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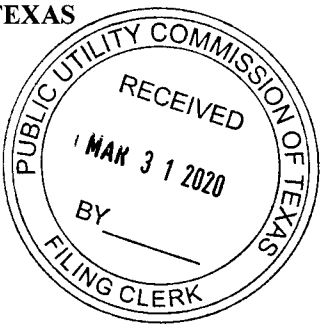
PUC DOCKET NO. 50669

APPLICATION OF SOUTHWESTERN ELECTRIC POWER COMPANY (SWEPCO) TO AMEND ITS CERTIFICATE OF CONVENIENCE AND NECESSITY FOR THE PROPOSED SWEPCO MORTON CUT-IN TO WOOD COUNTY ELECTRIC COOPERATIVE E BURGES CUT-IN 138-KV TRANSMISSION LINE IN VAN ZANDT COUNTY	§	**BEFORE THE** **PUBLIC UTILITY COMMISSION** **OF TEXAS**



APPLICATION

MARCH 31, 2020

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APPLICATION OF SOUTHWESTERN ELECTRIC POWER COMPANY (SWEPCO) TO AMEND ITS CERTIFICATE OF CONVENIENCE AND NECESSITY FOR THE PROPOSED SWEPCO MORTON CUT-IN TO THE WOOD COUNTY ELECTRIC COOPERATIVE E BURGES CUT-IN 138-KV TRANSMISSION LINE IN VAN ZANDT COUNTY

DOCKET NO. 50669

Submit seven (7) copies of the application and all attachments supporting the application: If the application is being filed pursuant to 16 Tex. Admin. Code § 25.101(b)(3)(D) (TAC) or 16 TAC § 25.174, include in the application all direct testimony. The application and other necessary documents shall be submitted to:

Public Utility Commission of Texas
Attn: Filing Clerk
1701 N. Congress Ave.
Austin, Texas 78711-3326

Applicant, Southwestern Electric Power Company (SWEPCO) requests that all parties serve copies of all pleadings, discovery, correspondence, and other documents on the following representative:

Service Contact:

Jerry Huerta
State Bar No. 24004709
AEP Service Corporation
400 W. 15th Street, Suite 1520
Austin, Texas 78701
(512) 481-3323 (Telephone)
(512) 481-4591 (Facsimile)
jnhuerta@aep.com

Attorney for Southwestern Electric Power Company.

1. **Applicant (Utility) Name:** Southwestern Electric Power Company

   Certificate Number: 30151

   Street Address: 400 W. 15th Street, Suite 1520
   Austin, TX 78701

   Mailing Address: 400 W. 15th Street, Suite 1520
   Austin, TX 78701

2. **Please identify all entities that will hold an ownership interest or an investment interest in the proposed project but which are not subject to the Commission's jurisdiction.**

   Not Applicable

3. **Person to Contact:** Randal E. Roper, PE

   Title/Position: Regulatory Case Manager – AEP Texas Inc.

   Phone Number: (512) 481 – 4572

   Mailing Address: 400 W. 15th Street, Suite 1520
   Austin, TX 78701

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   Alternate Contact: Roy R. Bermea

   Title/Position: Regulatory Consultant – AEP Texas Inc.

   Phone Number: (512) 481 – 4575

   Mailing Address: 400 W. 15th Street, Suite 1520
   Austin, TX 78701

   Email Address: rrbermea@aep.com

   Legal Counsel: Jerry Huerta – AEP Service Corporation

   Phone Number: (512) 481 – 3323

   Mailing Address: 400 W. 15th Street, Suite 1520
   Austin, TX 78701

   Email Address: jnhuerta@aep.com

4. Project Description:

Name or Designation of Project:

Application of Southwestern Electric Power Company (SWEPCO) to Amend its Certificate of Convenience and Necessity for the Proposed SWEPCO Morton cut-in to the Wood County Electric Cooperative E Burges cut-in 138-kV Transmission Line in Van Zandt County (Application)

Provide a general description of the project, including the design voltage rating (kV), the operating voltage (kV), the CREZ Zone(s) (if any) where the project is located (all or in part), any substations and/or substation reactive compensation constructed as part of the project, and any series elements such as sectionalizing switching devices, series line compensation, etc. For HVDC transmission lines, the converter stations should be considered to be project components and should be addressed in the project description.

SWEPCO is proposing to construct a new 138-kilovolt (kV) transmission line in Van Zandt County, Texas. The transmission line will begin at one of two points of connection (POC) that start near the existing SWEPCO Morton Substation located southeast of the City of Grand Saline, east of State Highway (SH) 110, and terminates at one of the three potential POC end options along the existing Wood County Electric Cooperative, Inc. (WCEC) 138-kV transmission line located east to southeast of Grand Saline, south of US Highway (US Hwy) 80, and north of the existing WCEC E Burges Substation (Project). Depending on which route is selected in this process, the total length of the proposed Project would be approximately 2.57 to 3.83 miles long.

If the project will be owned by more than one party, briefly explain the ownership arrangements between the parties and provide a description of the portion(s) that will be owned by each party. Provide a description of the responsibilities of each party for implementing the project (design, Right-Of-Way acquisition, material procurement, construction, etc.).

Not applicable. The Project that is the subject of the Application will be owned and operated solely by SWEPCO. WCEC will install the three way switch at the cut-in point into its 138-kV transmission at one of the three potential POC end options. This cost is not included in this CCN Application.

Identify and explain any deviation in transmission project components from the original transmission specifications as previously approved by the Commission or recommended by a PURA § 39.151 organization.

Not applicable. There are no transmission specifications that have been previously approved by the Commission for this Project and there was not a requirement for SPP to provide any specific transmission specifications for the Project.

5. Conductor and Structures:

Conductor Size and Type

The conductor to be used for the Project is 1272 ACSR 54/19 "Pheasant"conductors with one 7#8 Alumoweld shield wire.

Number of conductors per phase

The Project will be constructed with one conductor(s) per phase.

Continuous Summer Static Current Rating (A)

The Continuous Summer Static Current Rating for the Project is 1349 Amps.

Continuous Summer Static Line Capacity at Operating Voltage (MVA)

The Continuous Summer Static Line Capacity at Operating Voltage for the Project is 322 MVA.

Continuous Summer Static Line Capacity at Design Voltage (MVA)

The Continuous Summer Static Line Capacity at Design Voltage for the Project is 322 MVA.

Type and composition of Structures

The Project will be constructed primarily using self-supporting steel single pole structures. Alternative structure types, such as 3-pole structures, may be used due to engineering constraints. Constraints can include, but are not limited to, Federal Aviation Administration height limitations, underground and overhead obstructions, or existing line crossings.

Height of Typical Structures

The typical structure for the Project will be approximately 75 feet to 110 feet in height; however, the height may vary depending on the clearance requirements at a particular location, due to the terrain, span lengths, and overhead obstructions.

Estimated Maximum Height of Structures

The estimated maximum height of structures is 110 feet above ground for this project.

Explain why these structures were selected; include such factors as landowner preference, engineering considerations, and costs comparisons to alternate structures that were considered. Provide dimensional drawings of the typical structures to be used in the project.

The specific area of the Project is currently used for farming and ranching. This is the primary reason that self-supporting tubular steel monopole structures were selected for this Project since they do provide a reduced structure footprint. Landowners overwhelmingly prefer single-pole construction in an area where farming is occurring as well.

The reduced footprint of the monopole structure will ease the ability to access the easement in a manner to reduce the impact to farming and ranching operations for maintenance of the area around the structure, as well as provide the ability for the farmer or rancher to utilize more of the property. Monopole tubular steel structures are also cost competitive for this Project application.

Dimensional drawings of the typical monopole single-circuit structures are included as Figures 1-2 through 1-5 of the *E Burges 138-kV Transmission Line Project Environmental Assessment and Alternative Route Analysis, Van Zandt, Texas* (EA). This document was prepared for SWEPCO by routing consultant, POWER, and is included as Attachment 1 to this Application.

For joint applications, provide and separately identify the above-required information regarding structures for the portion(s) of the project owned by each applicant.

Not applicable. This is not a joint application.

6. Right-of-way:

Miles of Right-of-Way

The number of miles of right-of-way for the proposed Project will be from 2.57 to 3.83 miles, dependent on which route is approved.

Miles of Circuit

The transmission line is a single circuit transmission line so the number of miles of circuit will be from 2.57 to 3.83 miles, dependent on which route is approved.

Width of Right-of-Way

The typical right-of-way for the Project will be 100 feet in width.

Percent of Right-of-Way Acquired

No right-of-way has been acquired at this time.

For joint applications, provide and separately identify the above-required information for each route for the portion(s) of the project owned by each applicant.

Not applicable. This is not a joint application.

Provide a brief description of the area traversed by the transmission line. Include a description of the general land uses in the area and the type of terrain crossed by the line.

The study area is located within a rural setting. The entire area is predominantly improved pasture with woodlands interspersed primarily along creeks. Habitable structures identified within the study area are associated with rural ranches and are considered low intensity development. No developed medium intensity areas or high intensity areas were identified in the study area. The Morton Salt Mine is located in the northwest portion of the study area. The study area is located within the northern Post Oak Savannah region, abutting the Backland Prairie.

