Chimney swift	*Chaetura pelagica*		X	
APODIFORMES: Trochilidae				
Buff-bellied hummingbird	*Amazilia yucatanensis*		X	

TABLE 2-11 BIRD SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
Ruby-throated hummingbird	*Archilochus colubris*		X	
CAPRIMULGIFORMES: Caprimulgidae				
Chuck-will's-widow	*Antrostomus carolinensis*		X	
Common nighthawk	*Chordeiles minor*		X	
Common pauraque	*Nyctidromus albicollis*	X		
Common poorwill	*Phalaenoptilus nuttallii*	X		
Lesser nighthawk	*Chordeiles acutipennis*		X	
CHARADRIIFORMES: Charadriidae				
Black-bellied plover	*Pluvialis squatarola*			X
Killdeer	*Charadrius vociferus*	X		
Semipalmated plover	*Charadrius semipalmatus*		X	
Wilson's plover	*Charadrius wilsonia*			X
CHARADRIIFORMES: Laridae				
Black tern	*Chlidonias niger*		X	
Franklin's gull	*Leucophaeus pipixcan*			X
Herring gull	*Larus argentatus*			X
Ring-billed gull	*Larus delawarensis*			X
Sandwich tern	*Thalasseus sandvicensis*		X	
CHARADRIIFORMES: Recurvirostridae				
American avocet	*Recurvirostra americana*			X
Black-necked stilt	*Himantopus mexicanus*	X		
CHARADRIIFORMES: Scolopacidae				
Dunlin	*Calidris alpina*			X
Greater yellowlegs	*Tringa melanoleuca*		X	
Least sandpiper	*Calidris minutilla*			X
Long-billed curlew	*Numenius americanus*			X
Long-billed dowitcher	*Limnodromus scolopaceus*			X
Pectoral sandpiper	*Calidris melanotos*			X
Ruddy turnstone	*Arenaria interpres*			X
Sanderling	*Calidris alba*			X
Short-billed dowitcher	*Limnodromus griseus*			X
Spotted sandpiper	*Actitis macularius*	X		
Stilt sandpiper	*Calidris himantopus*		X	
Western sandpiper	*Calidris mauri*			X

TABLE 2-11 BIRD SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
Willet	*Tringa semipalmata*	X		
Wilson's phalarope	*Phalaropus tricolor*		X	
COLUMBIFORMES: Columbidae				
Common ground-dove	*Columbina passerina*	X		
Eurasian collared-dove	*Streptopelia decaocto*	X		
Inca dove	*Columbina inca*	X		
Mourning dove	*Zenaida macroura*	X		
Rock pigeon	*Columba livia*	X		
White-tipped dove	*Leptotila verreauxi*	X		
White-winged dove	*Zenaida asiatica*	X		
CORACIIFORMES: Alcedinidae				
Belted kingfisher	*Megaceryle alcyon*			X
CUCULIFORMES: Cuculidae				
Greater roadrunner	*Geococcyx californianus*	X		
Groove-billed ani	*Crotophaga sulcirostris*		X	
Yellow-billed cuckoo	*Coccyzus americanus*		X	
FALCONIFORMES: Falconidae				
American kestrel	*Falco sparverius*			X
Crested caracara	*Caracara cheriway*	X		
GALLIFORMES: Cracidae				
Plain chachalaca	*Ortalis vetula*	X		
GALLIFORMES: Odontophoridae				
Northern bobwhite	*Colinus virginianus*	X		
GALLIFORMES: Phasianidae				
Wild turkey	*Meleagris gallopavo*	X		
GRUIFORMES: Gruidae				
Sandhill crane	*Grus canadensis*			X
GRUIFORMES: Rallidae				
American coot	*Fulica americana*			X
Common gallinule	*Gallinula galeata*	X		
Sora	*Porzana carolina*		X	X
Virginia rail	*Rallus limicola*		X	
PASSERIFORMES: Bombycillidae				
Cedar waxwing	*Bombycilla cedrorum*			X

TABLE 2-11 BIRD SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
PASSERIFORMES: Cardinalidae				
Blue grosbeak	*Passerina caerulea*		X	
Dickcissel	*Spiza americana*		X	
Indigo bunting	*Passerina cyanea*		X	
Northern cardinal	*Cardinalis cardinalis*	X		
Painted bunting	*Passerina ciris*		X	
Pyrrhuloxia	*Cardinalis sinuatus*	X		
Rose-breasted grosbeak	*Pheucticus ludovicianus*		X	
Summer tanager	*Piranga rubra*		X	
PASSERIFORMES: Corvidae				
Blue jay	*Cyanocitta cristata*	X		
Green jay	*Cyanocorax yncas*	X		
PASSERIFORMES: Emberizidae				
Black-throated sparrow	*Amphispiza bilineata*	X		
Chipping sparrow	*Spizella passerina*			X
Clay-colored sparrow	*Spizella pallida*			X
Grasshopper sparrow	*Ammodramus savannarum*	X		
Lark bunting	*Calamospiza melanocorys*			X
Lark sparrow	*Chondestes grammacus*	X		
Lincoln's sparrow	*Melospiza lincolnii*			X
Olive sparrow	*Arremonops rufivirgatus*		X	
Savannah sparrow	*Passerculus sandwichensis*			X
Spotted towhee	*Pipilo maculatus*			X
Vesper sparrow	*Pooecetes gramineus*			X
White-crowned sparrow	*Zonotrichia leucophrys*			X
PASSERIFORMES: Fringillidae				
House finch	*Haemorhous mexicanus*	X		
PASSERIFORMES: Hirundinidae				
Bank swallow	*Riparia riparia*		X	
Barn swallow	*Hirundo rustica*		X	
Cave swallow	*Petrochelidon fulva*		X	
Cliff swallow	*Petrochelidon pyrrhonota*		X	
Northern rough-winged swallow	*Stelgidopteryx serripennis*		X	
Purple martin	*Progne subis*		X	

TABLE 2-11 BIRD SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
Tree swallow	*Tachycineta bicolor*			X
PASSERIFORMES: Icteridae				
Baltimore oriole	*Icterus galbula*		X	
Brewer's blackbird	*Euphagus cyanocephalus*			X
Bronzed cowbird	*Molothrus aeneus*	X		
Brown-headed cowbird	*Molothrus ater*	X		X
Eastern meadowlark	*Sturnella magna*	X		
Great-tailed grackle	*Quiscalus mexicanus*	X		
Orchard oriole	*Icterus spurius*		X	
Red-winged blackbird	*Agelaius phoeniceus*	X		X
Western meadowlark	*Sturnella neglecta*			X
PASSERIFORMES: Laniidae				
Loggerhead shrike	*Lanius ludovicianus*			X
PASSERIFORMES: Mimidae				
Gray catbird	*Dumetella carolinensis*			X
Long-billed thrasher	*Toxostoma longirostre*	X		
Northern mockingbird	*Mimus polyglottos*	X		
PASSERIFORMES: Motacillidae				
American pipit	*Anthus rubescens*			X
PASSERIFORMES: Paridae				
Black-crested titmouse	*Baeolophus atricristatus*	X		
Carolina chickadee	*Poecile carolinensis*	X		
PASSERIFORMES: Parulidae				
American redstart	*Setophaga ruticilla*		X	
Black-and-white warbler	*Mniotilta varia*		X	
Black-throated Green warbler	*Setophaga virens*			X
Chestnut-sided warbler	*Setophaga pensylvanica*		X	
Common yellowthroat	*Geothlypis trichas*		X	X
Hooded warbler	*Setophaga citrina*		X	
Louisiana waterthrush	*Parkesia motacilla*		X	
Magnolia warbler	*Setophaga magnolia*		X	
Mourning warbler	*Geothlypis philadelphia*		X	
Nashville warbler	*Oreothlypis ruficapilla*		X	
Northern parula	*Setophaga americana*		X	

TABLE 2-11 BIRD SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
Northern waterthrush	*Parkesia noveboracensis*		X	
Orange-crowned warbler	*Oreothlypis celata*			X
Ovenbird	*Seiurus aurocapilla*		X	
Tennessee warbler	*Oreothlypis peregrina*		X	
Wilson's warbler	*Cardellina pusilla*		X	
Yellow warbler	*Setophaga petechia*		X	
Yellow-breasted chat	*Icteria virens*		X	
Yellow-rumped warbler	*Setophaga coronata*			X
Yellow-throated warbler	*Setophaga dominica*		X	
PASSERIFORMES: Passeridae				
House sparrow	*Passer domesticus*	X		
Blue-gray gnatcatcher	*Polioptila caerulea*			X
PASSERIFORMES: Regulidae				
Ruby-crowned kinglet	*Regulus calendula*			X
Verdin	*Auriparus flaviceps*	X		
PASSERIFORMES: Sturnidae				
European starling	*Sturnus vulgaris*	X		
PASSERIFORMES: Troglodytidae				
Carolina wren	*Thryothorus ludovicianus*	X		
House wren	*Troglodytes aedon*			X
Marsh wren	*Cistothorus palustris*			X
Sedge wren	*Cistothorus platensis*			X
PASSERIFORMES: Turdidae				
American robin	*Turdus migratorius*			X
Swainson's thrush	*Catharus ustulatus*		X	
PASSERIFORMES: Tyrannidae				
Ash-throated flycatcher	*Myiarchus cinerascens*		X	
Brown-crested flycatcher	*Myiarchus tyrannulus*		X	
Couch's Kingbird	*Tyrannus couchii*		X	
Eastern kingbird	*Tyrannus tyrannus*		X	
Eastern phoebe	*Sayornis phoebe*			X
Eastern wood-pewee	*Contopus virens*		X	
Great crested flycatcher	*Myiarchus crinitus*		X	
Great kiskadee	*Pitangus sulphuratus*	X		

TABLE 2-11 BIRD SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME	RESIDENT	SUMMER	WINTER
Least flycatcher	*Empidonax minimus*		X	
Olive-sided flycatcher	*Contopus cooperi*		X	
Say's phoebe	*Sayornis saya*			X
Scissor-tailed flycatcher	*Tyrannus forficatus*		X	
Vermilion flycatcher	*Pyrocephalus rubinus*		X	X
Western kingbird	*Tyrannus verticalis*		X	
Willow flycatcher	*Empidonax traillii*		X	
Yellow-bellied flycatcher	*Empidonax flaviventris*		X	
PASSERIFORMES: Vireonidae				
Red-eyed vireo	*Vireo olivaceus*		X	
White-eyed vireo	*Vireo griseus*		X	
PELECANIFORMES: Ardeidae				
American bittern	*Botaurus lentiginosus*			X
Black-crowned night-heron	*Nycticorax nycticorax*			X
Cattle egret	*Bubulcus ibis*	X		
Great blue heron	*Ardea herodias*	X		
Great egret	*Ardea alba*	X		
Green heron	*Butorides virescens*		X	
Least bittern	*Ixobrychus exilis*		X	
Little Blue heron	*Egretta caerulea*		X	
Reddish egret	*Egretta rufescens*	X		
Snowy egret	*Egretta thula*	X		
Tricolored heron	*Egretta tricolor*	X		
Yellow-crowned night-heron	*Nyctanassa violacea*		X	
PELECANIFORMES: Pelecanidae				
American white pelican	*Pelecanus erythrorhynchos*			X
Brown pelican	*Pelecanus occidentalis*	X		
PELECANIFORMES: Threskiornithidae				
Roseate spoonbill	*Platalea ajaja*	X	X	
White ibis	*Eudocimus albus*		X	
White-faced ibis	*Plegadis chihi*	X	X	
PICIFORMES: Picidae				
Golden-fronted woodpecker	*Melanerpes aurifrons*	X		
Ladder-backed woodpecker	*Picoides scalaris*	X		

TABLE 2-11 BIRD SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
PODICIPEDIFORMES: Podicipedidae				
Eared grebe	*Podiceps nigricollis*			X
Least grebe	*Tachybaptus dominicus*	X		
Pied-billed grebe	*Podilymbus podiceps*			X
STRIGIFORMES: Strigidae				
Eastern screech-owl	*Megascops asio*	X		
Great Horned owl	*Bubo virginianus*	X		
STRIGIFORMES: Tytonidae				
Barn owl	*Tyto alba*	X		
SULIFORMES: Anhingidae				
Anhinga	*Anhinga anhinga*		X	
SULIFORMES: Phalacrocoracidae				
Double-crested cormorant	*Phalacrocorax auritus*	X		
Neotropic cormorant	*Phalacrocorax brasilianus*	X		

Source: Freeman 2012.

Mammals

Mammals that might potentially occur in the study area are listed in Table 2-12. The occurrence of each species within the study area is dependent upon available suitable habitat.

TABLE 2-12 MAMMAL SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
American badger	*Taxidea taxus*
American beaver	*Castor canadensis*
American mink	*Neovison vison*
Attwater's pocket gopher	*Geomys attwateri*
Big free-tailed bat	*Nyctinomops macrotis*
Black-tailed jackrabbit	*Lepus californicus*
Bobcat	*Lynx rufus*
Brazilian free-tailed bat	*Tadarida brasiliensis*
Common raccoon	*Procyon lotor*
Coyote	*Canis latrans*
Deer mouse	*Peromyscus maniculatus*
Eastern cottontail	*Sylvilagus floridanus*

TABLE 2-12 MAMMAL SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Eastern fox squirrel	*Sciurus niger*
Eastern gray squirrel	*Sciurus carolinensis*
Eastern mole	*Scalopus aquaticus*
Eastern pipistrelle	*Perimyotis subflavus*
Eastern red bat	*Lasiurus borealis*
Eastern spotted skunk	*Spilogale putorius*
Eastern woodrat	*Neotoma floridana*
Evening bat	*Nycticelus humeralis*
Feral pig	*Sus scrofa*
Fulvous harvest mouse	*Reithrodontomys fulvescens*
Gray fox	*Urocyon cinereoargenteus*
Hispid cotton rat	*Sigmodon hispidus*
Hispid pocket mouse	*Chaetodipus hispidus*
Hoary bat	*Aeorestes cinereus*
House mouse	*Mus musculus*
Least shrew	*Cryptotis parva*
Long-tailed weasel	*Mustela frenata*
Marsh rice rat	*Oryzomys texensis*
Nine-banded armadillo	*Dasypus novemcinctus*
Northern pygmy mouse	*Baiomys taylori*
Northern yellow bat	*Lasiurus intermedius*
Norway rat	*Rattus norvegicus*
Nutria	*Myocastor coypus*
Red fox	*Vulpes vulpes*
Ringtail	*Bassariscus astutus*
Roof rat	*Rattus rattus*
Seminole bat	*Lasiurus seminolus*
Silver-haired bat	*Lasionycteris noctivagans*
Southern short-tailed shrew	*Blarina carolinensis*
Striped skunk	*Mephitis mephitis*
Swamp rabbit	*Sylvilagus aquaticus*
Virginia opossum	*Didelphis virginiana*
Thirteen-lined ground squirrel	*Ictidomys tridecemlineatus*
White-footed mouse	*Peromyscus leucopus*

TABLE 2-12 MAMMAL SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
White-tailed deer	*Odocoileus virginianus*

Source: Schmidly and Bradley 2016.

Fisheries

In Texas, the divisions of the biotic provinces were separated based on terrestrial vertebrate distributions; however, the distribution of freshwater fishes generally corresponds with the terrestrial biotic province boundaries. Areas showing the greatest deviation from this general rule include northeast Texas and the coastal zone (Hubbs 1957). Aquatic habitats within the study area are associated with perennial and intermittent streams and ponds. Fish species that may potentially occur in the study area are listed in Table 2-13. The occurrence of each species within the study area is dependent upon available suitable habitat.

TABLE 2-13 FISH SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Bantam sunfish	*Lepomis symmetricus*
Blue catfish	*Ictalurus furcatus*
Bluegill	*Lepomis macrochirus*
Channel catfish	*Ictalurus punctatus*
Darter goby	*Ctenogobius boleosoma*
Fat sleeper	*Dormitator maculatus*
Gizzard shad	*Dorosoma cepedianum*
Golden topminnow	*Fundulus chrysotus*
Green sunfish	*Lepomis cyanellus*
Gulf killifish	*Fundulus grandis*
Hogchoker	*Trinectes maculatus*
Inland silverside	*Menidia beryllina*
Largemouth bass	*Micropterus salmoides*
Longear sunfish	*Lepomis megalotis*
Naked goby	*Gobiosoma bosc*
Pinfish	*Lagodon rhomboides*
Pugnose minnow	*Opsopoeodus emiliae*
Sailfin molly	*Poecilia latipinna*
Sheepshead minnow	*Cyprinodon variegatus*
Silver perch	*Bairdiella chrysoura*

TABLE 2-13 FISH SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Striped mullet	*Mugil cephalus*
Threadfin shad	*Dorosoma petenense*
Warmouth	*Lepomis gulosus*
Western mosquitofish	*Gambusia affinis*
White mullet	*Mugil curema*

Source: Hendrickson and Cohen 2015.

Perennial streams and larger ponds provide consistent aquatic habitat for all trophic levels with fish being the most prominent. The relatively stable water levels of perennial lakes/ponds and constant pools and flow of perennial streams facilitate stable population growth. Species with flowing water or pooled area habitat requirements will utilize perennial streams and those adapted for deeper waters will utilize smaller lake and pond environments. Larger populations of fish and other aquatic species will also attract fish eating bird species (Hubbs 1957).

In general, intermittent flowing streams support aquatic species primarily adapted to ephemeral pool habitats. Aquatic species in this habitat type are typically adapted to rapid dispersal and life cycle completion in pool habitats typically having fine-grained substrates. Because intermittent streams consist of small headwater drainages, persistent flow is unlikely to be sufficient to support any substantial fishery assemblage (Hubbs 1957).

In stream reaches dominated by scoured, sandy-clay bottoms, accumulations of woody debris and leaf pack provide the most important feeding and refuge areas for invertebrates and forage fish. Softer muddy stream bottoms generally harbor substantial populations of burrowing invertebrates (e.g., larval diptera and oligochaetes) which can be an important food source for higher aquatic trophic levels (Thomas et al. 2007).

2.4.4.5 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. Documented occurrences of unique vegetative communities within the study area were also reviewed. Special status species include those listed by the USFWS (2020b) as threatened, endangered, candidate, or proposed; and those species listed by TPWD (2020f) as threatened or endangered.

POWER requested data of known occurrences for listed species and/or sensitive vegetative communities from the TPWD Texas Natural Diversity Database (TXNDD 2020). For the purpose of this study, TXNDD information is not used as a substitute for a presence/absence survey, but as an indication of past observations of a species within suitable habitat. Only a site survey can determine whether a species or suitable habitat is present. The USFWS regulates activities affecting plants and animals designated as endangered or threatened under the ESA (16 U.S.C. § 1531 et seq.). A USFWS Information for Planning and Consultation ("IPaC") report request was submitted and received on October 16, 2020 (Consultation Code: 02ETTX00-2021-SLI-0156). This USFWS report identifies potentially occurring federally-listed threatened, endangered, and proposed species and designated critical habitat within the study area (USFWS 2020b). 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 threats to support listing as threatened or endangered and are likely to be proposed for listing in the near future. Proposed species are those that have been proposed in the Federal Register to be listed under the ESA. 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. The IPaC report states there are no designated critical habitats within the study area (USFWS 2020b).

The TPWD also regulates plants and animals designated as endangered or threatened (Chapters 67 and 68 of the TPWC and § 65.171-65.176 of Title 31 of the TAC; and Chapter 88 of the TPWC and § 69.01-69.9 of the TAC). 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.

Plant Species and Sensitive Vegetation Communities

No federally- (USFWS 2020b) or state- (TPWD 2020f) listed threatened or endangered plant species are listed as potentially occurring within the study area. Review of the TXNDD (2020) identified two occurrence records for a Vertisol Coastal Prairie vegetation community mapped within the study area. One occurrence record is mapped along the north boundary and one is mapped along the south boundary of the study area (TXNDD 2020).

Wildlife Species

The USFWS (2020b) IPaC official species list identifies federally-listed species to consider for the study area. State-listed species in the TPWD (2020f) Annotated County Lists of Rare Species have also been included in Table 2-14. A brief description of each species' life history, habitat requirements, and any documented occurrences within the study area are summarized below. Only USFWS listed threatened or endangered species are afforded federal protection under the ESA.

TABLE 2-14 THREATENED AND ENDANGERED ANIMAL SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

SPECIES		LEGAL STATUS	
Common Name	Scientific Name	USFWS[1]	TPWD[2]
Birds			
Interior least tern	*Sterna antillarum athalassos*	E	E
Piping plover	*Charadrius melodus*	T	T
Reddish egret	*Egretta rufescens*	-	T
Red knot	*Calidris canutus rufa*	T	T
Swallow-tailed kite	*Elanoides forficatus*	-	T
White-faced ibis	*Plegadis chihi*	-	T
White-tailed hawk	*Buteo albicaudatus*	-	T
Whooping crane	*Grus americana*	E	E
Wood stork	*Mycteria americana*	-	T
Reptiles			
Texas horned lizard	*Phrynosoma cornutum*	-	T

Status abbreviations: E - Endangered, T - Threatened
Sources: [1]USFWS 2020b; [2]TPWD 2020f.

Federally-Listed Species

BIRDS

Interior Least Tern

The interior least tern is a subspecies of least tern. The USFWS recognizes any nesting least tern that is 50 miles or greater from a coastline as being an interior least tern (Campbell 2003). Interior least terns nest inland along sand and gravel bars within braided streams and rivers as well as salt flats associated with rivers and reservoirs. They are also known to nest on man-made structures (inland beaches, wastewater treatment plants, gravel quarries, etc.) (Thompson et al. 2020). The study area is located within 50 miles of the Texas coastline and therefore the interior least tern is not anticipated to occur.

Piping Plover

The piping plover is an uncommon to locally common winter resident along the Texas coastline and rarely seen inland during migration. The birds leave for their nesting grounds in March or early April and return to the Gulf of Mexico coastline in Texas, Louisiana, Alabama, and Florida by mid-September to overwinter. Wintering habitat includes sandy beaches and lakeshores, bayside mudflats, and salt flats (Elliot-Smith and Haig 2020). Critical habitat for wintering piping plovers has been designated along the Gulf Coast but none is located within the study area. (USFWS 2020b). This species may occur temporarily within the study area as a rare non-breeding migrant (Lockwood and Freeman 2014), if potential suitable stopover habitat is available.

Red Knot

The red knot is a long-distance migrant that may travel up to 5,000 miles during migration without stopping. Red knots nest in the arctic tundra and overwinter along the Texas coastline. A significant spring migratory stopover site is located in Delaware Bay where the species gorges on horseshoe crab eggs to prepare for their long flight (NatureServe 2020). Winter foraging habitats include coastal beaches, tidal sand flats, mudflats, marsh, shallow ponds, and sand bars (Baker et al. 2020). This species is a non-breeding winter migrant along the Texas coastline (Lockwood and Freeman 2014) and may occur temporarily within the study area as a rare migrant if potential suitable stopover habitat is available.

Whooping Crane

The whooping crane breeds at Wood Buffalo National Park in Canada and overwinters primarily in marshes at Aransas National Wildlife Refuge on the Texas coast from November through March (Pearse et al. 2015). Family groups of whooping cranes have also been documented overwintering further inland in Central Texas, south-central Kansas, and central Nebraska, possibly in response to record warm temperatures and extreme drought conditions in the southern and central United States (Wright et al. 2014). Spring and fall migration primarily occur within a 200-mile-wide migratory corridor in which 95 percent of all whooping crane sightings occur. During migration, whooping cranes 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, small surface waters with emergent vegetation cover, harvested grainfields, pastures, or burned upland fields (Urbanek and Lewis 2020). The study area is located within the portion of the migratory corridor (Pearse et al. 2018) in which 75 percent of migration stopover sites occur (Pearse et al. 2015) and approximately 25 miles due west of the Aransas National Wildlife Refuge. This species may occur within the study area if potential suitable habitat is available.

Other Federally Protected Species

The bald eagle (*Haliaeetus leucocephalus*) was delisted in 2007 by the USFWS, because the population has recovered beyond the ESA criteria for listing. The status of the bald eagle population is currently monitored by the USFWS and the species is still afforded federal protection under the MBTA and the BGEPA. Bald eagles may occur as summer and/or winter residents in Texas. Eagles typically nest from October to July. The bald eagle will build large nests in treetops or on cliffs usually near large bodies of water; however, they have been known to nest anywhere there is a suitable nesting tree or structure (Buehler 2000). This species may occur within the study area as a breeding or wintering resident (Lockwood and Freeman 2014), if potential suitable habitat is available.

State-Listed Species

BIRDS

Reddish Egret

The reddish egret is a permanent resident of the Texas Gulf Coast and inhabits brackish marshes, shallow salt ponds, and tidal flats. In the spring, nests are built on the ground or in low vegetation on dry coastal islands in brushy thickets of Spanish dagger (*Yucca gloriosa*) and prickly-pear cactus (*Opuntia sp.*). Post breeding, reddish egrets disperse and occasionally travel inland during the summer, foraging along ponds and small lakes (Koczur 2020). This species may occur within the study area as a rare vagrant if potential suitable foraging habitat is available.

Swallow-tailed Kite

The swallow-tailed kite historically occurred along the coastal plains, interior lowlands, and riparian areas throughout the southeastern U.S. and into central Texas. Today in Texas, the species is a rare to uncommon migrant throughout the eastern third of the state and a rare to locally uncommon summer resident in southeast Texas. The most recent breeding records exist from Chambers, Liberty, Orange, and Tyler counties (Lockwood and Freeman 2014). Habitats include lowland forested swampy areas ranging into open woodland, marshes, rivers, lakes, and ponds. Nesting occurs in tall trees within clearings or on forest woodland edge, usually in pine, bald cypress, or other deciduous trees (Meyer 1995). This species may occur within the study area as a rare migrant (Lockwood and Freeman 2014), if potential suitable habitat is available.

White-faced Ibis

The white-faced ibis breeds and winters along the Texas Gulf Coast. Other breeding populations occurring in the northwestern US migrate south to overwinter along the Gulf Coast and in Central

America. Preferred habitat includes swamps, ponds, rivers, sloughs, irrigated rice fields, freshwater marsh, and sometimes brackish and saltwater marsh. This species is a colonial nester and forages on insects, newts, leeches, earthworms, snails, crayfish, frogs, and fish (Ryder and Manry 2020). This species may occur within the study area if potential suitable habitat is available.

White-tailed Hawk

The white-tailed hawk is a non-migratory species that inhabits prairies, cordgrass flats, scrub-live oak, mesquite and oak savannas, and mixed savanna-chaparral habitats of the Gulf Coast region of southeast Texas. This species requires a woody overstory cover of no more that 40 percent. Cultivated or fallow agricultural fields are not tolerated. The greatest concentration of breeding adults is located in the Coastal Bend region of south Texas (Farquhar 2020). This species may occur within the study area if potential suitable habitat is available.

Wood Stork

The wood stork is a colonial bird that breeds in Florida, Georgia, South Carolina, and Mexico. Nesting occurs in mangrove or cypress trees within brackish or freshwater swamp habitat. Post breeding, storks from Mexico migrate northward along Mississippi River Valley. Migrating wood storks use prairie ponds, flooded pastures or fields, ditches, and other shallow standing water habitats to forage for fish and other small animals. This species usually roosts communally in tall snags and sometimes in association with other wading birds (Coulter et al. 1999). This species may occur as an uncommon migrant (Lockwood and Freeman 2014) within the study area, if potential suitable stopover habitat is available.

REPTILES

Texas horned lizard

The Texas horned lizard inhabits a variety of habitats including open desert, grasslands, and shrubland in arid and semiarid habitats on soils varying from pure sands and sandy loams to coarse gravels, conglomerates, and desert pavements. Its primary prey item is the harvester ant (*Pogonomyrmex spp.),* but it may also consume grasshoppers, beetles, and grubs (Henke and Fair 1998). Historically the Texas horned lizard occurred throughout most of Texas but habitat loss and the spread of non-native fire ants (*Solenopsis invicta*) have caused population declines (Dixon 2013). This species may occur within the study area if potential suitable habitat is available.

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3.0 PROPOSED ALTERNATIVE ROUTE IDENTIFICATION

3.1 ROUTING STUDY METHODOLOGY

This section describes the methodologies and assumptions that were used to conduct the environmental assessment and routing study for the 345 kV Space City Solar Project. A base map was developed for the POWER planning team and CenterPoint Energy to delineate the study area boundaries. The POWER planning team was comprised of technical experts within each respective resource field. Field reconnaissance was conducted, and preliminary evaluation criteria were developed. Based on data pertinent to the study area, the POWER planning team and CenterPoint Energy also established criteria, consistent with PUC standards, for the resource analysis. Data were collected pertaining to land use, recreational and park areas, historical and aesthetic values and environmental integrity. Available GIS coverage with associated metadata was reviewed, and relevant resource data were selected and mapped. Sensitive resource locations were identified on an environmental and land use composite constraints map. Feasible and geographically diverse preliminary transmission line segments were developed. No modifications to the preliminary transmission line segments were necessary, and the preliminary transmission line segments were considered the primary transmission line segments. Data were tabulated for the primary transmission line segments, which were then combined into proposed alternative routes. A comparative potential impact assessment of the proposed alternative routes was completed, culminating in the recommendation of the proposed alternative route that best addresses the PURA and PUC substantive rules.

The study approach included the following major tasks:

- Base Map Development
- Study Area Delineation
- Development of Evaluation Criteria
- Data Collection and Mapping
- Reconnaissance Surveys
- Resource Analysis
- Opportunities and Constraints Evaluation
- Identification of Preliminary Transmission Line Segments
- Determination if an Open House Meeting was required
- Identification of Primary Transmission Line Segments

- Selection of Proposed Alternative Routes
- Impact Assessment of Proposed Alternative Routes
- Proposed Alternative Route Selection that best addresses the PURA and the PUC's Substantive Rules

A detailed description of the methodologies used to complete this environmental assessment and routing study follows.

3.1.1 Base Map Development

A base map was prepared at a scale of 1.0 inch = 700 feet. The base map was a map covering the area between the study area boundaries and was used to initially display resource data for the study area. Resource data categories and factors that were determined appropriate within the study area were selected and mapped.

Data typically displayed, if present, on the base map include:

- Major land jurisdictions and uses.
- Major roads, including CRs, FMs, US highways and SHs.
- Existing transmission line and pipeline corridors.
- Parks and recreational areas.
- Major political subdivision boundaries.
- Lakes, rivers, creeks and ponds.
- USACE mapped NWI wetlands.

The base map provides a broad overview of various resource locations indicating obvious routing constraints and areas of potential routing opportunities.

3.1.2 Study Area Delineation

The study area boundary (see Figure 2-1) was defined to include feasible geographically diverse alternatives for the location of the proposed 345 kV transmission line between the Project endpoints. Major physiographic features, jurisdictional boundaries, sensitive resources, land uses, and existing roadways and utility corridors helped to define the study area boundaries. The study area boundary was depicted on a

study area map (Figure 2-1) that was included with consultation letters, dated September 11, 2020, that were sent to agencies and officials to solicit comments on the Project (see Appendix A).

3.1.3 Evaluation Criteria

Evaluation criteria were developed to reflect accepted practices for routing electric transmission lines in Texas (see Table 3-1). Emphasis was placed on acquiring the types of information identified in Section 37.056(c)(4)(A)-(D) of the PURA, the PUC CCN application and 16 TAC § 25.101, including the policy of prudent avoidance. Evaluation criteria were further refined based on data collection, reconnaissance surveys and agency and public input. The routing activities were conducted with consideration and incorporation of the evaluation criteria. Routing activities included data collection, reconnaissance surveys, resource analysis, identification of routing opportunities and constraints and identification of the preliminary transmission line segments. Evaluation criteria data were collected, mapped, tabulated and analyzed (Section 4.0) for each resulting proposed alternative route and ultimately used as a basis for the comparison of the proposed alternative routes and the selection of the proposed alternative routes that best meet the requirements under PURA and PUC rules (Section 5.0).

TABLE 3-1 LAND USE AND ENVIRONMENTAL EVALUATION CRITERIA

LAND USE
Length of route (feet)
Length of route (miles)
Number of directly affected habitable structures[1] within 500 feet of route centerline
Number of directly affected habitable structures[1] also within 500 feet of an existing transmission line
Length of route using existing transmission line easement
Length of route parallel to existing transmission line ROW
Length of route not utilizing/paralleling existing transmission line ROW
Length of new ROW required for route
Length of route paralleling apparent property lines (or other natural or cultural features)[2]
Length of route parallel to other existing ROW (roadways, railways, canals, etc.)
Length of route not parallel to railroad ROW, apparent property lines, or other existing ROW (roadways, railways, canals, etc.)
Percent of route parallel with apparent features (existing ROWs or property lines)
Length of route across parks/recreational areas[3]
Number of additional parks/recreational areas[3] within 1,000 feet of route centerline
Length of route across agricultural land/cropland
Length of route across pastureland

TABLE 3-1 LAND USE AND ENVIRONMENTAL EVALUATION CRITERIA

LAND USE
Length of route across mobile irrigated cropland or pastureland
Length of route parallel to existing pipeline ROW
Number of pipeline crossings
Number of transmission line crossings
Number of US and state highway crossings
Number of FM road crossings
Number of local road crossings
Number of heliports within 5,000 feet of route centerline
Number of private airstrips within 10,000 feet of route centerline
Number of FAA-listed airports[4] within 10,000 feet of route centerline having no runway more than 3,200 feet
Number of FAA-listed airports[4] within 20,000 feet of route centerline having at least one runway more than 3,200 feet
Number of commercial AM radio transmitters within 10,000 feet of route centerline
Number of FM radio transmitters, microwave relay stations, and other electronic installations etc. within 2,000 feet of route centerline
Number of water wells within the ROW
Number of oil and gas wells within the ROW
AESTHETICS
Estimated length of route within foreground visual zone of US and state highways
Estimated length of route within foreground visual zone of FM and county roads
Estimated length of route within foreground visual zone of park and recreational areas
ECOLOGY
Length of route across upland woodlands
Length of route across bottomland/riparian woodlands
Length of route across National Wetland Inventory mapped wetlands
Length of route across critical habitat of federal threatened or endangered species of plants or animals
Length of route across open water (lakes or ponds)
Number of stream and canal crossings
Length of route parallel to streams within 100 feet of route centerline
Length of route across 100-year floodplains
CULTURAL RESOURCES
Number of cemeteries within 1,000 feet of the route centerline
Number of recorded historical or archeological sites crossed within ROW
Number of additional recorded historical or archeological sites within 1,000 feet of route centerline
Number of National Register of Historic Places listed or determined-eligible properties within ROW

TABLE 3-1 LAND USE AND ENVIRONMENTAL EVALUATION CRITERIA

LAND USE
Number of additional National of Register Historic Places listed or determined-eligible properties within 1,000 feet of route centerline
Length of route across areas of high archeological/historic site potential

3.2 DATA COLLECTION AND CONSTRAINTS MAPPING

Once the study area boundary was identified, comprehensive data collection activities began. POWER developed a list of potentially interested regulatory agencies, elected officials and organizations to receive a Project scoping letter. The purpose of the letter was to inform the various officials and agencies of the Project and to give them the opportunity to provide information regarding sensitive resources and potential issues within the study area. POWER utilized websites from Wharton County, in addition to confirmation through telephone calls, to identify local officials. Various federal and state agencies that may have potential concerns or regulatory permitting requirements for the Project were also contacted. Copies of correspondence with the various federal and state regulatory agencies, county and local officials, departments and non-governmental agencies are included in Appendix A.

Federal, state, and local agencies and officials contacted include:

- FAA
- FEMA
- NPS
- NRCS
- USACE
- DoD Siting Clearinghouse (DoD Military Aviation and Installation Assurance Siting Clearinghouse)
- USEPA
- USFWS
- RRC
- TCEQ
- TxDOT – Division of Aviation
- TxDOT – District Engineers
- TxDOT – Environmental Affairs Division
- TxDOT – Planning and Programming
- Texas GLO

- THC
- TPWD
- TWDB
- Wharton County Officials
- Wharton County Drainage Supervisor
- Wharton County Historical Commission
- El Campo ISD
- Louise ISD
- Lower Colorado River Authority
- Houston-Galveston Area Council
- Bayou Land Conservancy
- Gulf Coast Birding Observatory
- The Nature Conservancy
- Texas Land Trust Council

Available data were mapped to identify existing conditions and to determine potential conflicts that would result from the proposed 345 kV transmission line. Resource data were collected for land use, historical (cultural and archeological) and aesthetic values, physiographic and geologic features, surface waters, wetlands and biological resource areas. Data were mapped within the study area using GIS layers. Additional data collection consisted of file and record reviews conducted with various state regulatory agencies, a review of published literature and a review of various maps and readily available aerial imagery on the internet (NAIP 2018) and Google Maps. Results from the resource inventory data were described in Section 2.0 and were reflected on the Composite Constraints Map developed at a scale of 1.0 inch = 700 feet.

3.3 RECONNAISSANCE SURVEY

POWER personnel conducted a reconnaissance survey of the study area on September 18, 2020 to confirm the findings of the research and data collection activities and to identify potential constraints that may not have been previously noted. The reconnaissance survey confirmed some data point accuracy and identified changes in land use that occurred after the date of the aerial photography. The reconnaissance survey was limited to visual observations conducted from public roads and existing public ROWs located within the study area.

3.4 RESOURCE ANALYSIS

The composite constraints map was used as a foundation for the resource analysis. Criteria were developed for each resource to establish constraint parameters which facilitated the identification of preliminary transmission line segments. The following definitions were considered:

- **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.

Using this framework, overlays of individual resources were mapped to provide a visual representation of constraint areas, and potential routing opportunity areas were identified. Where feasible, identified constraints were avoided to the extent practicable to minimize potential impacts or conflicts.

3.5 OPPORTUNITIES AND CONSTRAINTS EVALUATION

In order to identify preliminary transmission line segments, information gathered during the data collection task, review of agency comments and management plans, internal review and discussions with the Project team were used to determine routing opportunities and constraints within the study area. Routing opportunities were generally located within open, undeveloped areas, or parallel to existing linear corridors. For example, existing transmission lines, roadways and property boundaries provided routing opportunities.

3.5.1 Existing Linear Corridors

Within the areas of opportunity, POWER identified existing linear corridor features as potential paralleling opportunities in accordance with the PURA Section 37.056(c) and 16 TAC § 25.101(b)(3)(B)(i-iii). Apparent property boundaries, roadways and existing transmission lines were evaluated for potential paralleling opportunities. Data sources used to identify existing linear ROWs include utility company regional system maps, aerial imagery, USGS topographical maps, CAD files from CenterPoint Energy (Wharton County Appraisal District 2020), additional available planning documents and reconnaissance surveys (PLATTS 2020; NAIP 2018).

3.5.2 Apparent Property Boundaries

Apparent property boundaries and fence lines were initially identified using parcel data that was downloaded and purchased (Wharton County Appraisal District 2020) supplemented by readily available existing aerial photography (NAIP 2018). CenterPoint Energy downloaded and purchased parcel information for the study area boundary directly from the Wharton County Appraisal District. The July 2020 parcel information was relied on to identify potential paralleling opportunities within the study area.

3.5.3 Roadway ROWs

POWER evaluated paralleling FMs 441 and 3086, and numerous other local roads. However, in many instances, existing constraints, developments and habitable structures prohibited paralleling many of the road ROWs due to development that typically occurs along existing road ROWs.

3.5.4 Existing Transmission Line ROWs

POWER identified several existing transmission line corridors in the area, which include eight 345 kV transmission lines and one 138 kV transmission line. Some opportunities for paralleling these transmission lines were identified. In some instances, constraints are located adjacent to these transmission lines or the location or orientation of these lines precluded paralleling them.

3.5.5 Existing Pipeline ROWs

POWER reviewed aerial photography and RRC data to identify pipeline ROWs within the study area. Pipeline locations were verified, where possible, during field reconnaissance surveys. POWER identified multiple existing pipeline ROWs traversing the study area. The existing pipeline ROWs were considered but did not always provide suitable paralleling opportunities. The PUC rulemaking Project No. 42740 regarding paralleling of pipelines was also taken into consideration.