Specific discussion regarding natural, human, and cultural resources in the Study Area is presented in Section 2 of the EA (Attachment 1 of this Application).

7. Substations or Switching Stations:

List the name of all existing HVDC converter stations, substations or switching stations that will be associated with the new transmission line. Provide documentation showing that the owner(s) of the existing HVDC converter stations, substations and/or switching stations have agreed to the installation of the required project facilities.

The transmission line project will begin at one of two POC options near the existing SWEPCO Morton Substation located southeast of the City of Grand Saline, east of SH 110, and terminates at one of three potential POC end options along the existing WCEC 138-kV transmission line located east to southeast of Grand Saline, south of US Hwy 80, and north of the existing WCEC E Burges Substation. No direct connection of this transmission line will be made at any existing HVDC converter station, substation, or switching station.

List the name of all new HVDC converter stations, substations or switching stations that will be associated with the new transmission line. Provide documentation showing that the owner(s) of the new HVDC converter stations, substations and/or switching stations have agreed to the installation of the required project facilities.

N/A.

8. Estimated Schedule:

Estimated Dates of:	**Start**	**Completion**
Right-of-way and Land Acquisition	April 2021	April 2022
Engineering and Design	April 2021	April 2022
Material and Equipment Procurement	September 2021	April 2022
Construction of Facilities	May 2022	November 2022
Energize Facilities	----------	November 2022

9. Counties:

For each route, list all counties in which the route is to be constructed.

The Project is located entirely within Van Zandt County.

10. Municipalities:

For each route, list all municipalities in which the route is to be constructed.

The study area for the Project is not located within the incorporated boundaries of a municipality.

For each applicant, attach a copy of the franchise, permit or other evidence of the city's consent held by the utility, if necessary or applicable. If franchise, permit, or other evidence of the city's consent has been previously filed, provide only the docket number of the application in which the consent was filed. Each applicant should provide this information only for the portion(s) of the project which will be owned by the applicant.

Not applicable.

11. Affected Utilities:

Identify any other electric utility served by or connected to facilities in this application.

WCEC is the only electric utility served by and directly connected to this Project. East Texas Electric Cooperative (ETEC) will also indirectly benefit from the Project.

Describe how any other electric utility will be affected and the extent of the other utilities' involvement in the construction of this project. Include any other utilities whose existing facilities will be utilized for the project (vacant circuit positions, ROW, substation sites and/or equipment, etc.) and provide documentation showing that the owner(s) of the existing facilities have agreed to the installation of the required project facilities.

WCEC will be the owner of any one of the three possible POC end points for this Project and has agreed to the connection as demonstrated in the E Burgess Delivery Point Agreement provided as Attachment 2 to this Application. WCEC is one of the owning members of ETEC. ETEC provides transmission and generation related services to its cooperative membership, which consists of 10 electric cooperatives located in east Texas. ETEC signed the E Burgess Delivery Point Agreement on behalf of its owning member cooperative WCEC.

12. Financing:

Describe the method of financing this project. For each applicant that is to be reimbursed for all or a portion of this project, identify the source and amount of the reimbursement (actual amount if known, estimated amount otherwise) and the portion(s) of the project for which the reimbursement will be made.

Funds for this Project will come from short-term borrowings and owner equity.

13. Estimated Costs:

Provide cost estimates for each route of the proposed project using the following table. Provide a breakdown of "Other" costs by major cost category and amount. Provide the information for each route in an attachment to this application.

	Transmission Facilities	**Substation Facilities**
Right-of-way and Land Acquisition		
Engineering and Design (Utility)		

Engineering and Design (Contract)		
Procurement of Material and Equipment (including stores)		
Construction of Facilities (Utility)		
Construction of Facilities (Contract)		
Other (all costs not included in the above categories)		
Estimated Total Cost*		

Tables showing the estimated cost and length of the transmission facilities for this Project are included as Attachment 3 of this Application.

For joint applications, provide and separately identify the above-required information for the portion(s) of the project owned by each applicant.

Not applicable. This is not a joint application.

14. Need for the Proposed Project:

For a standard application, describe the need for the construction and state how the proposed project will address the need. Describe the existing transmission system and conditions addressed by this application. For projects that are planned to accommodate load growth, provide historical load data and load projections for at least five years. For projects to accommodate load growth or to address reliability issues, provide a description of the steady state load flow analysis that justifies the project. For interconnection projects, provide any documentation from a transmission service customer, generator, transmission service provider, or other entity to establish that the proposed facilities are needed. For projects related to a Competitive Renewable Energy Zone, the foregoing requirements are not necessary; the applicant need only provide a specific reference to the pertinent portion(s) of an appropriate commission order specifying that the facilities are needed. For all projects, provide any documentation of the review and recommendation of a PURA § 39.151 organization.

On March 23, 2019, Rayburn Country Electric Cooperative, Inc. (RCEC) received approval from the PUC of Texas, Docket No. 48400, to transfer its customer loads and related electric facilities from the Southwest Power Pool (SPP) power grid to the Electric Reliability Council of Texas (ERCOT) power grid. These two power grids are electrically disconnected such that once RCEC moves its electric facilities to ERCOT they can no longer be connected to SWEPCO's electric facilities in the SPP. As of January 7, 2020, RCEC has moved its transmission facilities to ERCOT. This results in SWECPO now having the SWEPCO Morton Substation being served by a radial transmission line instead of looped transmission service. RCEC's exit from the SPP leaves SWEPCO with customer electrical load in the Grand Saline area being served by a radial transmission line, which will adversely impact the current transmission service reliability and expose customer load to potential extended loss of transmission service for the possible outage of the radial transmission line that results from this exit.

As stated previously in this application, ETEC, on behalf of WCEC, has entered into an agreement with SWEPCO as shown on Attachment 2 to have SWEPCO construct a transmission line that would address this radial transmission service issue. The new transmission line will restore the looped transmission service to SWEPCO's customer load and improve the transmission service for WCEC customers in this area.

15. Alternatives to Project:

For a standard application, describe alternatives to the construction of this project (not routing options). Include an analysis of distribution alternatives, upgrading voltage or bundling of conductors of existing facilities, adding transformers, and for utilities that have not unbundled, distributed generation as

alternatives to the project. Explain how the project overcomes the insufficiencies of the other options that were considered.

There are no practical alternatives to the Project.

16. Schematic or Diagram:

For a standard application, provide a schematic or diagram of the applicant's transmission system in the proximate area of the project. Show the location and voltage of existing transmission lines and substations, and the location of the construction. Locate any taps, ties, meter points, or other facilities involving other utilities on the system schematic.

A schematic of the transmission system in the proximate area of the Project is included with this Application in Attachment 4.

17. Routing Study:

Provide a brief summary of the routing study that includes a description of the process of selecting the study area, identifying routing constraints, selecting potential line segments, and the selection of the routes. Provide a copy of the complete routing study conducted by the utility or consultant. State which route the applicant believes best addresses the requirements of PURA and P.U.C. Substantive Rules.

SWEPCO retained POWER Engineers, Inc. (POWER) to prepare the *E Burges 138-kV Transmission Line Project Environmental Assessment and Alternative Route Analysis, Van Zandt, Texas (EA)*. A copy of the complete EA that was prepared by POWER is included as Attachment 1 of this Application. The EA presents the analysis that was conducted by POWER, and the land use and environmental data for this Project.

The following summary is based on information provided in Chapter 2.0 of the EA.

The objective of this EA/Routing Study was to develop alternative routes that provide geographic diversity in compliance with Section 37.056(c)(4)(A)-(D) of the Texas Utilities Code, 16 TAC § 22.52(a)(4), and 16 TAC § 25.101(b)(3)(B), including the PUC's policy of prudent avoidance. The study methodology utilized by POWER for this EA included the delineation of the study area based on the Project endpoints; identification and characterization of existing land use and environmental constraints; and identification of areas of potential routing opportunity located within the study area. POWER developed preliminary alternative route links taking into consideration potentially affected sensitive resources and input from regulatory agencies and local officials. SWEPCO hosted a public meeting for the Project to solicit comments from affected property owners. Subsequent alternative route link modifications or additions were completed after considering resource sensitivity and public comments. A set of primary alternative route links was developed as a result.

Primary alternative routes were developed from the primary alternative route links that were feasible, geographically diverse and forward progressing. These routes were comparatively analyzed using evaluation criteria to determine potential impacts to existing land use and environmental resources. The route selection process culminated with the ranking of the alternative routes by the POWER routing team from an environmental and land use perspective. SWEPCO will consider POWER's route ranking in addition to engineering and construction constraints, grid reliability and security issues, and estimated construction costs to identify one alternative route that it believes best addresses the requirements of PURA and PUC Substantive Rules. All the viable alternative routes developed will be submitted to the PUC in the CCN application.

POWER recommends Alternative Route 2 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. Alternative Route 2:

- is the shortest route, at 2.57 miles;
- has two habitable structures within 300 feet of the proposed route centerline;

- has the greatest percent parallel to existing compatible ROW, with 93 percent;
- crosses 42.8 feet of mapped NWI wetlands; and
- has the fourth shortest distance across areas of high archeological site potential, at 1.81 miles.

In addition, Alternative Route 2:

- crosses no parks/recreational areas;
- crosses no land irrigated by traveling systems (rolling or pivot type);
- crosses no electric transmission lines;
- crosses no US or state highways;
- crosses no cemeteries;
- has no FAA registered airports with at least one runway more than 3,200 feet in length located within 20,000 feet of the ROW;
- has no FAA registered airports having no runway more than 3,200 feet in length located within 10,000 feet of the ROW centerline;
- has no private airstrips within 10,000 feet of its ROW centerline; and
- has no heliports within 5,000 feet of its ROW centerline.

Therefore, based upon its evaluation of this Project and its experience and expertise in the field of transmission line routing, POWER recommends Alternative Route 2 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 Alternative Route 2 best addresses the applicable criteria in PURA § 37.056(c)(4) and the PUC Substantive Rules.

SWEPCO also did its review of the alternative routes considering which alternative route best balances the PUC routing criteria related to land use, ecology, cultural resource, engineering and construction constraints, grid reliability and security issues, and estimated costs. When considering the same benefits of Alternative Route 2 described above and the additional factors such as engineering and construction constraint, grid reliability and security issues, and estimated cost to construct and maintain, it was SWEPCO's conclusion that Alternative Route 2 was also the best overall alternative route that best addresses the applicable criteria in PURA § 37.056(c)(4) and the PUC Substantive Rules.

18. Public Meeting or Public Open House:

Provide the date and location for each public meeting or public open house that was held in accordance with 16 TAC § 22.52. Provide a summary of each public meeting or public open house including the approximate number of attendants, and a copy of any survey provided to attendants and a summary of the responses received. For each public meeting or public open house provide a description of the method of notice, a copy of any notices, and the number of notices that were mailed and/or published.

A public open house meeting invitation was mailed to landowners who own property located within 300 feet of the preliminary alternative routing link centerlines. A total of 61 invitations were mailed to individuals and entities for the open house meeting. Each landowner also received a map of the study area depicting the preliminary alternative routing links with their invitation letter.

SWEPCO hosted a public open house meeting on November 19, 2019 to receive public input and comments on the preliminary alternative routing links and POC option locations.

A total of 21 individuals attended the public open house meeting, according to the sign-in sheet, with four submitting questionnaires at the meeting. Ten questionnaires were received by mail after the meeting was held. Results from the questionnaires were reviewed and analyzed. Of the respondents that answered the questions, 11 (79%) agreed that the need for the Project was adequately explained. Of those attendees that responded, 86 percent were pleased with the open house format and 93 percent felt that the information provided was helpful to their understanding of the Project. A copy of the notice sent to the landowners for the public meeting and the questionnaire used to gather written input is provided in Attachment 1 to this

Application in Appendix B. Additional description of the public meeting is provided in Attachment in Section 3.3.2. Modifications to the preliminary alternative routing links were based on public input, local, state, and federal agency comment, stake-holder meetings, further communication with WCEC, and data refinement. Following the modifications, a set of geographically diverse primary alternative routes were identified from two western POC start options to three POC end option locations (1, 2, and 3) using the modified preliminary alternative routing links from the public meeting input.

PUC Procedural Rule Tex. Admin. Code § 22.52 (a)(4) related to notice in licensing proceedings, requires a utility to notify the Department of Defense Siting Clearinghouse of any public meeting to be held during the route evaluation process. SWEPCO provided notice to DoD of its intent to file an application with the PUC to amend its Certificates of Convenience and Necessity to construct a 138-kV electric transmission line in Van Zandt County, Texas and a public meeting on November 6, 2019. This notice is included as Attachment 5 to this Application.

19. Routing Maps:

Base maps should be a full scale (one inch = not more than one mile) highway map of the county or counties involved, or other maps of comparable scale denoting sufficient cultural and natural features to permit location of all routes in the field. Provide a map (or maps) showing the study area, routing constraints, and all routes or line segments that were considered prior to the selection of the routes. Identify the routes and any existing facilities to be interconnected or coordinated with the project. Identify any taps, ties, meter points, or other facilities involving other utilities on the routing map. Show all existing transmission facilities located in the study area. Include the locations of radio transmitters and other electronic installations, airstrips, irrigated pasture or cropland, parks and recreational areas, historical and archeological sites (subject to the instructions in Question 27), and any environmentally sensitive areas (subject to the instructions in Question 29).

Routing maps are provided in the EA (Attachment 1 to this Application). Figure 5-1 in the EA is an aerial-photograph based map with a scale of 1 inch = 1,000 feet that shows the Study Area, the routing links, existing transmission lines, other environmental and land use features, and the locations of all known habitable structures or groups of habitable structures located within 300 feet of the proposed routing links centerline.

Provide aerial photographs of the study area displaying the date that the photographs were taken or maps that show (1) the location of each route with each route segment identified, (2) the locations of all major public roads including, as a minimum, all federal and state roadways, (3) the locations of all known habitable structures or groups of habitable structures (see Question 19 below) on properties directly affected by any route, and (4) the boundaries (approximate or estimated according to best available information if required) of all properties directly affected by any route.

An aerial-photograph-based property ownership map with a scale of 1 inch = 1,000 feet is included in this Application as Attachment 6. It shows the approximate boundaries of all properties that are directly affected by the proposed 138-kV transmission line Proposed Routes according to the best information available from county tax appraisal district records. Each property has been assigned a unique "Map ID" number and each habitable structure within 300 feet a unique "Habitable Structure ID" number. This Map ID and Habitable Structure ID number is among the information provided in Attachment 7 that is the cross-reference table discussed below.

For each route, cross-reference each habitable structure (or group of habitable structures) and directly affected property identified on the maps or photographs with a list of corresponding landowner names and addresses and indicate which route segment affects each structure/group or property.

The number of habitable structures that are within 300 feet of the centerlines of the 10 alternative routes ranges from 1 on Route 1 to a high of 7 on Routes 3, 6, and 9. Landowner names, property identification on the map, habitable structure identification, and links effecting the property owner on the map are included in a cross-reference table provided as Attachment 7 of this Application.

20. Permits:

List any and all permits and/or approvals required by other governmental agencies for the construction of the proposed project. Indicate whether each permit has been obtained.

SWEPCO will coordinate with appropriate local, state, and federal agencies with jurisdiction regarding the construction of the transmission facilities associated with this Project. SWEPCO and/or POWER have initiated contact with and provided information about the Project to various agencies. Some input from these agencies has been incorporated in this Application; however, requests for permits and/or approvals will not be submitted to the appropriate agencies until the alignment of the route has been approved by the Commission. None of the following potential permits, approvals, requirements, easements, or clearances have been obtained.

- Based on Federal Aviation Administration (FAA) guidelines, SWEPCO will make a final determination of the need for FAA notification based on the alignment of the approved route, structure locations, and structure designs. The result of the notification, and the subsequent coordination with the FAA could include changes in the design and/or potential requirements to mark and/or illuminate the line.
- Permits or other requirements associated with possible impacts to waters of the U.S. under the jurisdiction of the U.S. Army Corps of Engineers (USACE) will be coordinated with USACE as necessary.
- Permits or other requirements associated with possible impacts to endangered/threatened species will be coordinated with the U.S. Fish and Wildlife Service as necessary.
- Coordination with Texas Parks & Wildlife Department (TPWD) might be necessary to determine the need for any surveys, and to avoid or minimize any potential adverse impacts to sensitive habitats, threatened or endangered species, and other fish and wildlife resources along the approved route.
- A Storm Water Pollution Prevention Plan (SWPPP) might be required by the Texas Commission on Environmental Quality (TCEQ). SWEPCO or its contractor will submit a Notice of Intent to the TCEQ at least 48 hours prior to the beginning of construction; and will have the SWPPP on site at the initiation of clearing and construction activities.
- Permits for crossing state-maintained roads/highways will be obtained from Texas Department of Transportation as necessary.
- Cultural resource clearance will be obtained from the Texas Historical Commission for the proposed Project right-of-way as necessary.
- Coordination with Texas General Land Office (GLO) might be necessary to determine if any streambeds or Permanent School Fund (PSF) land is crossed that would require an easement from GLO.

21. Habitable structures:

For each route list all single-family and multi-family dwellings and related structures, mobile homes, apartment buildings, commercial structures, industrial structures, business structures, churches, hospitals, nursing homes, schools, or other structures normally inhabited by humans or intended to be inhabited by humans on a daily or regular basis within 300 feet of the centerline if the proposed project will be constructed for operation at 230kV or less, or within 500 feet of the centerline if the proposed project will be constructed for operation at greater than 230kV. Provide a general description of each habitable structure and its distance from the centerline of the route. In cities, towns or rural subdivisions, houses can be identified in groups. Provide the number of habitable structures in each group and list the distance from the centerline of the route to the closest and the farthest habitable structure in the group. Locate all listed habitable structures or groups of structures on the routing map.

General descriptions of the habitable structures that are within 300 feet of the centerline of each route and the distances from the centerlines are provided in Section 5 of the EA and in Tables 5-2 through 5-11 of the EA. The habitable structures that are located within 300 feet of the routes are shown on Figure 5-1 (located in Map Pocket in the EA) and on Attachment 6. Details regarding the number of habitable structures that

are within 300 feet of the centerline of the alternative routes are included in Table 4-1 and in Section 4.2.1 of the EA.