3.6 PROPOSED ALTERNATIVE ROUTE IDENTIFICATION

CenterPoint Energy provided the location of the existing Hillje Substation and the planned Space City Solar Interconnection Substation to POWER. Multiple subsequent preliminary transmission line segments were developed to connect the Project endpoints.

3.6.1 Preliminary Transmission Line Segments

Preliminary transmission line segments were identified on an overlay of the composite environmental and land use constraints map. These segments were developed based upon maximizing the use of routing opportunity areas while avoiding areas of high environmental constraints or conflicting land uses. Aerial

photography was used as the background of the composite constraints overlay to identify optimal locations for the preliminary transmission line segment centerlines. During the preliminary transmission line segment development process, the location of residential areas, habitable structures, industrial facilities, pipelines, surface water crossings, wetlands, property boundaries, agricultural land and other sensitive resource areas were considered. POWER utilized the following to identify the preliminary transmission line segments:

- Input received from scoping activities with local officials, regulatory agencies and others.
- Results from reconnaissance surveys of the study area.
- Review of aerial photography.
- Findings of the data collection activities.
- Environmental and land use composite constraints maps.
- Apparent property boundaries from the study area county appraisal district.
- Existing compatible opportunity areas.
- Location of existing developments.

The preliminary transmission line segments were identified in accordance with the PURA § 37.056 (c)(4)(A)-(D), 16 TAC § 25.101, including the PUC's policy of prudent avoidance, while also considering the evaluation criteria in Table 3-1. It was POWER's intent to identify preliminary transmission line segments that, when combined, formed an adequate number of reasonable and geographically diverse proposed alternative transmission line routes based on all of the previously mentioned routing considerations.

POWER, with CenterPoint Energy's input, identified 16 preliminary transmission line segments illustrated on Figure 3-1.

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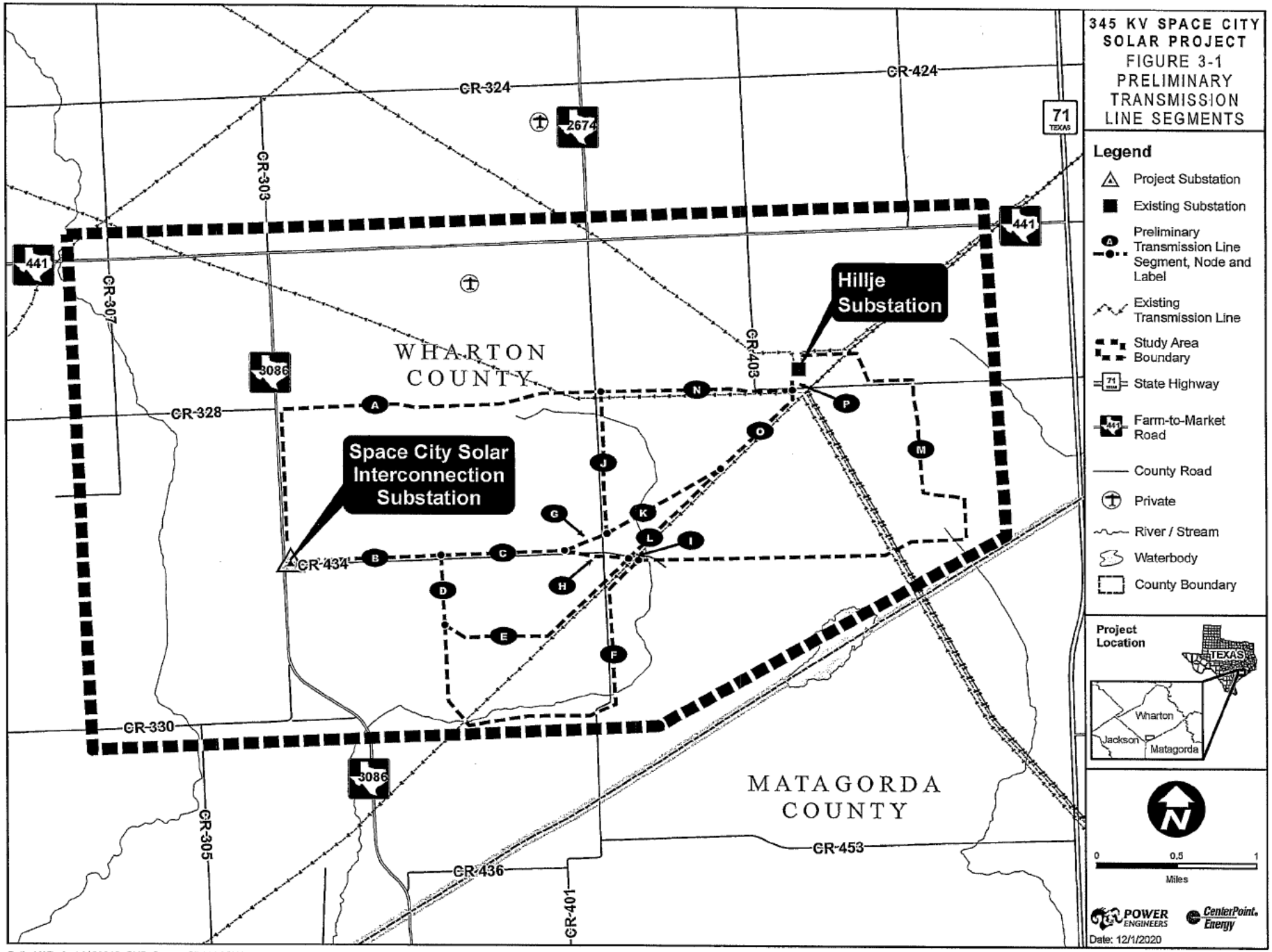

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3.6.2 Public Involvement Program

Typically, CenterPoint Energy hosts a public open-house meeting or meetings within the community to solicit comments, concerns, and input from residents, landowners, public officials, and other interested parties. However, since less than 25 landowners would have been entitled to receive direct notice for the preliminary routes developed, a public meeting was not required per PUC Procedural Rule 22.52 (a)(4).

3.6.3 Comments from Agencies, Officials and Organizations

POWER developed a list of federal, state and local agencies and organizations that would potentially have an interest in the Project. Section 3.1.3 lists agencies, organizations and public officials that were sent scoping letters regarding the Project. Maps of the study area were included with each letter. Copies of the agency scoping letters sent and responses received are located in Appendix A.

Responses received are summarized on the following pages.

- FEMA responded with a letter dated September 17, 2020, requesting that the community floodplain administrator be contacted for the review and possible permit requirements.
- The USACE responded with an email dated September 14, 2020, stating that the Project has been reviewed and that the USACE has no interest in the Project area.
- The USFWS responded with an email and a letter dated September 22, 2020, providing a form letter regarding threatened and endangered species inquiries. They also directed POWER to the online listing for federally-listed species.
- The THC responded with a letter dated October 20, 2020, stating that the study area contains landforms once occupied by prehistoric and historic Native Americans. They further stated that the study area has a moderate to high probability of containing significant cultural resources and that an investigation is warranted.
- The TPWD responded with a letter dated October 22, 2020 and provided a project number (45079) and made numerous recommendations. In summary, some of the TPWD recommendations include using existing facilities whenever possible and using existing ROW and utility corridors to minimize impacts to undisturbed habitats, and mitigation for all impacts.
- The Wharton County Historical Commission responded with an email dated September 15, 2020, stating that they did not work with proposed development or construction unless they would

adversely impact historic properties. The letter stated that they do not believe that would be an issue in this case.

3.6.4 Proposed Alternative Routes

POWER and CenterPoint Energy considered comments received from agencies and officials, reviewed the preliminary transmission line segments and determined that no further modifications or revisions were necessary. The preliminary transmission line segments were then considered to be the primary transmission line segments. The Project team used the primary transmission line segments to identify the proposed alternative routes to be evaluated by POWER in this EA.

Of the numerous possible forward progressing route combinations, seven proposed alternative routes were identified and selected by POWER and CenterPoint Energy. They provide geographically diverse alternatives across the study area to connect CenterPoint Energy's Hillje Substation with the Space City Solar Interconnection Substation. Each of the 16 proposed transmission line segments is used in at least one of the seven proposed alternative routes.

The seven proposed alternative routes and their segment combinations are presented in Table 3-2 below. Figure 3-2 (map pocket) depicts the location of the primary transmission line segments that, when combined, form the proposed alternative routes overlain on a USGS topographic map, along with the land use and environmental data and constraints identified and previously discussed.

TABLE 3-2 SEGMENT COMPOSITION OF THE PROPOSED ALTERNATIVE ROUTES

PROPOSED ALTERNATIVE ROUTES	SEGMENT COMBINATION
1	A-N-P
2	B-C-G-J-N-P
3	B-C-G-K-O-P
4	B-C-H-L-O-P
5	B-C-H-I-M
6	B-D-E-I-M
7	B-D-F-M

These seven proposed alternative routes are further evaluated, discussed and compared in Section 4.0. Within each resource area, the evaluation criteria for each of the proposed alternative routes were tabulated for comparative purposes.

4.0 IMPACT OF THE PROPOSED ALTERNATIVE ROUTES

Evaluation of the seven proposed alternative routes identified in Section 3.0 was conducted by utilizing the evaluation criteria listed in Table 3-1 in Section 3.1.3. The tabulated data was used to evaluate the proposed alternative routes and to conduct a quantitative comparative analysis. This analysis, along with consideration of geographic diversity, was the first step in the process POWER and CenterPoint Energy used to identify the set of proposed alternative routes, evaluated in Section 5.0, for inclusion in the PUC CCN Application.

The potential impacts of the proposed alternative routes were compared with respect to community values, recreational and park areas, historic and aesthetic values and environmental integrity. The results of the analysis are provided in Tables 4-1 (segment data) and 4-2 (route data), located in Appendix B. This section provides a summary and discussion of the comparison between the seven proposed alternative routes.

4.1 COMMUNITY VALUES

Impacts on community resources can be divided into direct and indirect effects. Direct effects are those that would occur if the location and construction of a transmission line results in the removal or loss of public access to a valued resource. Indirect effects are those that would result in a loss in the enjoyment or use of a resource due to the characteristics of the proposed transmission line, poles, tower structures or ROW.

4.1.1 Land Use

The magnitude of potential impacts to land use resulting from the construction of a transmission line is determined by the amount of land or land use type displaced by the actual ROW and by the compatibility of the transmission line ROW 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, in addition to temporary disruptions of traffic flow, may also temporarily affect residents and businesses in the area immediately adjacent to the ROW. Coordination between CenterPoint Energy, their contractors and the landowners regarding ROW access and construction scheduling should minimize these disruptions.

The evaluation criteria used to compare potential land use impacts include overall route length, the length of route paralleling existing corridors (including apparent property lines), the proximity of the route to habitable structures, potential impacts to recreational and park areas and the length of route across various

land use types. An analysis of the existing land use adjacent to the proposed ROW was required to evaluate the potential impacts. The following sections address potential impacts to land use associated with the seven proposed alternative routes.

4.1.2 Proposed Alternative Route Length

The length of a proposed alternative route can be an indicator of the relative magnitude of land use impacts. In general, a shorter route means that less land is crossed, which usually results in the least potential impacts. The total lengths of the proposed alternative routes vary from approximately 3.5 miles for Proposed Alternative Route 3, to approximately 8.0 miles for Proposed Alternative Route 7. The differences in route lengths reflect the direct or indirect pathway of each proposed alternative route between the Project endpoints. The length of the proposed alternative routes may also reflect the effort to parallel existing transmission lines, other existing linear features and apparent property lines and provide geographic diversity. The approximate lengths for each of the proposed alternative routes are presented in Table 4-2 (Appendix B).

4.1.3 Compatible ROW

16 TAC § 25.101(b)(3)(B) requires that the PUC consider whether new transmission line routes are within existing compatible ROWs and/or are parallel to existing compatible ROWs, property lines or other natural or cultural features. Criteria were used to evaluate compatible ROW utilization, length of route parallel to existing transmission line ROW, length of route parallel to other existing linear ROWs and length of ROW 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., the segment parallels both an apparent property line and a roadway, but it was only tabulated as paralleling the roadway). Although pipeline ROW was not generally treated as a routing opportunity, POWER and CenterPoint Energy did consider paralleling pipeline ROW where it paralleled other compatible ROW, or where an area is otherwise undisturbed except for an existing pipeline ROW.

All of the proposed alternative routes are parallel to some length of existing transmission line ROW. The total proposed alternative route lengths parallel to existing transmission line ROW vary from approximately 0.3 mile each for Proposed Alternative Routes 1, 2, and 5, to approximately 1.4 miles for Proposed Alternative Route 4. The length parallel to existing transmission line ROW for each of the proposed alternative routes are presented in Table 4-2 (Appendix B).

The proposed alternative routes with lengths parallel to existing pipeline ROW ranges from approximately 0.0 mile for Proposed Alternative Routes 1, 2, 4, 5, 6, and 7 to approximately 0.7 mile for Proposed Alternative Route 3. The lengths parallel to existing pipeline ROW for each of the proposed alternative routes are presented in Table 4-2 (Appendix B).

All but one of the proposed alternative routes parallel apparent property lines to the extent feasible in the absence of other existing linear features. The length of proposed alternative routes that parallel apparent property lines ranges from approximately 0.0 mile for Proposed Alternative Route 3, to approximately 2.4 miles for Proposed Alternative Route 1. The lengths paralleling apparent property lines for each of the proposed alternative routes are presented in Table 4-2 (Appendix B).

The proposed alternative routes with lengths paralleling other existing linear features, including roadways, railways, canals, etc. range from approximately 0.8 mile for Proposed Alternative Route 1, to approximately 1.9 miles for Proposed Alternative Routes 2, 5, and 7. The lengths paralleling other existing linear features for each of the proposed alternative routes are presented in Table 4-2 (Appendix B).

To evaluate whether and to what extent, the proposed alternative routes parallel existing compatible ROWs, apparent property lines, or other natural or cultural features, the percentage of each total route length parallel to these features was estimated. These percentages can be calculated by adding up the total route length paralleling existing transmission lines, other existing ROW, and apparent property lines and then dividing the result by the total length of the route. The percentage of each route that parallels existing linear features ranges from 59 percent for Proposed Alternative Route 7, to 92 percent for Proposed Alternative Route 4. The percentage of each proposed alternative route parallel with existing linear features is presented in Table 4-2 (Appendix B).

4.1.4 Urban and Residential Areas

One of the most important measures of potential land use impacts is the number of habitable structures located in the vicinity of each proposed alternative route. POWER determined the number and distance of habitable structures located within 500 feet of the centerline of each proposed alternative route through the interpretation of aerial photography and during reconnaissance surveys. The horizontal accuracy of the aerial photograph used to identify habitable structures was calculated at ±10 feet. To account for this margin of error and to ensure that all habitable structures were properly identified, POWER identified habitable structures within 510 feet of the centerline of each proposed alternative route.

Five of the alternative routes have habitable structures located within 500 feet of their centerlines. Proposed Alternative Routes 1 and 3 have the least number of habitable structures located within 500 feet of its centerline with zero. Proposed Alternative Route 5 has the most habitable structures located within 500 feet of its centerline with two, with neither of these already within 500 feet of an existing transmission line. The number of habitable structures located within 500 feet of each of the proposed alternative route centerlines are presented in Table 4-2 (Appendix B).

Tables 5-3 through 5-9 (Appendix C) present detailed information on habitable structures within 500 feet of each of the proposed alternative route centerlines. All known habitable structure locations are shown on Figure 3-2 (map pocket) and on Figure 5-1 (map pocket).

4.1.5 Land Use Categories

An analysis of compatibility with adjacent land use types was completed for each proposed alternative route. Land use categories occurring within the study area included residential, commercial and industrial areas, agricultural land or cropland, pastureland and state-owned land.

All proposed alternative routes cross agricultural land or cropland. However, due to the relatively small area affected (location of the structures), and the short duration of construction activities at any one location, such impacts should be both minor and temporary. The proposed alternative routes with lengths across agricultural land or cropland range from approximately 1.6 miles for Proposed Alternative Routes 3 and 4, to approximately 3.7 miles for Proposed Alternative Route 6. The lengths across agricultural land or cropland for each of the proposed alternative routes are presented in Table 4-2 (Appendix B).

All the proposed alternative routes cross pastureland. However, as CenterPoint Energy is not proposing to fence the ROW or otherwise separate the ROW from adjacent lands, there should not be any long-term or significant displacement of current grazing activities within pasturelands. The proposed alternative routes with lengths across pastureland range from approximately 0.7 mile for Proposed Alternative Route 1, to approximately 3.9 miles for Proposed Alternative Route 7. The lengths across pastureland for each of the proposed alternative routes are presented in Table 4-2 (Appendix B).

Alternative Route 7 has the only length across agricultural lands with known mobile irrigation systems (rolling or pivot) with approximately 0.4 mile. All of the remaining six proposed alternative routes do not cross any agricultural lands with known mobile irrigation systems. The lengths across agricultural lands

with known mobile irrigation systems (rolling or pivot) for each of the proposed alternative routes are presented in Table 4-2 (Appendix B).

4.1.6 Transportation/Aviation/Utilities

4.1.6.1 Transportation

Potential impacts to transportation include temporary disruption of traffic and conflicts with future proposed roadways or utility improvements. Traffic disruptions would include those associated with the movement of equipment and materials to the ROW, slightly increased traffic flow and periodic congestion during the construction phase of the Project. These impacts are typically considered minor, temporary and short-term. CenterPoint Energy would be required to obtain road-crossing permits from TxDOT for any crossing of state-maintained roadways.

There are no US Hwys, SHs, or FM roads crossed by the proposed alternative routes. The number of US Hwys, SHs and FM road crossings for each of the proposed alternative routes are presented in Table 4-2 (Appendix B).

4.1.6.2 Aviation

According to FAA regulations, Title 14 CFR Part 77, the construction of a transmission line requires FAA notification if the tower structure height exceeds the height of a theoretical line 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 runway of a public or military airport having at least one runway longer than 3,200 feet. The FAA also requires notification if tower structure heights exceed 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, and if tower structure heights exceed a 25:1 slope for a horizontal distance of 5,000 feet for heliports.

No public or military FAA registered airports with at least one runway longer than 3,200 feet are located within 20,000 feet of the proposed alternative routes.

There are no public or military FAA registered airports where no runway is longer than 3,200 feet is located within 10,000 feet of any of the proposed alternative routes.

There are no heliports located within 5,000 feet of the proposed alternative routes.

Following PUC approval of a route for the proposed transmission line, CenterPoint Energy will make a final determination of the need for FAA notification, 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.

The number of private airstrips located within 10,000 feet of the proposed alternative routes ranges from one for Proposed Alternative Routes 3, 4, 5, 6, and 7, to two each on Proposed Alternative Routes 1 and 2. Table 4-3 presents detailed airport, airstrip and heliport information for each of the proposed alternative routes.

Tables 5-3 through 5-9 (Appendix C) present detailed information on airports, airstrips and heliports. The number of airports, airstrips and heliports for each of the proposed alternative route centerlines are presented in Table 4-2 (Appendix B). The distance for each airport/airstrip and heliport from the nearest proposed alternative route was measured using GIS software and aerial photograph interpretation (Table 4-3). All known airport/airstrip and heliport locations are shown on Figure 3-2 (map pocket) and on Figure 5-1 (map pocket).

TABLE 4-3 AIRSTRIP RUNWAY LOCATIONS

FIGURE 5-1 MAP ID	AIRSTRIP	PROPOSED ALTERNATIVE ROUTES	DISTANCE FROM NEAREST ROUTING SEGMENT (FEET)	ESTIMATED RUNWAY LENGTH (FEET)[1]	EXCEEDS SLOPE
21	Private Airstrip	1, 2, 3, 4, 5, 6, 7	2,824	2,370	NA
22	Smith Aviation Inc. (Private)	1, 2	9,111	2,534	NA

[1]FAA 2020a and 2020b; POWER aerial photo and USGS Interpretation.

4.1.6.3 Utilities

Pipelines (including those carrying oil and gas) will be identified on engineering drawings and flagged prior to construction. CenterPoint Energy will coordinate with the respective pipeline companies at each crossing for continued safe operation of the pipeline during transmission line construction and operation. The number of pipelines crossed by each proposed alternative route varies from five crossings on Proposed Alternative Routes 1 and 2, to 22 crossings for Proposed Alternative Route 7. The number of pipeline crossings for each of the proposed alternative routes is presented in Table 4-2 (Appendix B).