The number of habitable structures that are within 300 feet of the centerlines of the 10 alternative routes ranges from 1 on Route 1 to a high of 7 on Routes 3, 6, and 9.

22. Electronic Installations:

For each route, list all commercial AM radio transmitters located within 10,000 feet of the center line of the route, and all FM radio transmitters, microwave relay stations, or other similar electronic installations located within 2,000 of the center line of the route. Provide a general description of each installation and its distance from the center line of the route. Locate all listed installations on a routing map.

As indicated in Table 4-1 of the EA, no AM radio transmitter was determined to be located within 10,000 feet of the Proposed Routes. One other electronic installation was identified within 2,000 feet of the centerline of Proposed Routes 1 through 6.

23. Airstrips:

For each route, list all known private airstrips within 10,000 feet of the center line of the project. List all airports registered with the Federal Aviation Administration (FAA) with at least one runway more than 3,200 feet in length that are located within 20,000 feet of the center line of any route. For each such airport, indicate whether any transmission structures will exceed a 100:1 horizontal slope (one foot in height for each 100 feet in distance) from the closest point of the closest runway. List all listed airports registered with the FAA having no runway more than 3,200 feet in length that are located within 10,000 feet of the center line of any route. For each such airport, indicate whether any transmission structures will exceed a 50:1 horizontal slope from the closest point of the closest runway. List all heliports located within 5,000 feet of the center line of any route. For each such heliport, indicate whether any transmission structures will exceed a 25:1 horizontal slope from the closest point of the closest landing and takeoff area of the heliport. Provide a general description of each listed private airstrip, registered airport, and heliport; and state the distance of each from the center line of each route. Locate and identify all listed airstrips, airports, and heliports on a routing map.

There is no known private airstrip within 10,000 feet of the centerline of the Proposed Routes.

There is no airport registered with the FAA with at least one runway more than 3,200 feet in length located within 20,000 feet of the centerline of the Proposed Routes.

There is no airport registered with the FAA having no runway more than 3,200 feet in length located within 10,000 feet of the centerline of the Proposed Routes.

There is no heliport located within 5,000 feet of the centerline of the Proposed Routes.

24. Irrigation Systems:

For each route identify any pasture or cropland irrigated by traveling irrigation systems (rolling or pivot type) that will be traversed by the route. Provide a description of the irrigated land and state how it will be affected by each route (number and type of structures etc.). Locate any such irrigated pasture or cropland on a routing map.

No pasture or cropland irrigated by traveling irrigation systems (rolling or pivot type) will be traversed by the Proposed Routes.

25. Notice:

Notice is to be provided in accordance with 16 TAC § 22.52.

A. Provide a copy of the written direct notice to owners of directly affected land.
Attach a list of the names and addresses of the owners of directly affected land receiving notice.

A sample copy of the written direct notice and enclosures that were mailed to owners of directly affected land is provided in Attachments 8a through 8f. A list of the names and addresses of these landowners is provided in Attachment 8g.

B. Provide a copy of the written notice to utilities that are located within five miles of the routes.

A sample copy of the written notice to utilities that are located within five miles of the proposed Project is provided in Attachment 9a, less the map and description provided previously as Attachments 8b and 8c. The list of the names and addresses of these utilities is provided in Attachment 9b.

C. Provide a copy of the written notice to county and municipal authorities, and the Department of Defense Siting Clearinghouse. Notice to the DoD Siting Clearinghouse should be provided at the email address found at http://www.acq.osd.mil/dodsc/ .

Sample copy of the written notice to county and municipal authorities is provided as Attachment 10a. The list of the names and addresses of these authorities is provided in Attachment 10b, less the map and description provided previously as Attachments 8b and 8c. A copy of the written notice to the Department of Defense Siting Clearinghouse is provided as Attachment 11, less the map and description provided previously as Attachments 8b and 8c.

D. Provide a copy of the notice that is to be published in newspapers of general circulation in the counties in which the facilities are to be constructed. Attach a list of the newspapers that will publish the notice for this application. After the notice is published, provide the publisher's affidavits and tear sheets.

A sample copy of the notice to be published in the newspaper of general circulation in Cameron County in which the proposed facilities are to be constructed is provided in Attachment 12a. The notice for this Application will be published in the Brownsville Herald, which is the newspaper of general circulation in Cameron County and as listed in Attachment 12b.

For a CREZ application, in addition to the requirements of 16 TAC § 22.52 the applicant shall, not less than twenty-one (21) days before the filing of the application, submit to the Commission staff a "generic" copy of each type of alternative published and written notice for review. Staff's comments, if any, regarding the alternative notices will be provided to the applicant not later than seven days after receipt by Staff of the alternative notices, Applicant may take into consideration any comments made by Commission staff before the notices are published or sent by mail.

Not Applicable. This is not a CREZ application.

In addition to the notices described above, 16 TAC § 22.52 requires SWEPCO to provide notice of this Application to the Office of Public Utility Counsel. A copy of that notice is included in this Application as Attachment 13, less the map and description provided previously as Attachments 8b and 8c.

26. Parks and Recreation Areas:

For each route, list all parks and recreational areas owned by a governmental body or an organized group, club, or church and located within 1,000 feet of the center line of the route. Provide a general description of each area and its distance from the center line. Identify the owner of the park or recreational area (public agency, church, club, etc.). List the sources used to identify the parks and recreational areas. Locate the listed sites on a routing map.

POWER performed a review of federal and state databases, county and local maps to identify parks and/or recreational areas within the Study Area. Reconnaissance surveys were also conducted to identify any additional park or recreational areas that are located within the Study Area.

No national or state parks were identified within the study area (NPS 2019a; TPWD 2019a).

No local parks were identified within the study area (Van Zandt County 2019).

27. Historical and Archeological Sites:

For each route, list all historical and archeological sites known to be within 1,000 feet of the center line of the route. Include a description of each site and its distance from the center line. List the sources (national, state or local commission or societies) used to identify the sites. Locate all historical sites on a routing map. For the protection of the sites, archeological sites need not be shown on maps.

The Texas Historical Commission (THC), working in conjunction with the Texas Archeological Research Laboratory (TARL), maintains records of previously recorded cultural resources as well as records of previous field investigations. On June 11, 2019, 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 was obtained from the Texas Archeological Sites Atlas (TASA) in June 2019. The locations of, and information pertaining to, State Antiquities Landmarks, National Register of Historic Places (NRHP) properties, Historic Texas Cemeteries, and Official Texas Historical Markers (OTHM) within the study area were obtained from the TASA (THC 2019a), and the Texas Historic Sites Atlas (THC 2019b). The TASA, Texas Historic Sites Atlas, and United State Geologic Survey 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. At the national level, the NRHP database (NPS 2019c) and NPS websites for National Historic Landmarks (NPS 2019d), and National Historic Trails (NPS 2019e) were reviewed.

The review of the TASA and TARL data indicates that two previously identified archeological sites and two OTHMs, one a Registered Texas Historic Landmark, have been recorded in the study area. Review of the NRHP database indicated that no NRHP properties are within the study area. No State Antiquities Landmarks, NRHP-listed or determined-eligible bridges, National Historic Trails, or cemeteries are recorded within the study area. Sites 41VN92 and 41VN93 are both prehistoric lithic scatters. Site 41VN92 consists of six chert flakes and 41VN93 consists of a debitage, a biface fragment, and a bone fragment (THC 2019a).

Two OTHMs are located within the study area. One commemorated the town of Jordan's Saline, Texas, which is now Grand Saline. The second is the Morton Salt Company Building marker, a Registered Texas Historic Landmark, and commemorates the importance of salt extracting in the area (THC 2019b).

Table 4-1 of the EA indicates that there are no cultural resource sites crossed by the Proposed Routes. There are two recorded sites within 1000 feet of the centerline for Proposed Routes 1, 2, 3, 4, and 5.

There is no NRHP-listed or determined-eligible site crossed by the Proposed Routes or within 1000 feet of the centerline.

28. Coastal Management Program:

For each route, indicate whether the route is located, either in whole or in part, within the coastal management program boundary as defined in 31 TAC §503.1. If any route is, either in whole or in part, within the coastal management program boundary, indicate whether any part of the route is seaward of the Coastal Facilities Designation Line as defined in 31 TAC § 19.2(a)(21). Using the designations in 31 TAC § 501.3(b), identify the type(s) of Coastal Natural Resource Area(s) impacted by any part of the route and/or facilities.

The proposed Project is not located within the Coastal Management Zone and no permitting action will be required under this program.

29. Environmental Impact:

Provide copies of any and all environmental impact studies and/or assessments of the project. If no formal study was conducted for this project, explain how the routing and construction of this project will impact

the environment. List the sources used to identify the existence or absence of sensitive environmental areas. Locate any environmentally sensitive areas on a routing map. In some instances, the location of the environmentally sensitive areas or the location of protected or endangered species should not be included on maps to ensure preservation of the areas or species. Within seven days after filing the application for the project, provide a copy of each environmental impact study and/or assessment to the Texas Parks and Wildlife Department (TPWD) for its review at the address below. Include with this application a copy of the letter of transmittal with which the studies/assessments were or will be sent to the TPWD.

Wildlife Habitat Assessment Program
Wildlife Division
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744

The EA that was conducted by POWER included with this Application as Attachment 1. Data used by POWER in the evaluation of the proposed routes of the 138-kV transmission line were drawn from a variety of sources, including published literature (documents, reports, maps, aerial photography, etc.), and information from local, state, and federal agencies. An extensive list of resources is provided in Section 7 of the EA. Ground reconnaissance of the study area and computer-based evaluation of digital aerial imagery were utilized for the evaluation of the route of the proposed 138-kV transmission line. Environmentally sensitive areas are shown on Figure 3-3 of the EA.

A copy of the letter of transmittal of the Application, including the EA for this Project, to the TPWD is included in this Application as Attachment 14a. An affidavit verifying that the Application and EA were sent to TPWD is included in this Application as Attachment 14b.

30. Affidavit:

Attach a sworn affidavit from a qualified individual authorized by the applicant to verify and affirm that, to the best of their knowledge, all information provided, statements made, and matters set forth in this application and attachments are true and correct.

The sworn affidavit of Nathan M. Koch, Project Manager – SWEPCO is included with this Application as Attachment 15.

CCN Application - List of Attachments

1	Environmental Assessment and Route Analysis
2	E Burgess Delivery Point Agreement (DPA)
3	Estimated Costs and Lengths of Alternative Routes
4	Diagram of Transmission System in Project Area
5	DoD Notice of Intent to File CCN Application and Public Meeting
6	Property Ownership Map
7	Landowner – Habitable Structure Cross-Reference Table
8a	Notice – Landowner Letter
8b	Notice – Map
8c	Notice – Route Descriptions
8d	Notice – PUC Landowner Brochure
8e	Notice – Protest/Comment Form
8f	Notice – Intervenor Form
8g	Notice – Landowner List
9a	Notice – Utilities Letter *
9b	Notice – Utilities List
10a	Notice – County and Municipal Officials Letter *
10b	Notice – County and Municipal Officials List
11	Notice – Department of Defense (DoD) Siting Clearinghouse*
12a	Notice – Newspaper Publication
12b	Notice – Newspaper Publication List
13	Notice – Office of Public Utility Counsel *
14a	Letter of Transmittal of Application to the Texas Parks and Wildlife Department
14b	Affidavit Verifying Transmittal of Application to the Texas Parks and Wildlife Department
15	Application Affidavit of SWEPCO Project Manager

* Excluding Maps and Route Descriptions provided in Attachment 8

March 2020

SOUTHWESTERN ELECTRIC POWER COMPANY

E Burges 138-kV Transmission Line Project

Environmental Assessment and Alternative Route Analysis

Van Zandt County, Texas

PROJECT NUMBER:
158522

PROJECT CONTACT:
Anastacia Santos
EMAIL:
anastacia santos@powereng com
PHONE:
(512) 735-1868

POWER ENGINEERS

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E Burges 138-kV Transmission Line Project

Environmental Assessment and Alternative Route Analysis

PREPARED FOR: *SOUTHWESTERN ELECTRIC POWER COMPANY*

PREPARED BY: *ANASTACIA SANTOS*
(512) 735-1868
ANASTACIA.SANTOS@POWERENG.COM

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TABLE OF CONTENTS

FIGURES:

TABLES:

APPENDICES:

ACRONYMS AND ABBREVIATIONS

AM radio	amplitude modulation radio
ANSI	American Nationals Standards Institute
BMP	best management practice
BP	before present
CCN	Certificate of Convenience and Necessity
CFR	Code of Federal Regulations
CR	county road
CWA	Clean Water Act
DoD	Department of Defense
EA	Environmental Assessment and Alternative Route Analysis
ERCOT	Electric Reliability Council of Texas
ESA	Endangered Species Act
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 System
GLO	Texas General Land Office
HPA	high probability areas
IPaC	Information for Planning and Consultation
ISD	Independent School District
kV	kilovolt
MBTA	Migratory Bird Treaty Act
NAIP	National Agriculture Imagery Program
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
NWP	Nationwide Permit
OTHM	Official Texas Historical Marker
PCN	Pre-construction Notification
PEM	palustrine emergent
PFO	palustrine forested
POC	point of connection
POWER	POWER Engineers, Inc.
Project	E Burges 138-kV Transmission Line Project

PUC	Public Utility Commission of Texas
PURA	Public Utility Regulatory Act
ROW	right-of-way
RRC	Railroad Commission of Texas
SH	state highway
SPP	Southwest Power Pool
SWEPCO	Southwestern Electric Power Company
SWPPP	Stormwater Pollution Prevention Plan
TAC	Texas Administrative Code
TARL	Texas Archeological Research Laboratory
TASA	Texas Archeological Sites Atlas
TCEQ	Texas Commission on Environmental Quality
THC	Texas Historical Commission
TPWD	Texas Parks and Wildlife Department
TxDOT	Texas Department of Transportation
TXNDD	Texas Natural Diversity Database
TXR150000	Texas Pollution Discharge Elimination System General Construction Permit
TxSDC	Texas State Data Center
TWDB	Texas Water Development Board
US	United States
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
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
WCEC	Wood County Electric Cooperative, Inc.

1.0 DESCRIPTION OF THE PROPOSED PROJECT

1.1 Scope of the Project

Southwestern Electric Power Company (SWEPCO) is proposing to construct the new E Burges 138-kilovolt (kV) Transmission Line Project (Project) in Van Zandt County, Texas (Figure 1-1). The transmission line Project will begin at one of two potential point of connection (POC) options starting on the western side of the project near the existing SWEPCO Morton Substation located southeast of the City of Grand Saline, east of State Highway (SH) 110, and terminates at one of four potential POC end options along the existing Wood County Electric Cooperative, Inc. (WCEC) 138-kV transmission line located east to southeast of Grand Saline and south of US Highway (US Hwy) 80. The termination into the existing SWEPCO Morton Substation will include the use of the existing SWEPCO transmission line assets for all routing options considered. The existing SWEPCO transmission lines are not included in this Environmental Assessment and Alternative Route Analysis (EA) since they will not be part of the route that SWEPCO will be submitting for Public Utility Commission of Texas (PUC) approval. These are existing SWEPCO certificated transmission assets and will not be rebuilt but will connect the POC Start Options into the SWEPCO Morton Substation. Depending on which route is selected in this process, the total length of the proposed Project would be approximately two to four miles long.

SWEPCO contracted with POWER Engineers, Inc. (POWER) to prepare this EA. This EA will support SWEPCO's application to amend its Certificate of Convenience and Necessity (CCN) to be submitted to the PUC. This EA may also be used to support any additional federal, state, or local permitting activities that might be required prior to construction of the proposed Project.

This EA discusses the environmental and land use constraints identified within the Project study area, documents routing methodologies and public involvement and provides an evaluation of alternative routes from an environmental and land-use perspective. The EA also provides the basis for SWEPCO to identify an alternative route that best addresses the requirements under the Public Utility Regulatory Act (PURA) and 16 Tex. Admin. Code (TAC) § 25.101.

To assist POWER in its evaluation of the proposed Project, SWEPCO provided POWER with the Project endpoints and information regarding the need for the Project, proposed construction practices, transmission line design, clearing methods, right-of-way (ROW) requirements and maintenance procedures for the proposed Project.

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Figure 1-1 Project Vicinity

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1.2 Purpose and Need

On March 23, 2019, Rayburn County Electric Cooperative received approval from the PUC of Texas, Docket No. 48400, to transfer its customer loads and related electric facilities from the Southwest Power Pool (SPP) power grid to the Electric Reliability Council of Texas (ERCOT) power grid. These two power grids are electrically disconnected such that once Rayburn County Electric Cooperative moves its electric facilities to ERCOT they can no longer be connected to SWEPCO's electric facilities in the SPP. The exit of Rayburn County Electric Cooperative from the SPP will leave SWEPCO with customer electrical load in the Grand Saline area being served by a radial transmission line, which will adversely impact the current transmission service reliability and expose customer load to potential extended loss of transmission service during a possible outage of the radial transmission line that results from this exit.

1.3 Description of the Proposed Design and Construction

1.3.1 Loading, Weather Data, and Design Criteria

SWEPCO's proposed 138-kV transmission line is located in the American National Standards Institute's (ANSI) National Electrical Safety Code (NESC) Heavy Loading Zone and will be designed to meet or exceed NESC 2017 loading criteria (ANSI C2-2017). Depending on the type of structure used, various combinations of unbalanced vertical, transverse (wind), and longitudinal loadings (with and without ice) will be analyzed as to the effects on the structures. The typical structure for this Project will consist of a steel single-pole structure design and will vary between 75 to 110 feet in height, depending on clearance requirements. The new 138-kV transmission line will utilize 1272 ACSR 54/19 "Pheasant" conductors with one 7#8 Alumoweld shield wire.

1.3.2 Structural and Geotechnical

All structure components, conductors, and overhead ground wires will be designed using the appropriate overload capacity factors, strength reduction factors, and tension limits as given in NESC 2017 and the manufacturer's recommended strength ratings for hardware. In conjunction with NESC 2017, SWEPCO's transmission line engineering standards will be used. The NESC Heavy-Loading Zone design criteria, and extreme wind and ice loading conditions will be utilized to determine tension sags for all wires.