Several existing electric transmission lines were identified within the study area and each of the proposed alternative routes crosses existing transmission lines. The number of transmission line crossings ranges from one each for Proposed Alternative Routes 1, 2, 3, and 4, to five crossings each for Proposed Alternative Routes 5, 6, and 7. CenterPoint Energy will coordinate with the appropriate entity to obtain the necessary permits or written agreements as required. The number of transmission line crossings for each of the proposed alternative routes is presented in Table 4-2 (Appendix B).

4.1.7 Communication Towers

None of the proposed alternative routes would have a significant impact on electronic communication facilities or operations in the study area. No commercial AM radio towers were identified within 10,000 feet of any of the route centerlines for the proposed alternative routes. One FM radio transmitter, microwave tower or other electronic installation was identified within 2,000 feet for all of the proposed alternative routes.

Tables 5-3 through 5-9 (Appendix C) present detailed information on electronic communication facilities. The number of AM radio towers located within 10,000 feet and FM radio and other commination facilities located within 2,000 feet of the proposed alternative route centerlines are presented in Table 4-2 (Appendix B). The distance of each communication tower from the nearest proposed alternative route was measured using GIS software and aerial photograph interpretation (see Table 4-4). All known communication tower locations are shown on Figure 3-2 (map pocket) and on Figure 5-1 (map pocket).

TABLE 4-4 ELECTRONIC COMMUNICATION FACILITIES

FIGURE 5-1 MAP ID	TOWER TYPE	PROPOSED ALTERNATIVE ROUTES	DISTANCE FROM NEAREST SEGMENT (FEET)*
13	Other communication tower	1, 2, 3, 4, 5, 6, 7	141

*POWER aerial photo and USGS interpretation; FCC 2020.

4.1.8 Socioeconomics

Construction and operation of the proposed transmission line will not result in a significant change in the population or employment rate within the study area. Construction workers for the Project will commute to the work site on a daily or weekly basis, instead of permanently relocating to the area. The presence of additional workers would likely result in a temporary increase in local retail sales due to purchases of food, fuel, and other merchandise. No additional staff will be necessary for line operations and maintenance.

4.2 RECREATIONAL AND PARK AREAS

Impacts to community resources, whether direct or indirect, can be gauged as they affect community recreational and park areas. Potential impacts to recreation include the disruption or preemption of recreational activities during the construction of the Project. There are few parks and recreational areas identified within the study area.

No significant 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 proposed alternative routes. No adverse impacts are anticipated for any of the fishing or hunting areas from the construction of any of the proposed alternative routes.

None of the proposed alternative routes cross or are located within 1,000 feet of parks or recreational areas. Refer to Table 4-2 (Appendix B) for the number of parks or recreation areas crossed and located within 1,000 feet of the proposed alternative routes.

4.3 HISTORICAL AND AESTHETIC 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 routing alternative; (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 Antiquities Code of Texas. These characteristics might include location, design, setting, materials, workmanship, feeling or association for architectural and engineering resources, or archeological information potential for archeological resources.

Direct impacts are those effects that physically or visually alter the integrity of key aspects or qualities that define the historical significance of the resource. Typically, direct impacts are caused by the actual construction of the line or through increased vehicular traffic during the construction phase.

Indirect impacts 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 after construction. 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 structures and wires.

Mitigation for direct and indirect impacts to cultural resources may be achieved, where appropriate, by avoidance through project design. Additional 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.

Because none of the proposed alternative routes have been surveyed in their entirety for cultural resources, the possibility of impacting undiscovered cultural resources exists along all of the proposed alternative routes. Areas with a high probability for prehistoric archeological sites include floodplains and secondary terraces of perennial stream channels, as well as areas near backswamps, wetlands and oxbow lakes. These highly productive environments provided high-food-density foraging areas to populations in the study area. Thus, all of the proposed alternative routes have been determined to have some HPA along their lengths, due to their proximity to water courses, wetlands, oxbow lakes and previously recorded archeological sites. The approximate lengths of HPAs crossed by each proposed alternative route are presented in Table 4-2 (Appendix B).

4.3.1 Historical Values

4.3.1.1 Archeological Sites

The file review, including data from TARL and TASA, indicated one documented archeological site within 1,000 feet of the proposed alternative routes (summarized in Table 4-5). Archeological site 41WH105 is a historic farmstead consisting of a scatter of ceramics, brick, glass, metal, stone, and other

domestic artifacts. The site has not been formally assessed for listing on the NRHP and is 603 feet from the centerline of Proposed Alternative Routes 3 and 4 (Table 4-5).

TABLE 4-5 ARCHEOLOGICAL SITES WITHIN 1,000 FEET OF PROPOSED ALTERNATIVE ROUTES

SITE TRINOMIAL	DESCRIPTION	DISTANCE IN FEET FROM CENTERLINE	PROPOSED ALTERNATIVE ROUTE(S)	COMMENTS
41WH105	Historic farmstead	603	3 and 4	NRHP eligibility undetermined

Source: THC 2020b.

4.3.1.2 Cemeteries

Review of the TASA and topographic maps indicated no cemeteries are crossed by or are within 1,000 feet of the proposed alternative routes.

4.3.1.3 Architectural Sites

Review of the TASA and NRHP Register indicated no NRHP-listed or determined eligible properties crossed by or within 1,000 feet of the proposed alternative routes.

4.3.1.4 Summary

None of the proposed alternative routes have been systematically surveyed for cultural resources; therefore, the potential for undiscovered cultural resources exists. HPAs have been designated within the study area and the proposed alternative route lengths crossing these areas vary from 0.2 mile for Proposed Alternative Route 3, to 2.2 miles for Proposed Alternative Route 7. There is the possibility that unknown prehistoric cultural resources and architectural resources may be located along any of the proposed alternative routes.

Proposed Alternative Routes 7, 6, and 5 have the greatest potential to impact recorded archeological sites. These three routes are among those that cross the most HPA, with 2.2, 0.9, and 0.9 miles, respectively. It is anticipated that any sites discovered during engineering or construction phases of the Project would be avoided by spanning or minor route adjustments. Thus, none of the proposed alternative routes are anticipated to have an adverse physical impact on any known cultural resources. Coordination with the THC may be necessary.

4.3.2 Aesthetic Values

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

Construction of the Project could have both temporary and permanent aesthetic effects. Temporary impacts would include views of the actual assembly and erection of the tower structures or concrete poles. Where wooded areas are cleared, the brush and wood debris could have an additional temporary negative impact on the local visual environment. Permanent impacts from the Project would result from visibility of the lattice tower or steel pole structures, conductors and cleared ROW.

Because no landscapes protected by legislation and no landscapes protected from most forms of development were identified within the study area, potential aesthetic impacts were evaluated by tabulating the linear feet of each proposed alternative route that would potentially create a new or additional impact to potential sensitive views. The length of each proposed alternative route within the foreground visual zone of the following viewpoints or corridors was tabulated:

- US Hwys and SHs within one-half mile with unobstructed views.
- FM and CRs within one-half mile with unobstructed views.
- Parks and recreational areas within one-half mile with unobstructed views.

None of the proposed alternative routes are located within the foreground visual zone of any US Hwys or SHs.

All of the proposed alternative routes have some portion of the routes located within the foreground visual zone of FM roads and CRs. Proposed Alternative Route 1 has the longest length of ROW within the foreground visual zone of FM roads and CRs, with approximately 1.3 miles, while Proposed Alternative Routes 2 through 7 all have approximately 0.3 mile.

None of the proposed alternative routes have ROW length located within the foreground visual zone of parks and recreational areas.

A summary of the lengths for each of the proposed alternative routes within the foreground visual zone of parks and recreational areas, US Hwys, SHs, FMs, and CRs is presented in Table 4-2 (Appendix B).

4.4 ENVIRONMENTAL INTEGRITY

4.4.1 Physiography and Geology

Construction of the proposed transmission line is not anticipated to have any significant adverse effects on the study area's physiographic or geologic features and resources. 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. Abandoned, plugged, and active oil/gas wells mapped in the study area are not anticipated to be impacted by the Project and no geologic hazards are anticipated to be created by the Project.

4.4.2 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 phase. Potential impacts to soils include erosion and compaction.

The highest risk for soil erosion and compaction is primarily associated with the construction phase of a project. In accordance with CenterPoint Energy's vegetation management specifications, ROW clearing, if required, of woody vegetation including trees, brush and undergrowth will be conducted within the ROW area prior to the start of construction. Areas where vegetation is removed have the highest potential for soil erosion, and the use of heavy equipment on the cleared ROW creates the greatest potential for soil compaction. Prior to construction, CenterPoint Energy will develop a SWPPP if required, to minimize potential impacts associated with soil erosion, compaction and off-ROW sedimentation. Implementing the SWPPP 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 revegetation and mitigating soil compaction to ensure adequate soil stabilization during the construction and post-construction phases. The existing herbaceous layer of vegetation will be maintained during construction to the extent practicable. Denuded areas will require seeding and/or implementation of permanent BMPs to stabilize disturbed areas and minimize soil erosion potential during the ROW restoration phase. The ROW will be inspected prior to and during construction to ensure that BMPs are implemented and maintained in accordance with the Stormwater General Permit.

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 is considered equivalent for all of the alternative routes.

4.4.3 Water Resources

4.4.3.1 Surface Water

All of the proposed alternative routes would cross multiple surface waters within the study area. These surface waters may include ephemeral, intermittent, and perennial streams and ponds. These features often attract wildlife and can support fisheries if they are perennial. CenterPoint Energy proposes to span all surface waters crossed by any of the proposed alternative routes. Structures would be located outside of the ordinary high-water marks of surface waters, when feasible. Removal of vegetation to meet conductor to ground clearances would be implemented, where necessary. The shorter understory and herbaceous layers of vegetation would remain, where allowable, and BMPs would be implemented in accordance with the SWPPP to minimize the potential for sedimentation into surface waters.

All of the proposed alternative routes cross streams and canals. The number of stream and canal crossings for the proposed alternative routes ranges from seven crossings for Proposed Alternative Routes 3 and 4, to 12 crossings for Proposed Alternative Route 6. The number of stream and canal crossings for each of the proposed alternative routes is presented in Table 4-2 (Appendix B).

Four of the seven proposed alternative routes cross open water. Alternative Routes 1, 6, and 7 do not cross any measurable lengths of open water; Alternative Routes 2, 3, 4, and 5 cross approximately 0.01 mile (53 feet) of open water areas.

Four of the seven proposed alternative routes parallel streams and canals (within 100 feet of each route centerline) for portions of their lengths. Alternative Routes 2, 3, and 4 do not parallel any streams. Alternative Route 1 parallels streams/canals for approximately 0.1 mile and Alternative Routes 5, 6, and 7 parallel streams/canals for approximately 0.2 mile.

All surface waters are proposed to be spanned and a SWPPP will be implemented during construction. No significant impacts to these surface waters are anticipated for any of the proposed alternative routes. In some instances, temporary surface water crossings may be required. These types of crossings will incorporate BMPs to minimize potential sedimentation into surface waters. Surface waters located within the study area are subject to USACE regulations as WOTUS under Section 404 of the CWA. Upon PUC

approval of a route, additional coordination with the USACE-Galveston District may be required to determine any permitting needs.

4.4.3.2 Groundwater

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

4.4.3.3 Floodplains

Three of the seven proposed alternative routes cross portions of the FEMA mapped 100-year floodplains. Alternative Routes 1, 2, 3, and 4 do not cross any mapped 100-year floodplains. Alternative Routes 5 and 6 each cross approximately 2.6 miles and Alternative Route 7 crosses approximately 3.7 miles of 100-year floodplains.

Construction of the proposed transmission line is not anticipated to have a significant impact on the overall function of the floodplain, nor adversely affect adjacent or downstream properties. 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. CenterPoint Energy will coordinate with the appropriate local floodplain administrator to determine any additional permit requirements.

4.4.3.4 Future Surface Water Developments

Review of the TWDB State Water Plan (TWDB 2017) did not indicate any planned future surface water development projects proposed within the study area, therefore none of the alternative routes are anticipated to impact future surface water development projects.

4.4.4 Ecological Resources

4.4.4.1 Vegetation Types

Potential impacts to vegetation types would result from clearing the ROW of woody and/or herbaceous vegetation. These activities facilitate ROW access for Project construction, line stringing, and future maintenance activities of the proposed transmission line. Removal of woody vegetation within the ROW will be required within upland and bottomland/riparian woodland areas. Prior to construction, mowing or shredding of herbaceous vegetation will occur within rangeland and pasture areas. Mowing activities will continue periodically (every three to five years) within the ROW for maintenance purposes. Impacts to vegetation will be limited to that necessary for the construction, operation and maintenance of the proposed transmission line. ROW clearing activities would be completed while maintaining the existing herbaceous layer or groundcover to the extent practical.

Clearing trees and shrubs from woodland areas typically causes a degree of habitat fragmentation. Habitat fragmentation is reduced when a proposed alternative route parallels or utilizes existing linear features such as electrical transmission lines, roads, railroads, pipelines, etc. During the route development process, consideration was given to maximize the length of the routes parallel to existing linear corridors to minimize the potential effects of habitat fragmentation.

All of the proposed alternative routes cross areas of upland woodlands. The approximate lengths of each proposed alternative route crossing upland woodlands range from 0.2 mile for Proposed Alternative Route 2, to 0.7 mile for Proposed Alternative Route 1. The approximate lengths of each proposed alternative route crossing upland woodlands are presented in Table 4-2 (Appendix B).

All of the proposed alternative routes cross areas of bottomland/riparian woodlands. The approximate lengths of each proposed alternative route crossing bottomland/riparian woodlands range from 0.01 mile for Proposed Alternative Routes 2 and 3, to 0.11 mile for Proposed Alternative Route 7. The approximate lengths of each proposed alternative route crossing bottomland/riparian woodlands are presented in Table 4-2 (Appendix B).

4.4.4.2 Wetlands

Wetlands are important to water quality and serve as habitat to numerous wildlife species and are often used as migration corridors and stopover habitat by birds. Removal of vegetation within wetlands increases the potential for erosion and sedimentation. Additional potential impacts to wetlands include the

temporary or permanent fill associated with structure construction and temporary impacts associated with access and new ROW.

Wetlands can often be spanned with impacts limited to the clearing of woody vegetation necessary to obtain conductor to ground clearance requirements. CenterPoint Energy proposes to span wetland areas where feasible and hand clear shrubs and trees located within PSS wetland areas to minimize potential impacts. Permanent impacts may include the conversion of PSS wetlands to PEM wetlands. Temporary impacts to wetlands may occur as necessary to access each structure during construction. Impact minimization measures such as the use of equipment mats during construction within all wetland areas can minimize potential temporary impacts by limiting the level of soil disturbance generated by heavy equipment.

All of the proposed alternative routes cross areas of NWI mapped wetlands, including PSS and PEM. The USFWS NWI dataset is a conservative approach to estimating wetlands. The approximate lengths of each proposed alternative route across NWI mapped wetlands ranges from 0.004 mile (24 feet) for Proposed Alternative Routes 2, 3, 4, and 5, to 0.05 mile (247 feet) for Proposed Alternative Route 7. The approximate lengths of each proposed alternative route crossing NWI mapped wetlands are presented in Table 4-2 (Appendix B).

The temporary and/or permanent placement of fill material within jurisdictional surface waters and associated wetlands may require a permit from the USACE under Section 404 of the CWA. A delineation of the wetlands crossed by the preferred route will be completed to determine USACE permit requirements prior to construction. If required, CenterPoint Energy will coordinate with the USACE prior to clearing and construction to ensure compliance with Section 404 to avoid, minimize, or mitigate wetland impacts. The construction of the transmission line may qualify under the NWP 12 Permit, if the General and Regional permit conditions are not exceeded.

4.4.4.3 Wildlife and Fisheries

The 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 will be 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 or fragmentation.

Construction activities may impact small, immobile or fossorial (living underground) animal species through incidental impacts or the alteration of local habitats. Incidental impacts of 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 fossorial species population dynamics.

Potential permanent impacts to wildlife may result from the clearing of upland and bottomland, including wetland, woodland habitats. By utilizing or paralleling existing linear features to the greatest extent feasible or minimizing the alternative route lengths within wooded areas, the potential impacts to wildlife and habitat fragmentation are reduced.

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 habitat areas immediately adjacent to the ROW. CenterPoint Energy proposes to complete all ROW clearing and construction activities in compliance with the MBTA to avoid or minimize potential impacts. ROW clearing would occur outside of the bird nesting season (March 15th to September 15th), if practical. If clearing occurs during the bird nesting season, nest surveys completed ahead of construction would facilitate identification and avoidance of active bird nests.

Transmission lines can present additional hazards to birds due to electrocutions and/or collisions with the electric conductors. Structure design and additional mitigation measures can be implemented to minimize the risk for electrocution of birds or the collisions of birds with transmission facilities. The electrocution risk to birds should not be significant as the engineering design distance between conductors, conductor to structure, or conductor to ground wire for the proposed 345 kV transmission line is greater than the wingspan of any bird potentially within the 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 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. The study area is located within the Central Migratory Flyway for neo-tropical migratory birds. The risk for bird strikes increases in the fall migration period when low visibility is common due to inclement weather conditions. CenterPoint Energy has an established avian protection plan program implemented through the CenterPoint Energy's Environmental Department. Once a PUC approved route is selected, CenterPoint Energy will evaluate avian habitats, and

potential high use avian flyways along the route and identify and implement appropriate avian protection measures, where necessary.

Potential impacts to aquatic systems may include effects of erosion, siltation and sedimentation. Clearing the ROW of vegetation might result in increased suspended solids or sediments in the surface waters crossed by the transmission line. Increases in suspended solids may adversely affect aquatic organisms that require relatively clear water for foraging or reproduction. Physical aquatic habitat loss or alteration may result wherever riparian vegetation is removed and at any temporary crossings required for access. Increased levels of siltation or sedimentation may also potentially impact downstream areas, primarily affecting filter feeding benthic and other aquatic invertebrates. CenterPoint Energy will implement BMPs as part of the SWPPP to prevent off-ROW sedimentation and degradation of surface water and wetland areas. No significant adverse impacts are anticipated to any aquatic habitats crossed or located adjacent to the ROW for any of the proposed alternative routes.

4.4.4.4 Threatened and Endangered Species

A review of the federally- and state-listed threatened and endangered species potentially occurring within the study area and their life histories were used to determine if suitable habitat may be present. Data and information on listed species and unique vegetation communities within the study area were obtained from a variety of sources, including correspondence with the USFWS, TPWD, and TXNDD (see Appendix A). No federally designated critical habitat (USFWS 2020b) occurs within the study area and no impacts to critical habitat will occur as a result of the Project.

Impacts on Plant Species and Sensitive Vegetation Communities

No federally- (USFWS 2020b) or state-listed (TPWD 2020f) threatened or endangered plant species were listed for the study area. The two occurrence records for the Vertisol Coastal Prairie vegetation community are not mapped along any of the proposed alternative routes. No impacts to federally- or state-listed threatened and endangered plant species and sensitive vegetation communities are anticipated to occur.

Impacts on Animal Species

Federally-listed Species

Federally-listed species for the study area include the interior least tern, piping plover, red knot, and whooping crane. The interior least tern is not anticipated to occur within the study area; therefore, no impacts are anticipated for this species. The piping plover, red knot, and whooping crane may occur

temporarily within the study area as rare non-breeding migrants, if suitable stopover habitat is available. The piping plover, red knot, and whooping crane may be susceptible to collisions with the transmission line, which can be minimized using line markers. These species may also be susceptible to minor temporary disturbances during construction efforts; however, no impacts from the proposed Project are anticipated to occur to these species' nesting or foraging habitat.

If federally-listed threatened or endangered species or their habitat are identified during a field survey of the PUC approved route, CenterPoint Energy will further coordinate with the USFWS to determine any permitting requirements and avoidance or mitigation strategies.

Other Federally Protected Species

Bald eagles may occur within the study area if suitable habitat is available. Bald eagles and their nests are protected under the MBTA and BGEPA. Nests are protected if they have been used within the previous five nesting seasons. If nests are identified or individuals are observed during field surveys of the PUC-approved route, CenterPoint Energy will further coordinate with the USFWS to determine avoidance or mitigation strategies. If during pre-construction surveys and/or construction activities, bald eagle roost or nest trees are identified within the vicinity of the Project, CenterPoint Energy will follow their procedures set forth in their Avian Protection Plan and coordinate with USFWS accordingly to avoid/minimize potential impacts.

State-listed Species

The reddish egret, swallow-tailed kite, white-faced ibis, and wood stork may occur temporarily or seasonally as migrants or transient species within the study area, if suitable habitat is available. These species may be susceptible to collisions with the transmission line, which can be minimized using line markers. These species may also be susceptible to minor temporary disturbances during construction efforts; however, no impacts from the proposed Project are anticipated to occur to these species' nesting or foraging habitat. The white-tailed hawk may occur within the study area and be susceptible to disturbances during construction efforts.

Due to its limited mobility and hibernation behavior, the Texas horned lizard may be impacted by equipment/vehicular traffic and soil compaction. If state-listed threatened or endangered species or their habitat are identified during a field survey of the PUC approved route, CenterPoint Energy may further coordinate with the TPWD to determine any avoidance or mitigation strategies.

Construction activities may temporarily displace animal species within and along the ROW. If federally- or state-listed species are observed during construction, they would be allowed to leave the area of their own accord. State-listed species can be relocated by a TPWD permitted biologist to suitable habitat outside of the Project workspaces.

5.0 PROPOSED ALTERNATIVE ROUTE SELECTION

5.1 EVALUATION OF PROPOSED ALTERNATIVE ROUTES

The purpose of this Routing Study was to delineate and evaluate alternative routes for CenterPoint Energy's proposed transmission line in Wharton County between CenterPoint Energy's existing Hillje Substation and the planned Space City Solar Interconnection Substation. POWER completed an environmental analysis of seven proposed alternative routes, the results of which are shown in Table 4-2 (Appendix B). The environmental evaluation was a comparison of the proposed alternative routes from a strictly environmental, land use, and cultural resource viewpoint based upon the measurement of 48 environmental criteria (Tables 3-1, 4-1, and 4-2) and the consensus process of POWER's group of evaluators. POWER used this information to evaluate and rank the alternative routes and to select an alternative route for recommendation that provides the best balance between land use, aesthetic, ecological, and cultural resource factors. CenterPoint Energy considers POWER's recommendations in addition to engineering and constructability constraints, cost estimates, and comments from agencies and stakeholders; and then identifies one alternative route that CenterPoint Energy believes best addresses the requirements of applicable portions of PURA and PUC Substantive Rules.

For comparison purposes, CenterPoint Energy provided construction cost estimates for each proposed alternative route, including ROW acquisition. The estimated total costs for the seven proposed alternative routes are summarized in Table 5-1.

TABLE 5-1 SUMMARY OF COST ESTIMATES

PROPOSED ALTERNATIVE ROUTE	INCLUSIVE SEGMENTS	TOTAL LENGTH (MILES)	ESTIMATED CONSTRUCTION COST[1]	ESTIMATED ROW COST[1]	TOTAL
1	A-N-P	4.2	$26,379,000	$7,315,000	$33,694,000
2	B-C-G-J-N-P	4.1	$21,378,000	$9,168,000	$30,546,000
3	B-C-G-K-O-P	3.5	$16,248,000	$6,708,000	$22,956,000
4	B-C-H-L-O-P	3.6	$16,650,000	$8,059,000	$24,709,000
5	B-C-H-I-M	6.2	$49,702,000	$11,547,000	$61,249,000
6	B-D-E-I-M	6.9	$52,812,000	$11,316,000	$64,128,000
7	B-D-F-M	8.0	$57,977,000	$12,529,000	$70,506,000

[1] Costs for Proposed Alternative Routes are estimated with predominantly double-circuit capable lattice towers in a vertical configuration within a 100-foot-wide ROW and transitioning to a 180-foot-wide ROW when approaching and crossing below existing transmission lines.

5.2 POWER'S ENVIRONMENTAL EVALUATION

POWER used a consensus process to evaluate the potential environmental, land use, and cultural resource impacts of the proposed 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 proposed alternative routes based on the environmental conditions present along each route. This evaluation was based on the evaluation criteria; comments received from the local, state, and federal agencies; and field reconnaissance of the study area. Each POWER technical expert independently analyzed the routes and the environmental data presented in Table 4-2 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. The group determined the relationship and relative sensitivity among the major land use, ecological, and cultural resource factors. The group then ranked the proposed alternative routes based strictly upon the environmental, land use, and cultural data considered.

The evaluators agreed that all of the proposed alternative routes are viable and acceptable from an overall land use, ecology, and cultural resource perspective. The evaluators each ranked the proposed alternative routes from 1st to 7th (with 1st having the least potential impact and 7th the greatest potential impact) from the perspective of their own technical discipline. The results of this ranking are summarized in Table 5-2.

TABLE 5-2 POWER'S ENVIRONMENTAL RANKING OF THE PROPOSED ALTERNATIVE ROUTES

	RANKING				
Proposed Alternative Route	Land Use Specialist	Ecology Specialist	Cultural Resources Specialist	Project Manager	Consensus
1	3rd	1st	4th	4th	3rd
2	4th	4th	2nd	5th	4th
3	1st	3rd	1st	1st	1st
4	2nd	2nd	3rd	2nd	2nd
5	6th	5th	6th	6th	6th
6	5th	6th	5th	7th	5th
7	7th	7th	7th	3rd	7th

The land use evaluation placed the greatest importance on the length of the route, number of habitable structures and percent parallel with apparent features. Comparing the seven alternative routes from a land use perspective, Alternative Route 3 was selected as the route having the least potential land use impact, followed in ranking by Alternative Routes 4, 1, 2, 6, 5, and 7.

The ecological ranking of the proposed alternative routes was based primarily on the length of route across National Wetland Inventory mapped wetlands and bottomland/riparian woodlands. Secondary consideration was also given to the length of route across upland woodlands and number of stream and

canal crossings. Additional considerations included proportion of the route parallel to existing linear features to minimize habitat fragmentation. The ecologist ranked Alternative Route 1 as having the least-potential ecological impact followed in ranking by Alternative Routes 4, 3, 2, 5, 6, and lastly 7.

The cultural resources ranking of the proposed alternative routes were based primarily on the amount of HPA crossed by the alternative routes. Alternative Route 3 was identified as having the least potential impact on cultural resources, followed in ranking by Alternative Routes 2, 4, 1, 6, 5, and 7. All of the alternative routes are acceptable from a cultural resources perspective since potential impacts were minimized during the route development phase.

The POWER Project Manager ranked the proposed alternative routes, considering all of the evaluation criteria in addition to the existing access to and the flow of the proposed alternative routes across the study area. Paralleling of existing compatible ROWs; paralleling other existing ROWs and apparent property lines; the overall length of the alternative route; as well as the number of pipeline and transmission line crossings were considered key factors. Landowner negotiations and developer interests were also considered in the Project Manager's ranking. Potential impact avoidance and minimization measures typically employed during the construction of transmission lines were also considered. For example, natural features identified along the ROW such as streams and open water can be spanned to minimize potential impacts. Alternative Route 3 was selected by the POWER Project Manager as the best-balanced route considering all the evaluation criteria reviewed, followed in ranking by Alternative Routes 4, 7, 1, 2, 5, and 6.

5.3 SELECTION OF THE ROUTE WHICH BEST ADDRESSES THE REQUIREMENTS OF PURA AND PUC SUBSTANTIVE RULES

Following the ranking by discipline, the group of POWER evaluators discussed the relative importance and sensitivity of the various criteria as they applied to all of the proposed alternative routes. 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 group that the total length of the route, number of habitable structures and percent parallel with apparent features were the primary factors in their decision for selecting the recommended alternative route and ranking the proposed alternative routes in order of preference.

The group selected Proposed Alternative Route 3 as the alternative route that best balances land use, ecology, cultural resources, and certain PUC routing criteria. The next top three, Alternative Routes 4, 1, and 2, in order of preference, were determined to have the least potential cumulative impacts. The ranking

of the proposed alternative routes is presented in Table 5-2. All seven of the proposed alternative routes are considered viable acceptable routes that provide geographic diversity.

In summary, POWER's decision to recommend Proposed Alternative Route 3 as the route that best balances the PUC routing criteria related to land use, ecology, and cultural resource, was based primarily on the following evaluation criteria:

Proposed Alternative Route 3 (Segments: B-C-G-K-O-P):

- Has the shortest length (3.5 miles).
- Is tied with one other route as having the third longest length (0.6 mile) of ROW paralleling existing transmission line ROW.
- Is tied with one other route as having the second longest length (1.6 miles) of ROW paralleling other existing ROW.
- Has the third fewest number of pipeline crossings (6).
- Is tied with one other route as having the shortest length (0.01 mile) across bottomland/riparian woodlands.
- Is tied with three other routes as having the shortest length (0.004 mile) across NWI mapped wetlands.
- Is tied with one other route for having the fewest number of stream and canal crossings (7).
- Has the shortest length (0.2 mile) of ROW across areas of HPA site potential.
- Has no habitable structures within 500 feet of the ROW centerline.
- Crosses no parks/recreational areas.
- Has no additional parks/recreational areas within 1,000 feet of the ROW centerline.
- Crosses no land irrigated by traveling systems (rolling or pivot type).
- Crosses no US Hwys or SHs.
- Crosses no FM roads.
- Has no heliports within 5,000 feet of its ROW centerline.
- Has no FAA registered airports with at least one runway more than 3,200 feet in length within 20,000 feet of the ROW centerline.
- Has no FAA registered airports with a runway more than 3,200 feet in length within 10,000 feet of the ROW centerline.
- Has no AM radio transmissions within 10,000 feet of the ROW centerline.
- Has no oil and gas wells within the ROW.

- Has no length within the foreground visual zone of US Hwys or SHs.
- Has no length within the foreground visual zone of parks/recreational areas.
- Has no length across critical habitat of federally-listed threatened or endangered species.
- Has no length parallel to streams.
- Crosses no 100-year floodplains.
- Has no cemeteries within 1,000 feet of the ROW centerline.
- Crosses no recorded archeological sites.
- Crosses no NRHP sites and is not located within 1,000 feet of any additional NRHP sites.

Therefore, based upon its evaluation of this project and its experience and expertise in the field of transmission line routing, POWER recommends Proposed Alternative Route 3 from an overall land use and environmental perspective and the remaining routes as alternatives. Considering all pertinent factors related to land use, environmental and cultural resources, it is POWER's opinion that Proposed Alternative Route 3 best addresses the applicable criteria in PURA § 37.056(c)(4) and the PUC Substantive Rules.

Tables 5-3 through 5-9 (Appendix C) present detailed information on habitable structures and other land use features in the vicinity of the proposed alternative routes. The items in Tables 5-3 through 5-9 and the proposed alternative routes are illustrated on Figure 5-1 (map pocket).

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Appendix A

Agency and Other Correspondence

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345 KV SPACE CITY SOLAR PROJECT
FEDERAL, STATE AND LOCAL AGENCIES

FEDERAL

Mr. Terry L. Biggio
Southwest Regional Administrator
Federal Aviation Administration
10101 Hillwood Parkway
Fort Worth, TX 76177

Mr. Tony Robinson
Region 6 Regional Administrator
Federal Emergency Management Agency
FRC 800 N. Loop 288
Denton, TX 76209-3698

Mr. Mike Reynold
Regional 6 Director
National Parks Service
IMRextrev@nps.gov

Mr. Salvador Salinas
State Conservationist
NRCS Texas State Office
101 South Main Street
Temple, TX 76501

Colonel Timothy R. Vail
District Commander
U.S. Army Corps of Engineers – Galveston District
CESWGRegulatoryInbox@usace.army.mil

Real Estate Division
U.S. Army Corps of Engineers – Galveston District
swg-re@usace.army.mil

Mr. Ron Tickle
Executive Director
U. S. Department of Defense Siting Clearinghouse
3400 Defense Pentagon, Room 5C646
Washington, DC 20301-3400

Mr. Ken McQueen
Region 6 Administrator
U.S. Environmental Protection Agency
1201 Elm Street, Suite 500
Dallas, TX 75270

Mr. Chuck Ardizzone
Project Leader
U.S. Fish and Wildlife Service
17629 El Camino Real, Suite 211
Houston, TX 77058

STATE

Mr. Wei Wang
Executive Director
Railroad Commission of Texas
P.O. Box 12967
Austin, TX 78711-2967

Ms. Nicole Bealle
Regional 12 Director
Texas Commission on Environmental Quality
5425 Polk St., Ste. H
Houston, TX 77023-1452

Mr. Dan Harmon
Director, Department of Aviation
Texas Department of Transportation
125 E. 11th Street
Austin, TX 78701-2483

Mr. Carlos Swonke, P.E.
Director, Environmental Affairs Division
Texas Department of Transportation
125 E. 11th Street
Austin, TX 78701-2483

Ms. Jessica Butler, P.E.
Director, Planning & Programming
Texas Department of Transportation
125 E. 11th Street
Austin, TX 78701-2483

Mr. Paul Reitz, P.E.
Yoakum District Engineer
Texas Department of Transportation
403 Huck Street
Yoakum, TX 77995

345 KV SPACE CITY SOLAR PROJECT
FEDERAL, STATE AND LOCAL AGENCIES

Mr. George P. Bush
Commissioner
Texas General Land Office
1700 N. Congress Ave., Suite 935
Austin, TX 78701-1495

Mr. Mark Wolfe
Executive Director
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711

Ms. Laura Zebehazy
Wildlife Habitat Assessment Program
Texas Parks and Wildlife Department
WHAB@tpwd.texas.gov

Mr. Jeff Walker
Executive Administrator
Texas Water Development Board
1700 N. Congress Avenue
Austin, TX 78701

LOCAL

The Honorable Phillip Spenrath
Wharton County Judge
100 South Fulton Street, Suite 100
Wharton, TX 77488

The Honorable Steven Goetsch
Wharton County Commissioner, Precinct 3
1271 CR 358
El Campo, Texas 77437

The Honorable Doug Mathews
Wharton County Commissioner, Precinct 4
P.O. Box 509
Pierce, TX 77467

Mr. Rusty Graves
Wharton County Drainage Supervisor
315 E. Milam, Suite 101
Wharton, Texas 77488

Mr. Bob Callaghan
El Campo ISD Superintendent
700 West Norris
El Campo, TX 77437

Dr. Garth Oliver
Louise ISD Superintendent
408 2nd Street
Louise, TX 77455

Ms. Patricia Blair
Wharton CHC Chair
1406 Kelving Way
Wharton, TX 77488

Other Regional

Mr. Rick Guerrero
Houston-Galveston Area Council, Director
P.O. Box 22777
Houston, TX 77227-2777

Environmental Organizations

Ms. Suzanne Scott
Texas Director
The Nature Conservancy
200 E. Grayson, Suite 202
San Antonio, TX 78215

Ms. Lori Olson
Executive Director
Texas Land Trust Council
P.O. Box 2677
Wimberley, TX 78676

Ms. Jill Boullion
Executive Director
Bayou Land Conservancy
10330 Lake Rd., Bldg. J
Houston, TX 77070

Mr. Martin Hagne
Executive Director
Gulf Coast Bird Observatory
299 West Highway 332
Lake Jackson, TX 77566

345 KV SPACE CITY SOLAR PROJECT
FEDERAL, STATE AND LOCAL AGENCIES

River Authorities

Ms. Kelly Payne
VP Water Operations
Lower Colorado River Authority
3700 Lake Austin Blvd.
Austin, TX 78703

POWER ENGINEERS, INC.
16825 NORTHCHASE DRIVE
SUITE 1200
HOUSTON, TX 77060 USA

PHONE 281-765-5500
FAX 281-765-5599

September 11, 2020
(via Mail)

Mr. First Last
Title
Company
Address
City, ST ZIP

Subject: 345 kV Space City Solar Project
Wharton County, TX
POWER Engineers, Inc. Project No. 166612

Dear *Mr. Last*:

CenterPoint Energy Houston Electric, LLC (CenterPoint Energy) is proposing to construct a new single-circuit 345 kilovolt (kV) electric transmission line located in Wharton County, Texas. The new transmission line will connect the existing CenterPoint Energy Hillje Substation and the proposed CenterPoint Energy Space City Solar Interconnection Substation. The Hillje Substation is located off of County Road (CR) 403, approximately two miles southwest of the intersection of Farm to Market Road 441 and State Highway (SH) 71. The Space City Solar Interconnection Substation is located off of CR 307, approximately one-half mile west of the intersection of CR 434 and CR 3086. Please refer to the enclosed map depicting the project study area.

POWER Engineers, Inc. (POWER) has been contracted by CenterPoint Energy to prepare an Environmental Assessment and Alternative Route Analysis to support an application for a Certificate of Convenience and Necessity for the Public Utility Commission of Texas (PUC). POWER is identifying environmental and land use constraints within the study area that will be incorporated into the creation of an environmental and land use constraints map. Based on this information, POWER will identify potential alternative routes for the proposed transmission line project.

We are requesting that your agency/office provide information concerning environmental and land use constraints or other issues of interest to your agency/office within the study area. Your input will be an important consideration in the evaluation of alternative routes and in the assessment of potential impacts of those routes. In addition, we would appreciate receiving information about any permits, easements, or other approvals by your agency/office that you believe could affect this project, or if you are aware of any major ongoing or proposed development or construction in the study area. Upon PUC approval of the proposed project including a final route, CenterPoint Energy will identify and obtain necessary permits, if required, from your agency/office.

Thank you for your assistance with this proposed electric transmission line project. Please contact me at 281-765-5507 or by e-mail, lisa.barko@powereng.com, if you have any questions or require additional information. We would appreciate receiving your reply by October 9, 2020.