All structures will be designed to support conductors and shield wires as specified above. The configuration of the conductor and shield wires will provide maximum lightning protection and the appropriate clearances for operation of a 138-kV transmission line. The geometry of a typical monopole single-circuit tangent structure and turning structure configurations are shown respectively on Figures 1-2 through 1-6. Geotechnical considerations will include soil borings and in-situ soils testing to provide the parameters for foundation design and/or the embedment depth required for new structures.

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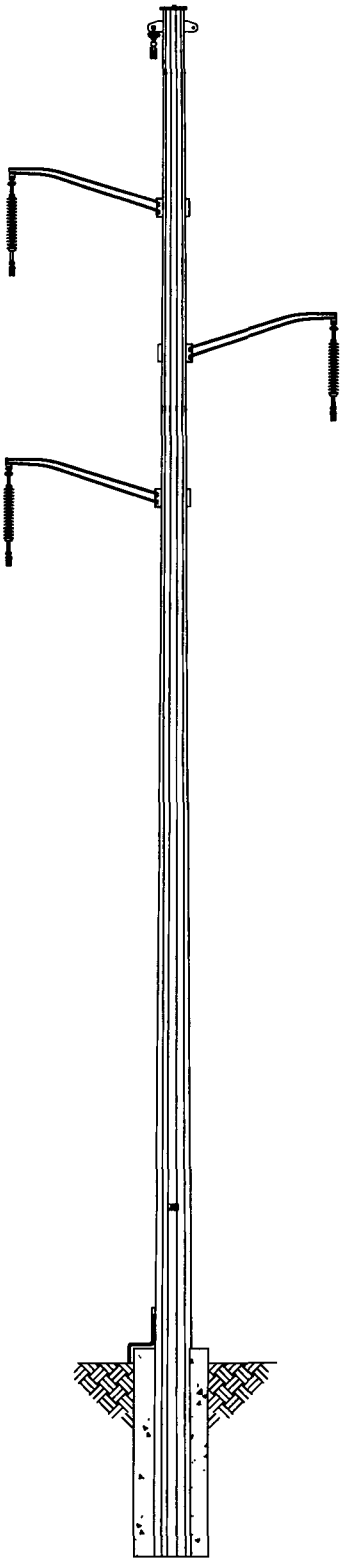

E BURGES 138-kV
TRANSMISSION LINE PROJECT

Figure 1-2
138-kV Steel Tangent Structure
Alternating Davit Arms
Direct Embed

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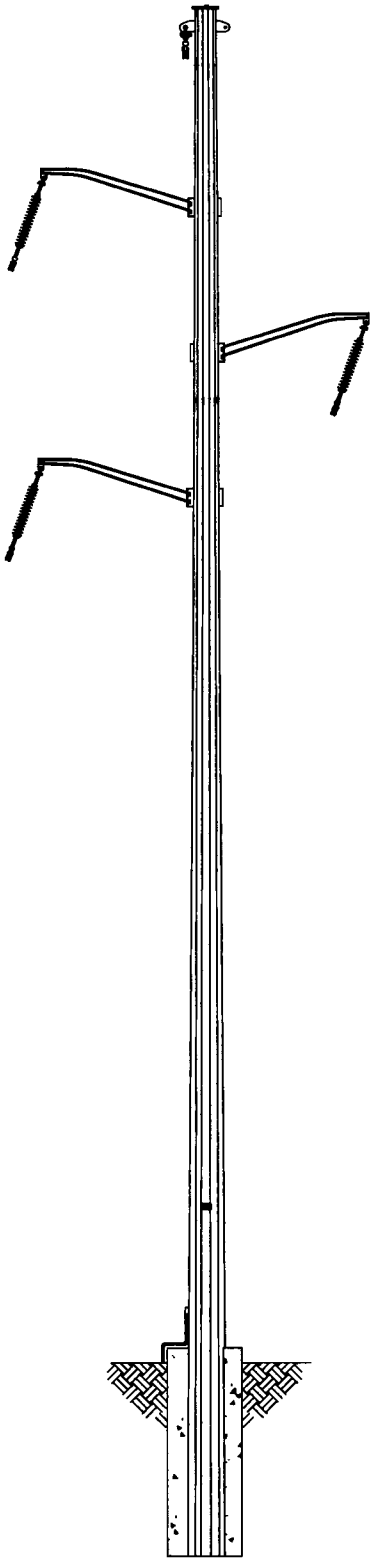

E BURGES 138-kV
TRANSMISSION LINE PROJECT

Figure 1-3
138kV Steel Running Angle Structure
Light Angle with Davit Arms
Direct Embed

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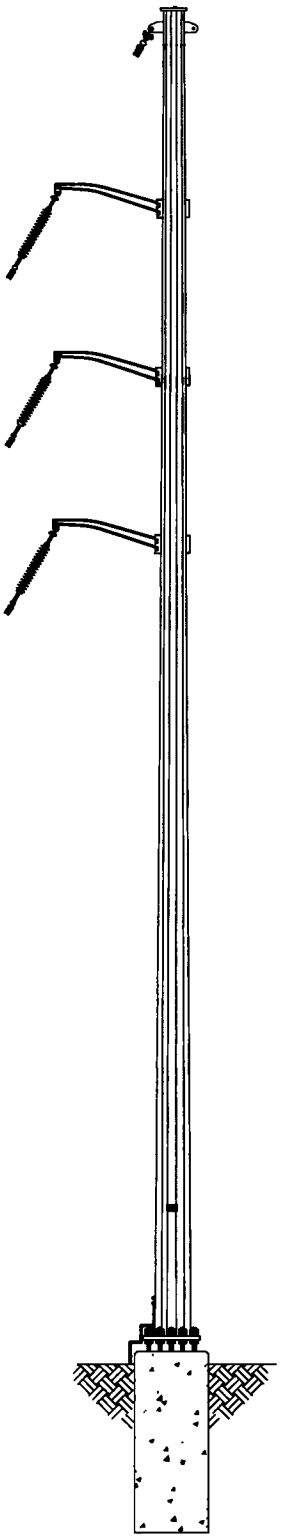

E BURGES 138-kV
TRANSMISSION LINE PROJECT

Figure 1-4
138kV Steel Running Angle Structure
Medium Angle with Davit Arms
Anchor Bolt

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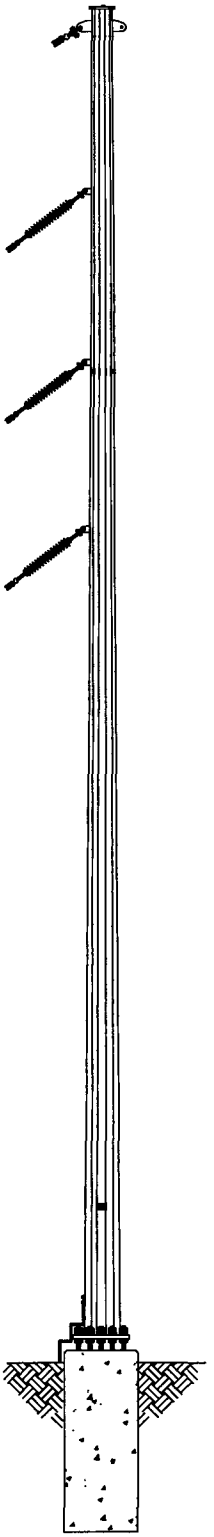

E BURGES 138-kV
TRANSMISSION LINE PROJECT

Figure 1-5
138kV Steel Running Angle Structure
Heavy Angle
Anchor Bolt

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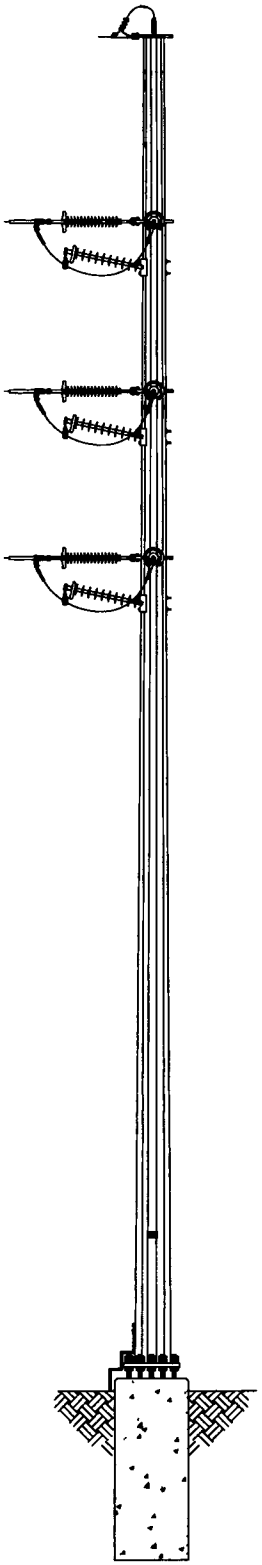

E BURGES 138-kV
TRANSMISSION LINE PROJECT

Figure 1-6
138kV Steel Dead-end Structure with Jumper Post Anchor Bolt

SOUTHWESTERN ELECTRIC POWER COMPANY

POWER ENGINEERS

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1.4 Construction Considerations

Projects of this type require surveying and ROW clearing, foundation installation, structure assembly and erection, conductor and shield wire installation, and Project cleanup and restoration. The following information regarding these activities was provided to POWER by SWEPCO.