Sincerely,

Lisa Barko Meaux

Lisa Barko Meaux
Senior Project Manager
Department Manager

Enclosure(s): Study Area Map

c:Project Wise 166612
PER-03

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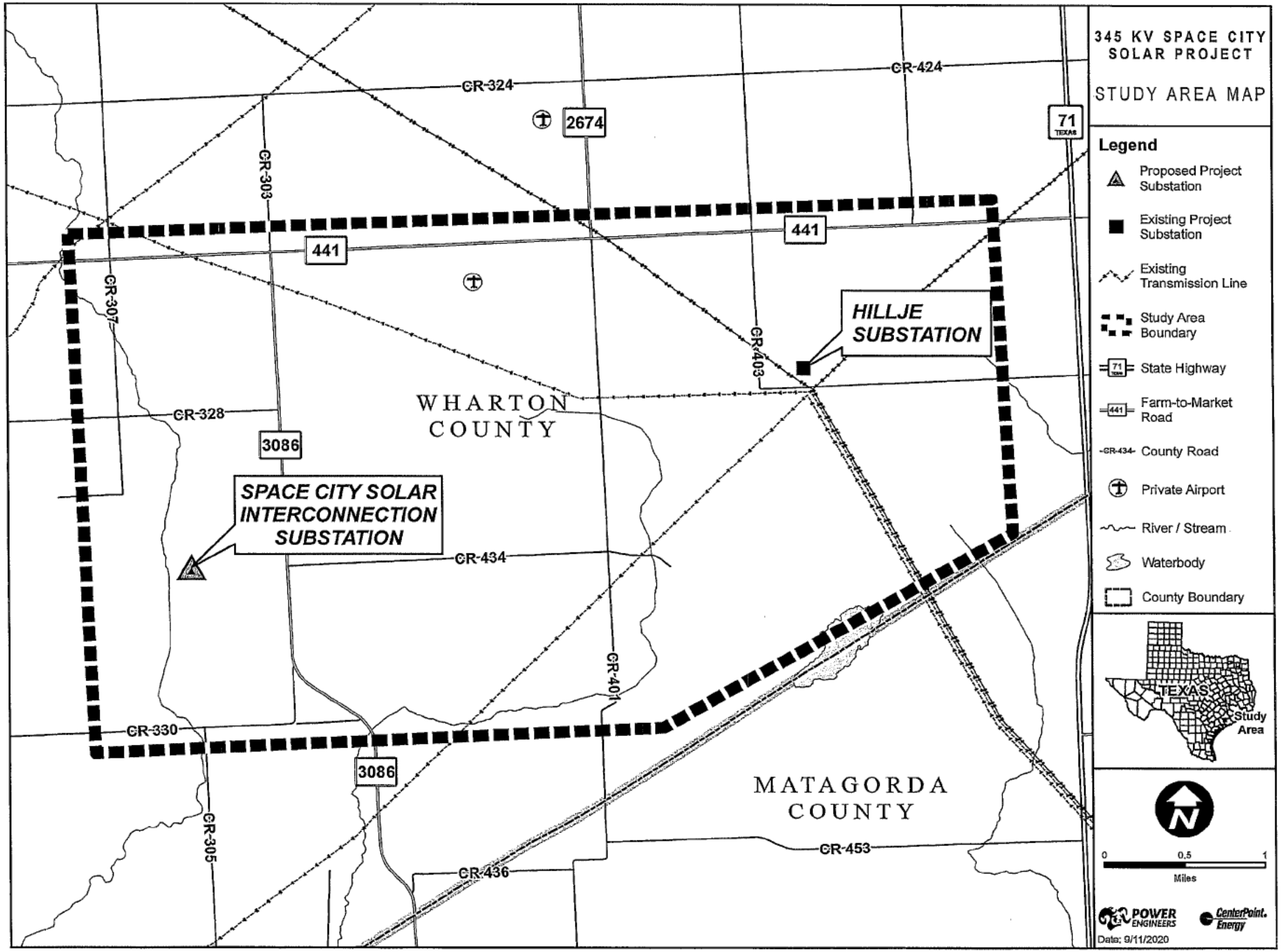
345 KV SPACE CITY SOLAR PROJECT
STUDY AREA MAP
Legend
Proposed Project Substation
Existing Project Substation
Existing Transmission Line
Study Area Boundary
State Highway
Farm-to-Market Road
County Road
Private Airport
River / Stream
Waterbody
County Boundary
TEXAS
Study Area
0
0.5
1
Miles
POWER ENGINEERS
CenterPoint. Energy
Date: 9/11/2020
CR-324
CR-424
2674
71
CR-303
441
441
CR-307
HILLJE SUBSTATION
CR-403
WHARTON COUNTY
CR-328
3086
SPACE CITY SOLAR INTERCONNECTION SUBSTATION
CR-434
CR-401
CR-330
3086
MATAGORDA COUNTY
CR-305
CR-453
CR-436

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U. S. Department of Homeland Security
FEMA Region 6
800 North Loop 288
Denton, TX 76209-3698

FEMA

FEDERAL EMERGENCY MANAGEMENT AGENCY
REGION 6
MITIGATION DIVISION

RE: 345 kV Space City Solar Project, Wharton County, TX, POWER Engineers, Inc. Project No. 166612

NOTICE REVIEW/ENVIRONMENTAL CONSULTATION

☐ We have no comments to offer. ☒ We offer the following comments:

WE WOULD REQUEST THAT THE COMMUNITY FLOODPLAIN ADMINISTRATOR BE CONTACTED FOR THE REVIEW AND POSSIBLE PERMIT REQUIREMENTS FOR THIS PROJECT. IF FEDERALLY FUNDED, WE WOULD REQUEST PROJECT TO BE IN COMPLIANCE WITH EO11988 & EO 11990.

Monica Martin
Permits & Inspections
315 East Milam Street, Suite 102
Wharton, TX 77488
Monica.martin@co.wharton.tx.us
(979) 532-8587

REVIEWER:

Colleen Sciano
Floodplain Management and Insurance Branch
Mitigation Division
(940) 383-7257

DATE: September 17, 2020

POWER ENGINEERS

POWER ENGINEERS, INC.
16825 NORTHCHASE DRIVE
SUITE 1200
HOUSTON, TX 77060 USA

PHONE 281-765-5500
FAX 281-765-5599

20·9·61282

Date Rec'd: 9/17/20		
Rec'd by: KK		
	Action	Info
RA		X
Deputy RA		X
XA		
Analyst		
RES		
REC		
MIT	X	
MSD		
NP		
Grants		
File		X
Suspense Date: 10/1/20		

September 11, 2020
(via Mail)

Mr. Tony Robinson
Region 6 Regional Administrator
Federal Emergency Management Agency
FRC 800 N. Loop 288
Denton, TX 76209-3698

Subject: 345 kV Space City Solar Project
Wharton County, TX
POWER Engineers, Inc. Project No. 166612

Dear Mr. Robinson:

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We are requesting that your agency/office provide information concerning environmental and land use constraints or other issues of interest to your agency/office within the study area. Your input will be an important consideration in the evaluation of alternative routes and in the assessment of potential impacts of those routes. In addition, we would appreciate receiving information about any permits, easements, or other approvals by your agency/office that you believe could affect this project, or if you are aware of any major ongoing or proposed development or construction in the study area. Upon PUC approval of the proposed project including a final route, CenterPoint Energy will identify and obtain necessary permits, if required, from your agency/office.

Thank you for your assistance with this proposed electric transmission line project. Please contact me at 281-765-5507 or by e-mail, lisa.barko@powereng.com, if you have any questions or require additional information. We would appreciate receiving your reply by October 9, 2020.

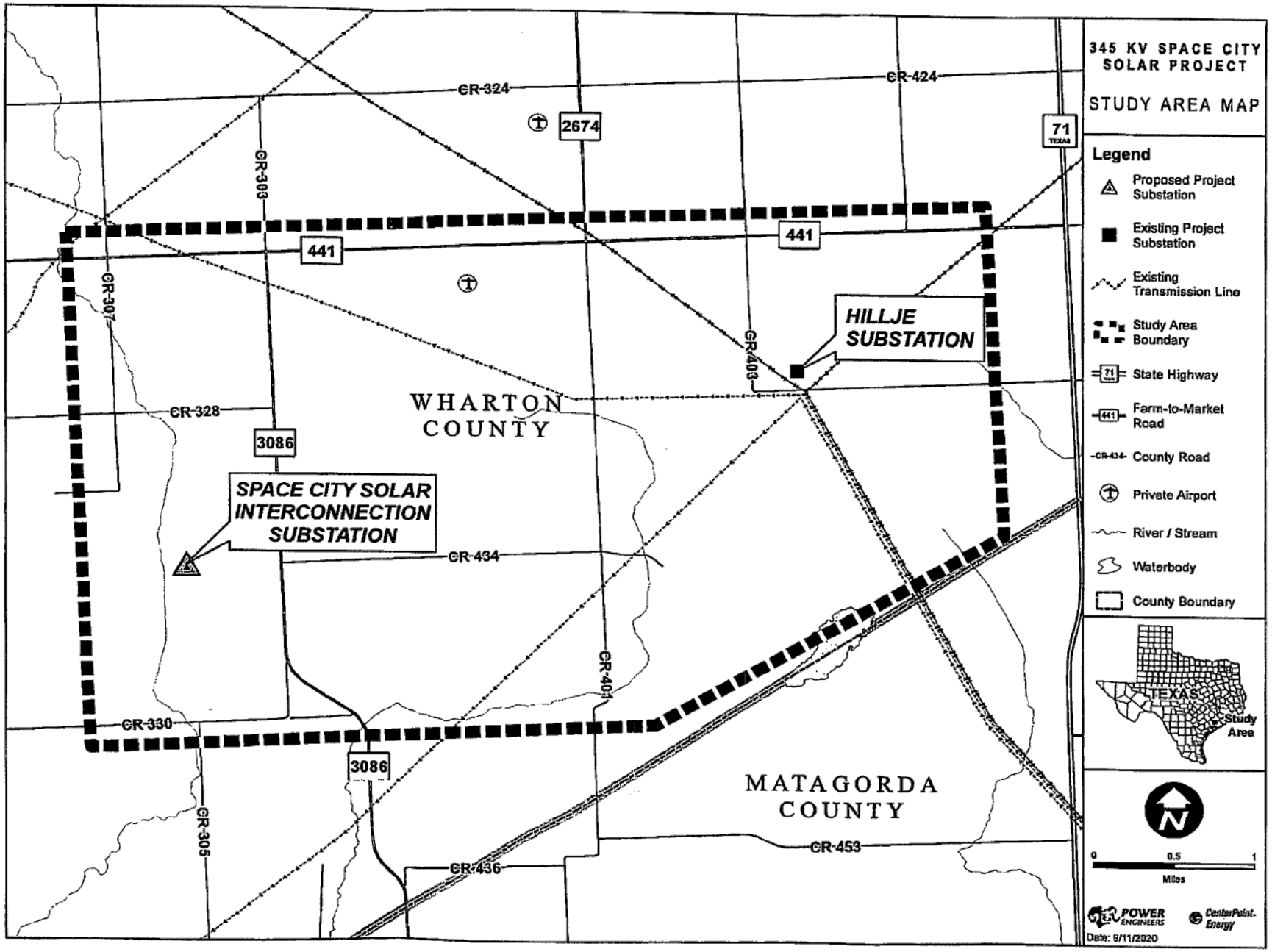
Sincerely,

Lisa Barko Meaux

Lisa Barko Meaux
Senior Project Manager
Department Manager

Enclosure(s): Study Area Map

c: Project Wise 166612
PER-03


345 KV SPACE CITY SOLAR PROJECT
STUDY AREA MAP
Legend
Proposed Project Substation
Existing Project Substation
Existing Transmission Line
Study Area Boundary
State Highway
Farm-to-Market Road
County Road
Private Airport
River / Stream
Waterbody
County Boundary
TEXAS
Study Area
0
0.5
1
Miles
POWER ENGINEERS
CenterPoint Energy
Date: 9/11/2020
CR-324
CR-424
2674
71
CR-303
441
441
CR-307
HILLJE SUBSTATION
CR-403
WHARTON COUNTY
CR-328
3086
SPACE CITY SOLAR INTERCONNECTION SUBSTATION
CR-434
CR-401
CR-330
3086
MATAGORDA COUNTY
CR-305
CR-453
CR-436

From: SWG-RE <SWG-RE@usace.army.mil>
Sent: Monday, September 14, 2020 8:50 AM
To: Taylor, Ashley; SWG-RE
Cc: Williams, Denise; Meaux, Lisa
Subject: RE: Proposed 345 kV Space City Solar Project

Ms. Taylor,

Your project has been reviewed and the U.S. Army Corps of Engineers has no interest in the area of your project location.

Thank you,

Dana

From: ashley.taylor@powereng.com <ashley.taylor@powereng.com>
Sent: Friday, September 11, 2020 1:46 PM
To: SWG-RE <SWG-RE@usace.army.mil>
Cc: denise.williams@powereng.com; lisa.barko@powereng.com
Subject: [Non-DoD Source] Proposed 345 kV Space City Solar Project

To Whom It May Concern.

On behalf of our client, CenterPoint Energy Houston Electric, LLC, attached please find a proposed project information letter.

Thank you for your assistance with this proposed electric transmission line project. Please contact the Project Manager, Lisa Barko-Meaux, by phone at 281-765-5507, or by e-mail at lisa.barko@power.com, if you have any questions or require additional information.

Thanks,

Ashley Taylor
Environmental Specialist
Central Env Svc PM Department
16825 Northchase Drive, Suite 1200
Houston, TX 77060
281-765-5512 direct
832-244-8654 cell

POWER Engineers, Inc.
Blockedwww.powereng.com


Go Green! Please print this email only when necessary.
Thank you for helping POWER Engineers be environmentally responsible.

Meaux, Lisa

From: Bulliner, Kathryn M <kathryn_bulliner@fws.gov>
Sent: Tuesday, September 22, 2020 8:39 AM
To: Meaux, Lisa
Subject: [EXTERNAL] CenterPoint Energy Houston Electric, project no 166612
Attachments: U.S. FIsh and Wildlife Service IPaC letter.pdf

Good Morning Ms. Barko,

Our office received your letter and request for review and comment on the construction of a new 345 kV transmission line in Wharton county, Texas. We received your project letter and are providing the following guidance.

Please refer to the attached letter. To better assist with the consultation, the U.S. Fish and Wildlife Service (Service) requests that you input your project into our Information for Planning and Consultation (IPaC) online program. Once project details have been entered, the program will generate information on federal trust species that should guide the federal action agency in making determinations on the project's impacts to these species. It will also generate a tracking number and letter with our field office's letterhead with further guidance on these determinations. Please include this tracking number in our future communications.

IPaC is the system the Service initiated to streamline and expedite the consultation process. Here are a few helpful hints:

**You will need to hit the button "define project," which will prompt you to draw the exact location of your project. It will also ask you to create an account (or at least the first time) that is a simple user ID and password. The tracking number(s) will be tied to this account. Once you have generated the letter on our letterhead, it will instruct you further on whether you need to contact this office or simply retain the letter for your records. If you are still making the determination of "No Effects" for federal trust species in the project area, the generated letter is all you need. Be mindful that the federal action agency is responsible for making these determinations unless otherwise designated in writing.

Please let me know if you have any questions or need further assistance.

Thank you.

Kathryn

Kathryn M. Bulliner, Ph.D.
Fish and Wildlife Biologist
Texas Coastal Ecological Services Field Office
U.S. Fish and Wildlife Service
17629 El Camino Real Suite 211
Houston, TX 77058
Office: (281)212-1508

~ ~ ~ I am currently teleworking.~ ~ ~

United States Department of the Interior
FISH AND WILDLIFE SERVICE

Texas Coastal Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, Texas 77058
281/286-8282 / (FAX) 281/488-5882

Thank you for your request for threatened and endangered species, fish and wildlife, environmental and/or aquatic resources information, comments, and/or recommendations within the United States Fish and Wildlife Service (Service) Texas Coastal Ecological Service's area (Houston Office) of responsibility.

In order to obtain information regarding fish and wildlife resources concerning a specific project or project area, we recommend that you first utilize the Service-developed Information for Planning and Consultation (IPaC) system. The IPaC system is designed for easy public access to information about the natural resources for which the Service has trust or regulatory responsibility. Examples include: threatened and endangered species, migratory birds, National Wildlife Refuge lands, and National Wetlands Inventory wetlands. One of the primary goals of the IPaC system is to provide this information in a manner that assists people in planning their activities within the context of natural resource conservation. The IPaC system also assists people through the various regulatory consultation, permitting, and approval processes administered by the Service, helping achieve more effective and efficient results for both the project proponents and natural resources.

The IPaC system can be found at the following website address: http://ecos.fws.gov/ipac/. Please note, by requesting an Official Species List, you will receive an official consultation response letter and tracking number. If, after visiting the IPaC system, you still have questions concerning your project as it relates to fish and wildlife resources, please feel free to contact our office at the letterhead address above. We will be happy to assist you.

Sincerely,

Charles Ardizzone
Field Supervisor

From:	Meaux, Lisa
To:	Williams, Denise
Cc:	Schubert, Darren
Subject:	FW: [EXTERNAL] Project Review: 202100912
Date:	Tuesday, October 20, 2020 12:35:41 PM
Attachments:	202100912L.pdf

LISA BARKO MEAUX
PROJECT MANAGER
ENVIRONMENTAL DEPARTMENT MANAGER
16825 Northchase Drive, Suite 1200
Houston, Texas 77060

281-765-5507 direct
713-962-8476 cell
lisa.barko@powereng.com

POWER Engineers, Inc.
www.powereng.com

From: Info_Tech@thc.state.tx.us <Info_Tech@thc.state.tx.us>
Sent: Tuesday, October 20, 2020 12:33 PM
To: Meaux, Lisa <lisa.barko@powereng.com>; reviews@thc.state.tx.us
Subject: [EXTERNAL] Project Review: 202100912

Re: Project Review under Section 106 of the National Historic Preservation Act and/or the Antiquities Code of Texas
THC Tracking #202100912
CenterPoint Energy Houston Electric, LLC

Dear Client:
Thank you for your submittal regarding the above-referenced project. This response represents the comments of the Executive Director of the Texas Historical Commission (THC), pursuant to review under the Antiquities Code of Texas.

A letter response is attached. We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers: Jeff.Durst@thc.texas.gov

This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit http://thc.texas.gov/etrac-system [thc.texas.gov].

Sincerely,

For Mark Wolfe, State Historic Preservation Officer
Executive Director, Texas Historical Commission

Please do not respond to this email.

October 20, 2020

Lisa Barko Meaux
Power Engineers
16825 Northchase Dr. Suite 1200
Houston, Texas 77060

Re: Project review under Section 106 of the National Historic Preservation Act of 1966
Proposed 345 kV Space City Solar Transmission Line Project, Wharton County, Texas. Power Engineers, Inc. Project No. 166612

Dear Ms. Meaux:

Thank you for allowing us to review the proposed transmission line project referenced above. This letter serves as comment on the proposed undertaking from the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission.

The review staff, led by Jeff Durst, has completed its review. The project setting includes landforms potentially occupied by prehistoric and historic Native Americans. Additionally, a water source is located within the proposed study area and will likely be crossed by the transmission line route. Potential for encountering significant cultural materials can be heightened in the vicinity of water sources.

This area has a moderate to high probability of containing significant cultural resources; and an archeological investigation is warranted. If any portion of the project should cross lands owned or controlled by the state of Texas or any subdivision thereof, then an Antiquities Code of Texas Archeological Permit will be required before conducting survey across these lands. Federal regulations require consultation with the USACE to determine locations of jurisdictional lands that will require archeological survey. Once these determinations have been established an archeological survey should be conducted to satisfy all state and federal requirements.

Thank you for your cooperation in this federal review process, and for your efforts to preserve the irreplaceable heritage of Texas. **If we may be of further assistance, please call Jeff Durst of our staff at 512/463-8884.**

Sincerely,

for
Mark Wolfe, State Historic Preservation Officer

MW/jjd

October 22, 2020

Ms. Lisa Barko Meaux
POWER Engineers, Inc.
7600B N Capital of Texas Highway
Suite 320
Austin, TX 78731

RE: Centerpoint Energy Houston Electric, LLC's 345 kV Space City Solar Project, POWER Engineers, Inc. Project No. 166612; Wharton County, Texas

Dear Ms. Barko Meaux:

Texas Parks and Wildlife Department (TPWD) has received and reviewed the submitted documentation regarding the above-referenced proposed transmission line project.

Please be aware that a written response to a TPWD recommendation or informational comment received by a state governmental agency may be required by state law. For further guidance, see the Texas Parks and Wildlife Code, Section 12.0011. For tracking purposes, please refer to TPWD project number 45079 in any return correspondence regarding this project.

Project Description

CenterPoint Energy Houston Electric, LLC (CenterPoint Energy) is proposing to construct a new single-circuit 345 kilovolt (kV) electric transmission line located in Wharton County, Texas. The new transmission line will connect the existing CenterPoint Energy Hillje Substation and the proposed CenterPoint Energy Space City Solar Interconnection Substation. The Hillje Substation is located off of County Road (CR) 403, approximately two miles southwest of the intersection of Farm to Market Road 441 and State Highway (SH) 71. The Space City Solar Interconnection Substation is located off of CR 307, approximately one-half mile west of the intersection of CR 434 and CR 3086.

POWER Engineers, Inc. (POWER) has been contracted by CenterPoint Energy to prepare an Environmental Assessment and Alternative Route Analysis (EA) to support an application for a Certificate of Convenience and Necessity for the Public Utility Commission of Texas (PUC). POWER is identifying environmental and land use constraints within the study area that will be incorporated into the creation of an environmental and land use constraints map. Based on this information, POWER will identify potential alternative routes for the proposed transmission line project.

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512.389.4800

www.tpwd.texas.gov

TPWD offers the following comments and recommendations concerning this project.

Recommendation: TPWD recommends using existing facilities whenever possible. Where new construction is the only feasible option, TPWD recommends routing new transmission and distribution lines along existing roads, pipelines, transmission lines, or other utility rights-of-way (ROW) and easements to reduce habitat fragmentation. By utilizing previously disturbed, existing utility corridors, county roads and highway ROWs, adverse impacts to fish and wildlife resources would be mitigated by avoiding and/or minimizing the impacts to undisturbed habitats. Please see the *TPWD Recommendations for Electrical Transmission/Distribution Line Design and Construction* found online at The TPWD Wildlife Habitat Assessment Program: Planning Tools and Best Management Practices webpage. Please review the recommendations and incorporate these measures into design and construction plans.

Conservation Easements

A conservation easement is a legal agreement between a landowner and a land trust or governmental agency that permanently limits uses of the land (including future fragmentation) to protect and conserve the land's natural values such as fertile soils, mature trees, and wildlife habitat. Lands with conservation easements protect existing wildlife habitat from future fragmentation and therefore have greater environmental integrity than comparable lands without conservation easements. Potential fragmentation of wildlife habitat from transmission line construction on properties where conservation agreements serve to protect the state's natural resources now and in the future is of concern to TPWD.

Recommendation: TPWD recommends properties protected by conservation easements be identified in the constraints analysis and avoided during development of alternative routes. Data sources for the location of these properties include online databases such as the Protected Areas Data Portal and the National Conservation Easement Database, as well as available county records. If properties protected by conservation easements would be affected, TPWD recommends the length of routes through these properties be included in any accounting of alternative route impacts presented in the EA.

Construction Recommendations

General Construction Recommendations

Recommendation: Where trenching or other excavation is involved in construction TPWD recommends that contractors keep trenching/excavation and backfilling crews close together to minimize the amount of trenches/excavation areas left open at any given time during construction. TPWD recommends that any open trenches or excavation areas be covered overnight and/or inspected every morning to ensure no wildlife species have been trapped. Trenches left open for more than two daylight hours should be inspected for the presence of trapped

wildlife prior to backfilling. If trenches/excavation areas cannot be backfilled the day of initial excavation, then escape ramps should be installed at least every 90 meters (approximately 295 feet). Escape ramps can be short lateral trenches or wooden planks sloping to the surface at an angle less than 45 degrees (1:1).

Recommendation: For soil stabilization and/or revegetation of disturbed areas within the proposed project area, TPWD recommends erosion and seed/mulch stabilization materials that avoid entanglement hazards to snakes and other wildlife species. Because the mesh found in many erosion control blankets or mats pose an entanglement hazard to wildlife, TPWD recommends the use of no-till drilling, hydromulching and/or hydroseeding rather than erosion control blankets or mats due to a reduced risk to wildlife. If erosion control blankets or mats will be used, the product should contain no netting or contain loosely woven, natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic mesh matting should be avoided.

Recommendation: During construction, operation, and maintenance of the proposed facility, TPWD recommends observing slow (25 miles per hour, or less) speed limits within the project site. Reduced speed limits would allow personnel to see wildlife in the vehicle path and avoid harming them.

Federal Law: Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits direct and affirmative purposeful action that reduce migratory birds, their eggs, or their nests, by killing or capturing, to human control, except when specifically authorized by the Department of the Interior. This protection applies to most native bird species, including ground nesting species. The U.S. Fish and Wildlife Service (USFWS) Migratory Bird Office can be contacted at (505) 248-7882 for more information on potential impacts to migratory birds.

Within the project area, potential impacts to migratory birds may occur during site preparation and grading activities through the disturbance of existing vegetation and bare ground that may harbor active bird nests, including nests that may occur in grass, shrubs and trees and on bare ground.

Recommendation: TPWD recommends any vegetation clearing be scheduled outside of the general bird nesting season of March 15th to September 15th; however, if clearing must occur during nesting season, nest surveys should be conducted prior to clearing. Nest surveys should take place within 5 days of scheduled clearing in order to maximize the detection of active nests. If nests are observed during surveys, a vegetation buffer area of no less than 150-feet in diameter should remain around the nest until all young have fledged.

The potential exists for birds to collide with power lines and associated guy wires and static lines. Bird fatalities can also occur due to electrocution if perching birds simultaneously make contact with energized and grounded structures.

Recommendation: TPWD recommends bird collision and electrocution risks be considered during project routing and design and recommends incorporating design features which minimize those risks. For additional information, please see the guidelines published by USFWS and the Avian Power Lines Interaction Committee (APLIC) in the updated guidance document *Reducing Avian Collisions with Power Lines: State of the Art in 2012*. This manual, released on December 20, 2012, identifies best practices and provides specific guidance to help electric utilities and cooperatives reduce bird collisions with power lines. A companion document, *Suggested Practices for Avian Protection on Power Lines*, was published by APLIC and the USFWS in 2006.

Federal Law: Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald eagles (*Haliaeetus leucocephalus*) or golden eagles (*Aquila chrysaetos*), including their parts, nests, or eggs. The BGEPA provides criminal penalties for persons who "*take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof.*" The BGEPA defines "take" as to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.

Recommendation: When potential impacts to the bald eagle are anticipated, TPWD recommends consultation with USFWS – Clear Lake Ecological Services at (281) 286-8282 regarding compliance with the BGEPA.

Federal Law: Endangered Species Act

Federally listed animal species and their habitat are protected from take on any property by the Endangered Species Act (ESA). Take of a federally listed species can be allowed if it is incidental to an otherwise lawful activity and must be permitted in accordance with Section 7 or 10 of the ESA. Any take of a federally listed species or its habitat without the required take permit from the U.S. Fish and Wildlife Service (USFWS) is a violation of the ESA.

Recommendation: The USFWS should be contacted for species occurrence data, guidance, permitting, survey protocols, and mitigation for federally listed species.

Federal Law: Clean Water Act

Section 404 of the Clean Water Act (CWA) establishes a federal program to regulate the discharge of dredged and fill material into the waters of the U.S., including wetlands. The U.S. Army Corps of Engineers (USACE) and the Environmental Protection Agency are responsible for making jurisdictional determinations and regulating wetlands and other waters under Section 404 of the CWA.

Wetland mitigation is out-of-kind and insufficient to compensate for impacts to stream functions. For unavoidable stream impacts, stream compensation is required under 33 CFR §332.3(e)(3); item 11.B.2. in Compensatory Mitigation for Losses of Aquatic Resources (73 Federal Register 19596, April 10, 2008).

Recommendation: TPWD recommends consulting with the USACE for potential impacts to waters of the U.S. including jurisdictional determinations, delineations, and mitigation.

Recommendation: TPWD recommends mitigation for all impacts to aquatic resources. The wetland and stream mitigation plan should be developed in consultation with TPWD. The applicant should coordinate with Mr. Tom Heger (512- 389-4583) regarding aquatic habitat impacts and mitigation occurring in Grimes County. The applicant should coordinate with Mr. Bryan Eastham (281-534-0105) regarding aquatic habitat impacts and mitigation occurring in Montgomery County.

State Law: Parks and Wildlife Code – Chapter 64, Birds

Texas Parks and Wildlife (TPW) Code Section 64.002, regarding protection of nongame birds, provides that no person may catch, kill, injure, pursue, or possess a bird that is not a game bird. TPW Code Section 64.003, regarding destroying nests or eggs, provides that no person may destroy or take the nests, eggs, or young and any wild game bird, wild bird, or wild fowl. TPW Code Chapter 64 does not allow for incidental take and; therefore, is more restrictive than the MBTA.

Recommendation: Please review the *Federal Law: Migratory Bird Treaty Act* section above for recommendations as they are also applicable for Chapter 64 of the TPW Code compliance.

State Law: Aquatic Resources

TPW Code Section 1.011 grants TPWD authority to regulate and conserve aquatic animal life of public waters. Title 31, Chapter 57, Subchapter B, Section 57.157 of Texas Administrative Code (TAC) regulates take of mussels which are **not limited to state-listed mussels.** Section 12.301 of TPW Code identifies liability for wildlife taken in violation of TPW Code or a regulation adopted under TPW Code.

Recommendation: TPWD recommends route design which avoids and/or minimizes crossing or paralleling aquatic resources (e.g. river, creeks, wetlands).

Under TPW Code Section 12.015, 12.019, 66.015 and TAC 52.101-52.105, 52.202, and 57.251-57.259, TPWD regulates the introduction and stocking of fish, shellfish, and aquatic plants into public waters of the state. *The Permit to Introduce Fish, Shellfish or Aquatic Plants into Public Waters* allows for movement (i.e., introduction, stocking, transplant, relocation) of aquatic species in waters of the state. Movement of aquatic species, even within the same river or estuary, has potential

natural resources risk (e.g., exotics, timing for successful survival); therefore, a permit is required to minimize that risk.

Dewatering or other construction activities can trample, dredge or fill areas exhibiting stationary aquatic resources such as plants and mussels. To avoid or reduce impacts if dewatering or other construction activities are proposed in aquatic habitat, TPWD recommends relocating aquatic life, including, but not limited to, fish, turtles, and mussels, to an area of suitable habitat outside the project footprint. Relocation activities are done under the authority of a TPWD *Permit to Introduce Fish, Shellfish or Aquatic Plants into Public Waters.*

Recommendation: Aquatic Resource Relocation Plans (ARRPs) are used to plan resource handling activities and assist in the permitting process. If construction occurs during times when water is present in streams and dewatering activities or other harmful construction activities are involved (such as placement of temporary or permanent fills), then TPWD recommends relocating potentially impacted native aquatic resources in conjunction with a Permit to Introduce Fish, Shellfish or Aquatic Plants into Public Waters and an ARRP. The ARRP should be completed and approved by the department 30 days prior to activity within project waters and/or resource relocation and submitted with an application for a no-cost *Permit to Introduce Fish, Shellfish, or Aquatic Plants into Public Waters.* For impacts within Wharton County that require an ARRP contact TPWD Region 3 Kills and Spills Team (KAST) at (281)-534-0107 regarding submittal of ARRPs.

Recommendation: All waterways and associated floodplains, riparian corridors, and wetlands, regardless of their jurisdictional status, provide valuable wildlife habitat and should be protected to the maximum extent possible. If dewatering activities and other project-related activities cause mortality to fish and wildlife species, then the responsible party would be subject to investigation by the TPWD KAST and will be liable for the value of the lost resources under the authority of TPW Code Sections 12.001 1 (b) (1) and 12.301.

State Law: Parks and Wildlife Code, Section 68.015

TPW Code regulates state-listed threatened and endangered animal species. The capture, trap, take, or killing of state-listed threatened and endangered animal species is unlawful unless expressly authorized under a permit issued by USFWS or TPWD. A copy of TPWD Protection of State-Listed Species Guidelines, which includes a list of penalties for take of species, can be found online at the TPWD Wildlife Habitat Assessment Program: Laws and Regulations Applicable to TPWD Review webpage. For purposes of relocation, surveys, monitoring, and research, State-listed species may only be handled by persons with the appropriate authorization obtained through the TPWD Wildlife Permits Program. For more information on this authorization, please contact the Wildlife Permits Office at (512) 389-4647.

TPWD provides online access to state-listed species information through the TPWD Rare, Threatened, and Endangered Species of Texas by County (RTEST) application.

This application provides county-level information regarding occurrence of protected species (federal- or state-listed threatened or endangered) and may be utilized to inform development project planning. Additionally, records of occurrence for these protected species are tracked within the Texas Natural Diversity Database (TXNDD) and are publicly available by request.

Recommendation: TPWD recommends POWER review the current county list for Wharton County utilizing the RTEST application. The species lists and information regarding preferred habitats should be utilized during route development. TPWD recommends avoiding areas of habitat preferred by state-listed species.

Recommendation: TPWD recommends POWER request the most current data available from the TXNDD, to utilize in the development of environmental constraints and route alternatives.

Recommendation: Upon route selection, TPWD recommends Centerpoint Energy survey potentially disturbed areas for state listed species habitat prior to construction. If suitable habitat for species is observed in the area, disturbance of the habitat should be avoided to the extent feasible.

Species of Concern/Special Features

In addition to state and federally-protected species, TPWD tracks special features, natural communities, and rare species that are not listed as threatened or endangered. TPWD actively promotes their conservation and considers it important to evaluate and, if necessary, minimize impacts to rare species and their habitat to reduce the likelihood of endangerment and preclude the need to list. These species and communities are tracked in the TXNDD.

Please note that the absence of TXNDD information in an area does not imply that a species is absent from that area. Given the small proportion of public versus private land in Texas, the TXNDD does not include a representative inventory of rare resources in the state. Although it is based on the best data available to TPWD regarding rare species, the data from the TXNDD do not provide a definitive statement as to the presence, absence or condition of special species, natural communities, or other significant features within your project area. These data are not inclusive and cannot be used as presence/absence data. This information cannot be substituted for on-the-ground surveys. The TXNDD is updated continuously. As the project progresses and for future projects, please request the most current and accurate information at TexasNatural.DiversityDatabase@tpwd.texas.gov.

Recommendation: Please review the TPWD county list for Wharton County, as rare species could be present depending upon habitat availability. These lists are available online using the TPWD RTEST web application. If during construction, the project area is found to contain rare species, natural plant communities, or special features, TPWD recommends that precautions be taken to avoid impacts to

them. The USFWS should be contacted for species occurrence data, guidance, permitting, survey protocols, and mitigation for federally listed species.

Determining the actual presence of a species in a given area depends on many variables including daily and seasonal activity cycles, environmental activity cues, preferred habitat, transiency and population density (both wildlife and human). The absence of a species can be demonstrated only with great difficulty and then only with repeated negative observations, taking into account all the variable factors contributing to the lack of detectable presence. If encountered during construction, measures should be taken to avoid impacting wildlife.

Vegetation

The Ecological Mapping Systems of Texas (EMST) provide recently mapped vegetative cover based on the NatureServe Ecological System Classification System as described by Comer (2003). Additional information about the EMST, including a link to download shape files, can be found at the TPWD Geographic Information Systems webpage.

Recommendation: TPWD recommends utilizing EMST data during project planning and minimizing impacts to native vegetation to the maximum extent feasible during project planning, design, and construction.

Recommendation: Mitigation should be planned for unavoidable loss of native vegetation disturbed by project activities and should be developed in coordination with TPWD. TPWD recommends utilizing online resources concerning vegetation, clearing, and revegetation, available at the TPWD Wildlife Habitat Assessment Program: Planning Tools and Best Management Practices webpage. Specific requirements apply to impacts to wetlands; please reference the above *Federal Laws: Clean Water Act* and *State Law: Aquatic Resources* sections for information on coordination of wetland mitigation with federal and state agencies.

Invasive Species

The study area is susceptible to colonization by a variety of invasive species of aquatic and terrestrial plants. These plants often outcompete native plant species and establish monocultures, making the area less useful for wildlife, people, and lowering aesthetic value of an invaded area.

Recommendation: TPWD recommends Centerpoint Energy establish sanitation procedures to prevent the spread of invasive terrestrial plants. TPWD recommends such a plan include the following measures to minimize invasive plant spread: 1) Inspect the site for infestation prior to operations. 2) Avoid driving vehicles, mowers, all-terrain vehicles, or spray equipment through infestations in seed or fruit. 3) Brush and wipe all seeds and debris from clothes, boots, socks, and personal protective equipment. 4) Clean motorized equipment, especially the

undercarriage and tire surfaces. 5) Cover loads or bag cut invasive plants before transport.

Recommendation: TPWD recommends Centerpoint Energy avoid utilizing invasive species in seed mixes or plantings for revegetation or soil stabilization purposes. More information and resources regarding revegetation and restoration with native plants may be found at TPWD's Wildlife Habitat Assessment Program: Planning Tools and Best Management Practices webpage and at the Pollinator Partnership Planting Guides webpage.

The zebra mussel *(Dreissena polymorpha),* a highly invasive aquatic species, has been documented in Texas lakes including lakes in the Red River Basin, Trinity River Basin, and Brazos River Basin. The zebra mussel larvae and post-larval forms are known to spread between waters via contaminated equipment; post-larval forms can survive several days out of water before being carried to other waters. Post-larval zebra mussels attach to hard surfaces, such as boats, intake structures and piers. The larvae, called veligers, are microscopic and are visually undetectable, thus they are unknowingly carried to other waters via live wells, bait buckets, scuba equipment, and anything that carries small amounts of water.

Statewide rules have been enacted per TAC Title 31, Part 2, Chapter 57, Subchapter N that requires persons leaving or approaching public fresh water to drain all water from their vessels and on-board receptacles (includes live wells, bilges, motors and any other receptacles or water-intake systems coming into contact with public waters). This rule applies to all sites where boats can be launched and includes all types and sizes of boats whether powered or not, personal watercraft, sailboats, kayaks/canoes, or any other vessel used to travel on public waters. Furthermore, per TAC Title 31, Part 2, Chapter 57, Subchapter A, it is an offense for any person to possess, transport, or release into the water of this state any species, hybrid of a species, subspecies, eggs, seeds, or any part of any species defined as a harmful or potentially harmful exotic fish, shellfish, or aquatic plant. This rule applies not only to zebra mussels (live or dead) and their larvae but also to any species (or fragments thereof) designated as harmful or potentially harmful under this subchapter (e.g., giant salvinia, hydrilla, Eurasian watermillfoil).

Recommendation: If equipment comes in contact with inland streams or water bodies during construction, such as at temporary crossings, , and in order to minimize the risk of transporting zebra mussels or other aquatic invasive species on construction equipment and materials, TPWD recommends Centerpoint Energy review and adhere to the *TPWD Clean/Drain/Dry Procedures and Zebra Mussel Decontamination Procedures for Contractors Working in Inland Public Waters* for equipment and materials entering or leaving waters at the project site. The procedures can be obtained at TPWD's Wildlife Habitat Assessment Program: Planning Tools and Best Management Practices webpage.

Monarch and Pollinator Conservation

There is widespread concern regarding the decline of monarch butterflies (*Danaus plexippus*) and other native insect pollinator species due to reductions in native floral resources. To support pollinators and migrating monarchs, TPWD encourages the establishment of native wildflower habitats on private and public lands. Establishing wildflower habitats in new developments can contribute to pollinator conservation. Infrastructure ROW can provide habitat for a diverse community of pollinators, providing forage for food and breeding or nesting opportunities. Infrastructure ROWs extend across a variety of landscapes and can aid dispersal of pollinators by linking fragmented habitats. By acting as refugia for pollinators in otherwise inhospitable landscapes, this habitat can contribute to the maintenance of healthy ecosystems and provision of ecological services such as crop pollination services. Recent publications on conserving pollinators in Texas can be found at the TPWD Wildlife Habitat Assessment Program: Planning Tools and Best Management Practices webpage.

Recommendation: To contribute to pollinator conservation efforts, TPWD encourages Centerpoint Energy to revegetate impacted areas with vegetation which provides habitat for monarch butterflies and other pollinator species. Species appropriate for the project area can be found by accessing the Lady Bird Johnson Wildflower Center, working with TPWD biologists to develop an appropriate list of species, or utilizing resources found at the Xerces Society's Guidelines webpage.

Recommendation: TPWD advises against planting the non-native milkweed species black swallow-wort (*Cynanchum louiseae*) and pale swallow-wort (*C. rossicum*). Monarch butterflies will lay eggs on these plant species, but the larvae are unable to feed and complete their life cycle. Additionally, these plant species can be highly invasive. Additionally, TPWD advises against planting the non-native tropical milkweed (*Asclepias curassavica*), a popular commercial nursery milkweed that can persist year-round in southern states. The year-round persistence of tropical milkweed fosters greater transmission of the protozoan *Ophryocystis elektroscirrha* (OE), increasing the likelihood that monarchs become infected with the debilitating parasite.

Mitigation Plan

TPWD recommends preparing a mitigation plan to provide compensatory mitigation for those habitats where impacts from the transmission line cannot be avoided or minimized. This would include impacts to species and habitats covered under federal law (wetlands and associated habitats, threatened or endangered species) and state resource habitat types not covered by state or federal law (riparian areas, native prairies). At a minimum, TPWD recommends a replacement ratio of 1:1 for state resource habitat types. For more detailed suggestions or information regarding a mitigation plan, please contact this office.

Data Reporting and the Texas Natural Diversity Database

TPWD maintains records of occurrence for protected and rare species, or SGCN, within the TXNDD and these data are publicly available by request. The TXNDD is intended to assist users in avoiding harm to rare species or significant ecological features. The TXNDD is updated continuously, and relies partially on information submitted by private parties, such as developers or their consultants. Given the small proportion of public versus private land in Texas, the TXNDD does not include a representative inventory of rare resources in the state.