1.4.1 Clearing

Required clearing of the ROW will be performed by a contractor under the direction of SWEPCO. Available methods of disposal include but are not limited to mulching, brush piling, and salvaging. Woody vegetation within the ROW will be cleared to allow safe construction, operation and maintenance of the line. Tree stumps will be cut to ground level and left in place. The cleared ROW will be utilized for access during construction operations and additional ingress and egress may be required across private property to access the ROW. In these circumstances, existing private roads will be used where possible with the preference and permission of affected property owners. Temporary culverts might be installed to cross small streams and creeks where necessary. Larger creeks crossings are typically not crossed with equipment and spanned by the transmission line having structures located on both side of the creek crossing. Clearing will be accomplished to comply with North American Electric Reliability Corporation (NERC) reliability standards.

Clearing plans, methods, and practices are extremely important for success in any program designed to minimize the impacts of electric transmission lines on the natural environment. The following considerations, thoughtfully implemented and applied to this Project, will help meet this goal:

- Clearing will be performed in a manner that will maximize the preservation of natural beauty and conserve natural resources while minimizing disturbances to the landscape.
- Clearing will be performed in a manner that will minimize impacts to waters in the area of the activity.
- The time and method of clearing ROW will consider soil stability, the protection of natural vegetation and sensitive habitats, the protection of adjacent resources such as natural habitat for plants and wildlife, and the prevention of silt deposition in watercourses.
- SWEPCO will use the most efficient and effective method to remove undesirable vegetation species. Hydro axes and flail mowers might be used in clearing operations where such use will preserve the cover crop of grass and similar vegetation. If deemed appropriate, United States Environmental Protection Agency (USEPA)-approved herbicides will be applied and handled in accordance with the manufacturers' published recommendations and specifications, and as directed by appropriate qualified staff.

1.4.2 Construction

After regulatory approval and engineering design of the transmission line is finalized, ROW is obtained, surveyed and then cleared of woody vegetation according to SWEPCO ROW clearing specifications. Pole locations are surveyed and marked for construction. Steel pole sections and associated line construction hardware are transported to the site, usually to each structure location. Structures can be either direct embedded or installed on concrete anchor bolt foundations, depending on the soil condition and associated line angles at that specific location. Once the structures have been erected, the conductor is pulled through stringing blocks or pulleys, which are attached to the insulators on the structures. This process is repeated for all three conductor assemblies and static wire assembly. Once all the conductors have been pulled through, the wire is then tensioned based on wire sag data. The wire is then permanently "clipped" into conductor clamps located at the attachment end of the insulator.

Construction operations will be conducted with attention to the preservation of natural beauty and the conservation of natural resources. The following criteria will be used to attain this goal. These criteria are subject to adjustment according to the rules and judgments of any public agencies whose lands might be crossed by the proposed line or that may have regulatory authority over the construction activities.

- Clearing and grading of construction areas such as storage areas, setup sites, etc., will be minimal. These areas will be graded in a manner that will minimize erosion and conform to the natural topography.
- Soil that has been excavated during construction and not used will be evenly backfilled onto a cleared area or removed from the site. The backfilled soil will be sloped gradually to conform to the terrain and then seeded.
- Erosion control devices will be constructed where necessary to reduce soil erosion in the ROW.
- Construction crews will take care to minimize damage to the ROW by minimizing the number of pathways traveled.
- Equipment will not traverse unstable slopes.
- Clearing and construction activities near streambeds will be performed in a manner to minimize impacts to the existing condition of the area. Stream banks will be restored as necessary to minimize erosion.
- Efforts will be made to prevent, and remediate, accidental chemical spills and other types of pollution, particularly while performing work near streams, lakes, and reservoirs.
- Precautions will be taken to prevent the possibility of accidentally starting wildfires.
- Precautions will be taken to protect sensitive features and cultural resources identified within the ROW.
- If endangered species habitat is present, recommendations or permits from the United States Fish and Wildlife Service (USFWS) will be obtained prior to all clearing and construction activities.
- Soil disturbance during construction will be kept to a minimum, and restorative measures will be taken in a reasonable length of time.
- Compliance with any applicable permit or regulatory approval.

1.4.3 Cleanup

The cleanup operation involves the leveling of all disturbed areas to existing contours, the removal of all construction debris, and ROW restoration.

The following criteria provide for the cleanup of construction debris and ROW restoration. Restoration activities will be coordinated with property owners when necessary.

- If site factors make it unusually difficult to establish a protective vegetative cover, other restoration procedures will be used, such as the use of gravel or rocks.
- Sears, cuts, fill, or other aesthetically degraded areas will be reseeded with native grass species, in consultation with property owner, to stabilize the ROW, restore a natural appearance and to provide food and cover for wildlife.
- If temporary roads are removed, the original contours will be restored.
- Construction equipment and supplies will be removed from the ROW after construction is complete.

- Clearing down to the mineral soil might be required for temporary access road development. In this case, water diversion berms, velocity dissipaters, or other erosion-control devices will be used to reduce erosion potential.
- Construction waste will be removed prior to completion of the Project.
- Replacement of soil adjacent to water crossing for access roads will be at slopes less than the normal angle of repose for the soil type involved and will be stabilized/ revegetated to avoid erosion.
- Compliance with any applicable permit or regulatory approval.

1.5 Maintenance Considerations

The following information regarding maintenance of the facilities was provided to POWER by SWEPCO. Maintenance of the facilities will include periodic inspection of the line and repair of damaged structures due to equipment failures, accidents, or natural phenomena, such as wind or lightning. In areas where treatment of vegetation within the ROW is required, mowing, pruning, or application of USEPA-approved herbicides will be conducted as required. While maintenance patrols will vary, aerial, vehicle, and foot patrols will be performed periodically. In cropland areas and properly managed grazing lands, little or no vegetation control will be required due to existing land-use practices. The major maintenance item will be the trimming of trees that pose a potential danger to the conductors or structures. Trimming will provide a safe and reliable power line.

The maintenance of SWEPCO's transmission ROW occurs through the implementation of a comprehensive, systematic, integrated vegetation management program designed to ensure that the vegetation along each transmission line is managed at the proper time and in the most cost effective and environmentally sound manner. Vegetation is managed on a prescriptive basis. Ongoing evaluation of the system through ground and aerial inspections provides the basic information used by SWEPCO to develop an annual plan. Circuit criticality, historical data, line voltage, location, vegetative inventory information, and land use are among the factors considered in developing the annual vegetation management plan. The plans are modified as required by vegetation patrols and changed conditions.

1.6 Agency Actions

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

1.6.1 Public Utility Commission of Texas

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

- 16 TAC § 25.101(b)(3)(B)
- 16 TAC § 22.52(a)(4)
- Policy of prudent avoidance
- CCN application requirements

This EA has been prepared by POWER in support of SWEPCO's CCN application for the Project to be filed at the PUC for its consideration.

1.6.2 United States Army Corps of Engineers

The United States Army Corps of Engineers (USACE) is directed by Congress under Section 10 of the Rivers and Harbors Act (33 United States Code [U.S.C.] § 403) and Section 404 of the Clean Water Act (CWA) (33 U.S.C. § 1344) to implement these statues. Under Section 10 of the Rivers and Harbors Act, the USACE regulates all work or structures in or affecting the course, condition or capacity of navigable waters of the United States (US). 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 dredged and fill material into all "Waters of the US," including associated wetlands. The intent of this law is to protect the waters of the US and aquatic ecosystems from the indiscriminate discharge of material capable of causing pollution and to restore and maintain their chemical, physical, and biological integrity. The proposed Project is located within the jurisdiction of the USACE – Fort Worth District.

Review of the USACE - Ft. Worth District listed Section 10 Waters (USACE 2020) does not indicate any located within the Project study area; therefore, a Section Permit is not anticipated for this Project.

USFWS National Wetlands Inventory (NWI) (USFWS 2019a) mapped wetlands information was incorporated for the study area. 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). Delineation of waters of the US and associated wetlands may be required for the approved route to determine if additional permitting and/or mitigation will be required under Section 404. The construction of the Project will likely meet the criteria of Nationwide Permit (NWP) No. 12 - Utility Line Activities, which applies to activities associated with any cable, line, or wire for the transmission of electrical energy. If the proposed impacts of the Project exceed the criteria established under General Conditions 4 and 13 or other regional conditions listed under the NWP 12, then a Pre-Construction Notification (PCN) may be required. If the proposed impacts exceed the NWP 12 acreage restrictions, an Individual Permit under Section 404 may be required.

1.6.3 United States Fish and Wildlife Service

The USFWS is charged with the responsibility for enforcement of federal wildlife laws and providing comments on proposed construction projects with a federal nexus under the National Environmental Policy Act and within the framework of several federal laws including the Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), and Bald and Golden Eagle Protection Act. POWER reviewed the USFWS Information for Planning and Consultation (IPaC) (Consultation Code: 02ETAR00-2019-SLI-1560) website for federally protected species and designated critical habitats within the study area.