Although it is based on the best data available to TPWD regarding rare species, the data from the TXNDD do not provide a definitive statement as to the presence, absence, or condition of special species, natural communities, or other significant features within a project area. Determining the actual presence of a species in a given area depends on many variables including daily and seasonal activity cycles, environmental activity cues, preferred habitat, transiency, and population density (both wildlife and human). The absence of a species can be demonstrated only with great difficulty, and then only with repeated negative observations, taking into account all the variable factors contributing to the lack of detectable presence. Please note that the absence of TXNDD information in an area does not imply that a species is absent from that area. These data are not inclusive and cannot be substituted for field surveys.

> **Recommendation:** To aid in the scientific knowledge of a species' status and current range, TPWD encourages reporting encounters of protected and rare species to the TXNDD according to the data submittal instructions found at the TPWD Texas Natural Diversity Database: Submit Data webpage.

Thank you for considering potential impacts to Texas' wildlife and natural resources during project planning. Please contact me at (979) 732-4213 or Rachel.Lange@tpwd.texas.gov if you have any questions.

Sincerely,

Rachel Lange

Rachel Lange
Wildlife Habitat Assessment Program
Wildlife Division

RL: 45079

Meaux, Lisa

From: Patricia Blair <blairpatm@gmail.com>
Sent: Tuesday, September 15, 2020 3:59 PM
To: Meaux, Lisa
Subject: [EXTERNAL] 345 kV Space City Solar Project, Wharton County, TX, Project #166612

Dear Ms. Barko:

Thank you for your letter of September 11, addressed to me as county historical commission chairman. The only commens I would be in a position to make would relate to potential impact of the new transmission line on historical properties/features in this part of the county. The historical commission does not deal with permits or easements nor proposed development/construction other than in places that could be adversely impacted in terms of historic properties. I do not believe that would be an issue in this case.

Since I did not see the names of other consulting parties in your letter, I'm wondering if you would like me to forward it to the county commissioner who oversees this precinct, which would be either Doug Mathews or Steven Goetsch? If so, I would be happy to do that.

Sincerely,

Patricia Blair, Chairman
Wharton County Historical Commission

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Appendix B

Environmental and Land Use Data for the Proposed Transmission Line Segments (Table 4-1)
Environmental and Land Use Data for the Proposed Alternative Routes (Table 4-2)

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Table 4-1
Environmental and Land Use Data
for the Proposed Transmission Line Segments
12/1/2020

	Evaluation Criteria																
	Land Use	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
1	Length of segment (feet)	15,152	4,372	4,069	2,316	7,276	13,791	1,435	2,118	336	4,805	4,442	4,300	21,949	6,330	3,662	458
2	Length of segment (miles)	2.9	0.8	0.8	0.4	1.4	2.6	0.3	0.4	0.1	0.9	0.8	0.8	4.2	1.2	0.7	0.1
3	Number of directly affected habitable structures[1] within 500 feet of segment centerline	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0
4	Number of directly affected habitable structures[1] also within 500 feet of an existing transmission line	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Length of segment using existing transmission line easement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Length of segment parallel to existing transmission line ROW	0	0	0	0	0.7	0.3	0	0	0	0	0.001	0.8	0.3	0.3	0.6	0
7	Length of segment not utilizing/paralleling existing transmission line ROW	2.9	0.8	0.8	0.4	0.7	2.3	0.3	0.4	0.1	0.9	0.8	0	3.9	0.9	0.1	0.1
8	Length of new ROW required for segment	2.9	0.8	0.8	0.4	1.4	2.6	0.3	0.4	0.1	0.9	0.8	0.8	4.2	1.2	0.7	0.1
9	Length of segment parallel to apparent property lines (or other natural or cultural features)[2]	1.6	0	0	0.4	0.5	0.5	0	0.2	0	0	0	0	1.3	0.8	0	0
10	Length of segment parallel to other existing ROW (roadways, railways, canals, etc.)	0.8	0.8	0.8	0	0	0.8	0	0	0	0.3	0	0	0.3	0	0	0
11	Length of segment not parallel to railroad ROW, apparent property lines, or other existing ROW (roadways, railways, canals, etc.)	0.5	0.0	0.0	0.0	0.9	1.3	0.3	0.2	0.1	0.6	0.8	0.8	2.5	0.4	0.7	0.1
12	Percent of segment parallel with apparent features (existing ROWs or property lines)	**84%**	**100%**	**100%**	**100%**	**89%**	**61%**	**0%**	**52%**	**0%**	**35%**	**0%**	**100%**	**46%**	**89%**	**91%**	**0%**
13	Length of segment across parks/recreational areas[3]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Number of additional parks/recreational areas[3] within 1,000 feet of segment centerline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	Length of segment across agricultural land/cropland	1.6	0.3	0.5	0.4	0.8	0.5	0.1	0.1	0	0.01	0.1	0.1	2.1	1.1	0.6	0.01
16	Length of segment across pastureland	0.7	0.5	0.3	0.01	0.6	1.8	0.2	0.3	0.1	0.8	0.2	0.3	1.6	0	0.1	0.1
17	Length of segment across mobile irrigated cropland or pastureland	0	0	0	0	0	0.4	0	0	0	0	0	0	0	0	0	0
18	Length of segment parallel to existing pipeline ROW	0	0	0	0	0	0	0	0	0	0	0.7	0	0	0	0	0
19	Number of pipeline crossings	4	0	0	0	6	10	0	6	0	4	0	6	12	1	6	0
20	Number of transmission line crossings	1	0	0	0	0	1	0	0	1	1	0	0	4	0	1	0
21	Number of U.S. and state highway crossings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	Number of F.M. road crossings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	Number of local road crossings	1	0	0	1	1	1	1	2	0	0	0	0	1	0	0	1
24	Number of heliports within 5,000 feet of segment centerline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	Number of private airstrips within 10,000 feet of segment centerline	2	1	1	1	0	0	1	1	0	2	1	0	0	2	0	0
26	Number of FAA-listed airports[4] within 10,000 feet of segment centerline having no runway more than 3,200 feet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	Number of FAA-listed airports[4] within 20,000 feet of segment centerline having at least one runway more than 3,200 feet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	Number of commercial AM radio transmitters within 10,000 feet of segment centerline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	centerline	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
30	Number of water wells within the ROW	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0
31	Number of oil and gas wells within the ROW	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	Aesthetics																
32	Estimated length of segment within foreground visual zone[5] of U.S. and state highways	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	Estimated length of segment within foreground visual zone[5] of FM and county roads	1.3	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	Estimated length of segment within foreground visual zone[5][6] of park and recreational areas[4]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ecology																
35	Length of segment across upland woodlands	0.6	0	0	0	0.02	0.2	0.01	0	0	0.1	0.5	0.4	0.4	0.1	0	0
36	Length of segment across bottomland/riparian woodlands	0.02	0	0.01	0	0	0.1	0	0	0	0.003	0.01	0.01	0.02	0	0	0
37	Length of segment across National Wetland Inventory mapped wetlands	0.01	0	0.004	0.01	0.005	0.04	0	0	0	0	0	0	0	0	0	0
38	Length of segment across critical habitat of federally listed threatened or endangered species	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	Length of segment across open water (lakes or ponds)	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0
40	Number of stream and canal crossings	7	1	3	1	4	3	0	0	0	3	2	2	6	1	1	0
41	Length of segment parallel to streams within 100 feet of segment centerline	0.1	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0
42	Length of segment across 100-year floodplains	0	0	0	0	0	1.1	0	0	0	0	0	0	2.6	0	0	0
	Cultural Resources																
43	Number of cemeteries within 1,000 feet of the segment centerline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	Number of recorded historical and archeological sites crossed within ROW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	Number of additional recorded historical and archeological sites within 1,000 feet of segment centerline	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0
46	Number of National Register of Historic Places listed or determined-eligible properties within ROW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	Number of additional National of Register Historic Places listed or determined-eligible properties within 1,000 feet of segment centerline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	Length of segment across areas of high archaeological/historic site potential	0.4	0	0	0	0.04	1.4	0	0.05	0.1	0.3	0.1	0.2	0.8	0	0.1	0

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

[2] Apparent property boundaries created by existing roads, highway, or railroad ROW are not "double counted" in the length of ROW parallel to apparent property boundaries criteria. Property

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

[4] As listed in the Chart Supplement South Central U.S. (FAA 2020b formerly known as the Airport/Facility Directory South Central U.S.), and FAA 2020a.

[5] One-half mile, unobstructed. Lengths of ROW within the visual foreground zone of interstates, US and state highway criteria are not "double-counted" in the length of ROW within the visual foreground zone of FM roads criteria.

[6] One-half mile, unobstructed. Lengths of ROW within the visual foreground zone of parks/recreational areas may overlap with the total length of ROW within the visual foreground zone of interstates, US and state highway criteria and/or with the total length of ROW within the visual foreground zone of FM roads criteria.

Note: All length measurements in miles unless noted otherwise. All linear measurements were obtained from various aerial photograph sources: NAIP 2018, ESRI 2019, and Google Earth with the exception of high probability areas for archaeological/historical resources which were measured from USGS Topographic Quadrangles using GIS software.

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Table 4-2
Environmental and Land Use Data
for the Proposed Alternative Routes
12/1/2020

	Evaluation Criteria	A-N-P	B-C-G-J-N-P	B-C-G-K-O-P	B-C-H-L-O-P	B-C-H-I-M	B-D-E-I-M	B-D-F-M
	Land Use	1	2	3	4	5	6	7
1	Length of route (feet)	21,939	21,470	18,439	18,979	32,845	36,249	42,428
2	Length of route (miles)	4.2	4.1	3.5	3.6	6.2	6.9	8.0
3	Number of directly affected habitable structures[1] within 500 feet of route centerline	0	1	0	1	2	1	1
4	Number of directly affected habitable structures[1] also within 500 feet of an existing transmission line	0	0	0	0	0	0	0
5	Length of route using existing transmission line easement	0	0	0	0	0	0	0
6	Length of route parallel to existing transmission line ROW	0.3	0.3	0.6	1.4	0.3	1.0	0.6
7	Length of route not utilizing/paralleling existing transmission line ROW	3.9	3.8	2.9	2.1	5.9	5.9	7.5
8	Length of new ROW required for route	4.2	4.1	3.5	3.6	6.2	6.9	8.0
9	Length of route parallel to apparent property lines (or other natural or cultural features)[2]	2.4	0.8	0	0.2	1.6	2.3	2.3
10	Length of route parallel to other existing ROW (roadways, railways, canals, etc.)	0.6	1.9	1.6	1.6	1.9	1.1	1.9
11	Length of route not parallel to railroad ROW, apparent property lines, or other existing ROW (roadways, railways, canals, etc.)	0.9	1.3	1.9	1.7	2.8	3.5	3.8
12	Percent of route parallel with apparent features (existing ROWs or property lines)	84%	73%	64%	92%	60%	64%	59%
13	Length of route across parks/recreational areas[3]	0	0	0	0	0	0	0
14	Number of additional parks/recreational areas[3] within 1,000 feet of route centerline	0	0	0	0	0	0	0
15	Length of route across agricultural land/cropland	2.7	2.0	1.6	1.6	3.0	3.7	3.4
16	Length of route across pastureland	0.7	1.8	1.3	1.5	2.7	2.7	3.9
17	Length of route across mobile irrigated cropland or pastureland	0	0	0	0	0	0	0.4
18	Length of route parallel to existing pipeline ROW	0	0	0.7	0	0	0	0
19	Number of pipeline crossings	5	5	6	18	18	18	22
20	Number of transmission line crossings	1	1	1	1	5	5	5
21	Number of U.S. and state highway crossings	0	0	0	0	0	0	0
22	Number of F.M. road crossings	0	0	0	0	0	0	0
23	Number of local road crossings	2	2	2	3	3	3	3
24	Number of heliports within 5,000 feet of route centerline	0	0	0	0	0	0	0
25	Number of private airstrips within 10,000 feet of route centerline	2	2	1	1	1	1	1
26	Number of FAA-listed airports[4] within 10,000 feet of route centerline having no runway more than 3,200 feet	0	0	0	0	0	0	0
27	Number of FAA-listed airports[4] within 20,000 feet of route centerline having at least one runway more than 3,200 feet	0	0	0	0	0	0	0
28	Number of commercial AM radio transmitters within 10,000 feet of route centerline	0	0	0	0	0	0	0
29	Number of FM radio transmitters, microwave relay stations, and other electronic installations etc. within 2,000 feet of route centerline	1	1	1	1	1	1	1
30	Number of water wells within the ROW	0	2	1	1	1	0	1
31	Number of oil and gas wells within the ROW	0	0	0	0	1	1	1
	Aesthetics							
32	Estimated length of route within foreground visual zone[5] of U.S. and state highways	0	0	0	0	0	0	0
33	Estimated length of route within foreground visual zone[5] of FM and county roads	1.3	0.3	0.3	0.3	0.3	0.3	0.3
34	Estimated length of route within foreground visual zone[5][6] of park and recreational areas[4]	0	0	0	0	0	0	0
	Ecology							
35	Length of route across upland woodlands	0.7	0.2	0.5	0.4	0.4	0.4	0.5
36	Length of route across bottomland/riparian woodlands	0.02	0.01	0.01	0.02	0.02	0.02	0.11
37	Length of route across National Wetland Inventory mapped wetlands	0.01	0.004	0.004	0.004	0.004	0.01	0.05
38	Length of route across critical habitat of federally listed threatened or endangered species	0	0	0	0	0	0	0
39	Length of route across open water (lakes or ponds)	0	0.01	0.01	0.01	0.01	0	0
40	Number of stream and canal crossings	8	8	7	7	10	12	11
41	Length of route parallel to streams within 100 feet of route centerline	0.1	0	0	0	0.2	0.2	0.2
42	Length of route across 100-year floodplains	0	0	0	0	2.6	2.6	3.7
	Cultural Resources							
43	Number of cemeteries within 1,000 feet of the route centerline	0	0	0	0	0	0	0
44	Number of recorded historical and archeological sites crossed within ROW	0	0	0	0	0	0	0
45	Number of additional recorded historical and archeological sites within 1,000 feet of route centerline	0	0	1	1	0	0	0
46	Number of National Register of Historic Places listed or determined-eligible properties within ROW	0	0	0	0	0	0	0
47	Number of additional National of Register Historic Places listed or determined-eligible properties within 1,000 feet of route centerline	0	0	0	0	0	0	0
48	Length of route across areas of high archaeological/historic site potential	0.4	0.3	0.2	0.4	0.9	0.9	2.2

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

[2] Apparent property boundaries created by existing roads, highway, or railroad ROW are not "double counted" in the length of ROW parallel to apparent property boundaries criteria. Property boundary

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

[4] As listed in the Chart Supplement South Central U.S. (FAA 2020b formerly known as the Airport/Facility Directory South Central U.S.), and FAA 2020a.

[5] One-half mile, unobstructed. Lengths of ROW within the visual foreground zone of Interstates, US and state highway criteria are not "double-counted" in the length of ROW within the visual foreground zone of FM roads criteria.

[6] One-half mile, unobstructed. Lengths of ROW within the visual foreground zone of parks/recreational areas may overlap with the total length of ROW within the visual foreground zone of Interstates, US and state highway criteria and/or with the total length of ROW within the visual foreground zone of FM roads criteria.

Note: All length measurements in miles unless noted otherwise. All linear measurements were obtained from various aerial photograph sources: NAIP 2018, ESRI 2019, and Google Earth with the exception of high probability areas for archaeological historical/resources which were measured from USGS Topographic Quadrangles using GIS software.

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Appendix C

Habitable Structures and Other Land Use Features in the Vicinity of the Proposed Alternative Routes (CCN Inventory Tables, Tables 5-3 through 5-9)

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Table 5-3 Habitable Structures and Other Land Use Features in the Vicinity of the Proposed Alternative Route 1

Segment Combinations: A-N-P			
Map Number	**Structure or Feature**	**Approximate Distance from Route Centerline[1] (feet)**	**Nearest Alternative Route Segment**
13	Other Communication Tower	141	N
21	Private Airstrip	9,111	A
22	Smith Aviation	2,823	A

[1] Due to the potential horizontal inaccuracies of the aerial photography and data utilized, all habitable structures within 510' have been identified.

Table 5-4 Habitable Structures and Other Land Use Features in the Vicinity of the Proposed Alternative Route 2

Segment Combinations: B-C-G-J-N-P			
Map Number	**Structure or Feature**	**Approximate Distance from Route Centerline[1] (feet)**	**Nearest Alternative Route Segment**
1	Single-family Residence - Mobile Home	20	J
13	Other Communication Tower	141	N
21	Private Airstrip	9,162	J
22	Smith Aviation	4,823	J

[1] Due to the potential horizontal inaccuracies of the aerial photography and data utilized, all habitable structures within 510' have been identified.

Table 5-5 Habitable Structures and Other Land Use Features in the Vicinity of the Proposed Alternative Route 3

Segment Combinations: B-C-G-K-O-P			
Map Number	**Structure or Feature**	**Approximate Distance from Route Centerline[1] (feet)**	**Nearest Alternative Route Segment[2]**
13	Other Communication Tower	622	P
21	Private Airstrip	7,880	C
--	41WH146	--	O

[1] Due to the potential horizontal inaccuracies of the aerial photography and data utilized, all habitable structures within 510' have been identified.

[2] Distances to sensitive cultural resource sites are not provided for protection of the sites.

Table 5-6 Habitable Structures and Other Land Use Features in the Vicinity of the Proposed Alternative Route 4

Segment Combinations: B-C-H-L-O-P			
Map Number	**Structure or Feature**	**Approximate Distance from Route Centerline[1] (feet)**	**Nearest Alternative Route Segment[2]**
2	Single-family Residence	256	H
13	Other Communication Tower	622	P
21	Private Airstrip	7,880	C
--	41WH146	--	O

[1] Due to the potential horizontal inaccuracies of the aerial photography and data utilized, all habitable structures within 510' have been identified.

[2] Distances to sensitive cultural resource sites are not provided for protection of the sites.

Table 5-7 Habitable Structures and Other Land Use Features in the Vicinity of the Proposed Alternative Route 5

Segment Combinations: B-C-H-I-M			
Map Number	**Structure or Feature**	**Approximate Distance from Route Centerline[1] (feet)**	**Nearest Alternative Route Segment**
2	Single-family Residence	256	H
3	Single-family Residence	508	M
13	Other Communication Tower	1,339	M
21	Private Airstrip	7,880	C

[1] Due to the potential horizontal inaccuracies of the aerial photography and data utilized, all habitable structures within 510' have been identified.

Table 5-8 Habitable Structures and Other Land Use Features in the Vicinity of the Proposed Alternative Route 6

Segment Combinations: B-D-E-I-M			
Map Number	**Structure or Feature**	**Approximate Distance from Route Centerline[1] (feet)**	**Nearest Alternative Route Segment**
3	Single-family Residence	508	M
13	Other Communication Tower	1,339	M
21	Private Airstrip	7,999	D

[1] Due to the potential horizontal inaccuracies of the aerial photography and data utilized, all habitable structures within 510' have been identified.

Table 5-9 Habitable Structures and Other Land Use Features in the Vicinity of the Proposed Alternative Route 7

Segment Combinations: B-D-F-M			
Map Number	**Structure or Feature**	**Approximate Distance from Route Centerline[1] (feet)**	**Nearest Alternative Route Segment**
3	Single-family Residence	508	M
13	Other Communication Tower	1,339	M
21	Private Airstrip	7,999	D

[1] Due to the potential horizontal inaccuracies of the aerial photography and data utilized, all habitable structures within 510' have been identified.

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Figure 3-2

Proposed Alternative Routes with Environmental and Land Use Constraints (Topographic Base Map with Constraints)

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Figure 3-2

PROPOSED ALTERNATIVE ROUTES WITH ENVIRONMENTAL AND LAND USE CONSTRAINTS (TOPOGRAPHIC BASE MAP WITH CONSTRAINTS)

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Figure 5-1

Habitable Structures and Other Land Use Features
In the Vicinity of the Proposed Alternative Routes
(Aerial Photograph Base Map with CCN Inventory Items)

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Figure 5-1

HABITABLE STRUCTURES AND OTHER LAND USE FEATURES IN THE VICINITY OF THE PROPOPSED ALTERNATIVE ROUTES (AERIAL PHOTOGRAPH BASE MAP WITH CCN INVENTORY ITEMS)

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