Upon PUC approval of a route and prior to construction, surveys will be completed as necessary to identify any potential suitable habitat for federally-listed species. If suitable habitat is identified, then consultation with the USFWS – Arlington Ecological Services Field Office might be completed to determine the need for any required species-specific surveys and/or permitting under Section 10 of the ESA.

1.6.4 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, or 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.

1.6.5 United States Department of Defense Siting Clearing House

The 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. Review of 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. On June 27, 2019, the DoD was contacted about the proposed Project to provide notification and to solicit any input from the DoD about the proposed Project. In addition, on November 6, 2019 and in accordance with 16 TAC § 22.52 (a)(4), public meeting notice was mailed to the DoD Siting Clearinghouse for the public meeting that was held for the proposed Project on November 19, 2019. A notice of the filing of the CCN application will be sent to the DoD Siting Clearinghouse when the CCN amendment application is filed with the PUC.

1.6.6 Texas Parks and Wildlife Department

The Texas Parks and Wildlife Department (TPWD) is the state agency with the primary responsibility for protecting the state's fish and wildlife resources in accordance with the Texas Parks and Wildlife Code Sections 12.0011(b), 64.003, 68.015 and 1.011. POWER solicited comment from TPWD during the Project scoping phase and a copy of this EA will be submitted to TPWD when the CCN amendment 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, SWEPCO will complete a field review as determined necessary 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.

1.6.7 Floodplain Management

Floodplain maps published by the Federal Emergency Management Agency (FEMA) were reviewed for the study area (FEMA 2019) and the mapped 100-year floodplains were identified. The mapped 100-year floodplains are associated with the larger creeks and streams 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. The 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 local floodplain administrator will be completed as determined necessary, after the PUC route approval to determine if any permits are necessary.

1.6.8 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 will require a Texas Pollution Discharge Elimination System 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.

1.6.9 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). The Texas Historical Commission (THC) was contacted by POWER to identify known cultural resource sites within the study area boundary. POWER also reviewed Texas Archeological Research Laboratory (TARL) records for known locations of cultural resource sites. Once a route is approved by the PUC, depending on a state or federal nexus, additional coordination with the THC might be required to determine the need for archeological surveys or additional permitting requirements. SWEPCO proposes to implement an unanticipated discovery procedure during construction activities. If artifacts are discovered during construction, activities will cease and SWEPCO will notify the State Historic Preservation Office for additional consultation.

1.6.10 Texas Department of Transportation

The Texas Department of Transportation (TxDOT) has been notified of the proposed Project. If the approved route crosses or occupies TxDOT ROW, it will be constructed in accordance with the rules,

regulations, and policies of TxDOT. Best management practices (BMPs) will be used as required to minimize erosion and sedimentation resulting from construction. Revegetation will occur as required under the "Revegetation Special Provisions" and contained in TxDOT Form 1023 (Rev. 9-93). Traffic control measures will comply with applicable portions of the Texas Manual of Uniform Traffic Control Devices.

1.6.11 Texas General Land Office

The Texas General Land Office (GLO) requires a miscellaneous easement for ROWs within any state-owned riverbeds or navigable streams or tidally influenced waters. Coordination with the GLO will be completed after PUC approval of a route.

The Texas Land Commissioner administers the Texas Coastal Management Program under the GLO, which has the responsibility for implementing the Texas Coastal Management Program. This program intends to help ensure the environmental and economic well-being of the Texas coast through proper management of coastal natural resource areas. The Texas Coastal Management Program has federal and state project and permit action review processes to evaluate consistency with the program. The proposed Project is not located within the Coastal Management Zone and no permitting action will be required under this program.

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2.0 DESCRIPTION OF THE STUDY AREA

2.1 Routing Study Methodology

The objective of this EA/Routing Study was to develop alternative routes that provide geographic diversity in compliance with Section 37.056(c)(4)(A)-(D) of the Texas Utilities Code, 16 TAC § 22.52 (a)(4), and 16 TAC § 25.101(b)(3)(B), including the PUC's policy of prudent avoidance. The study methodology utilized by POWER for this EA included the delineation of the study area based on the Project endpoints; identification and characterization of existing land use and environmental constraints; and identification of areas of potential routing opportunity located within the study area. POWER developed preliminary alternative route links taking into consideration potentially affected sensitive resources and input from regulatory agencies and local officials. SWEPCO hosted a public meeting for the Project to solicit comments from affected property owners. Subsequent alternative route link modifications or additions were completed after considering resource sensitivity and public comments. A set of primary alternative route links was developed as a result.

Primary alternative routes were developed from the primary alternative routing links that were feasible, geographically diverse and forward progressing. These routes were comparatively analyzed using evaluation criteria to determine potential impacts to existing land use and environmental resources. The route selection process culminated with the ranking of the alternative routes by the POWER routing team from an environmental and land use perspective. SWEPCO will consider POWER's route ranking in addition to engineering and construction constraints, grid reliability and security issues, and estimated construction costs to identify one alternative route that it believes best addresses the requirements of PURA and PUC Substantive Rules. All the viable alternative routes developed will be submitted to the PUC in the CCN application.

2.1.1 Study Area Boundary Delineation

The study area established the boundaries for the data collection process and was defined to include feasible geographically diverse alternative routes between the POC Start Options near the existing SWEPCO Morton Substation site and the four potential POC End Options (1, 2, 3, and 4). Major physiographic features, jurisdictional boundaries, sensitive land uses, and existing utility corridors helped to define the study area boundaries. The extent of the Project endpoints and the study area are described below and illustrated in Figure 2-1.

The study area is oriented in a west to east direction with the existing SWEPCO Morton Substation defining the western portion of the study area. There are two western POC Start Options (A and B). POC Start-Option A connects to the south circuit of the existing SWEPCO transmission line continues into the SWEPCO Morton Substation. POC Start-Option B connects to the existing SWEPCO transmission line structure # 129. Rayburn County Electric Cooperative will no longer have their existing line in service past POC Start-Option B to the southwest. The eastern POC consists of four potential POC End Options (1, 2, 3, and 4) located along the existing WCEC 138-kV transmission line located in the eastern portion of the study area.

More specifically, the SWEPCO Morton Substation site is located south of the City of Grand Saline, east of SH 110. On the western end of the Project the POC Start-Option A is located approximately 0.60 mile southeast of the intersection of SH 110 and County Road (CR) 1606. The POC Start-Option B is located approximately 0.60 mile southeast of the intersection of SH 110 and CR 1602. On the eastern side of the Project the POC End-Option 1 is located south of CR 1701 approximately 1.90 miles east of the intersection of Farm to Market Road (FM) 857 and CR 1701. POC End-Option 2 is located south of CR 1703 approximately 1.60 miles southeast of the intersection of FM 857 and CR

1703. POC End-Option 3 is located approximately 0.4 mile northeast of the intersection of FM 857 and CR 1705. POC End-Option 4 is located east of CR 1605 and approximately 0.4 mile northeast of the intersection of FM 1255 and CR 1605.

The northern and southern study area boundaries are defined to provide adequate opportunities for the development of a set of geographically diverse routing alternatives east to west. The western boundary of the study area is defined by the existing SWEPCO Morton Substation site. The eastern boundary of the study area was defined by the existing WCEC 138-kV Transmission Line.

Figure 2-1 Project Study Area

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2.1.2 Base Map Development

After the delineation of the study area, a Project base map, overlain on United States Geological Survey (USGS) 7.5-minute topographic maps and aerial photography (National Agriculture Imagery Program [NAIP] 2018), was prepared and used to initially display resource data for the Project area. Resource data categories and factors that were determined appropriate for interpretation and analysis were selected and mapped. The base map provides a broad overview of various resource locations indicating obvious routing constraints and areas of potential routing opportunities.

Data typically displayed on the base map includes:

- Major land jurisdictions and uses.
- Major roads (including county roads, FM, US Hwys, SHs, and Interstate Highways).
- Existing transmission line and pipeline corridors.
- Parks and wildlife management areas.
- Major political subdivision boundaries.
- Lakes, reservoirs, rivers, and ponds.

2.1.3 Evaluation Criteria

Land use and environmental evaluation criteria were developed to reflect accepted practices for routing electric transmission lines in the state of Texas (Table 2-1). Emphasis was placed on acquiring information identified in Section 37.056(c)(4)(A)-(D) of the Texas Utilities Code, 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 public input. The alternative route development process was conducted with consideration and incorporation of the evaluation criteria.

TABLE 2-1 LAND USE AND ENVIRONMENTAL EVALUATION CRITERIA

EVALUATION CRITERIA
Land Use
Length of alternative route
Number of habitable structures[1] within 300 feet of the right-of-way (ROW) centerline
Length of ROW using existing transmission line ROW
Length of ROW parallel and adjacent to existing transmission line ROW
Length of ROW parallel to other existing ROW (roadways, railways, canals, etc.)
Length of ROW parallel and adjacent to apparent property lines[2]
Sum of evaluation criteria 4, 5, and 6
Percent of evaluation criteria 4, 5, and 6
Length of ROW across parks/recreational areas[3]
Number of additional parks/recreational areas[3] within 1,000 feet of the ROW centerline
Length of ROW across cropland
Length of ROW across pasture/rangeland
Length of ROW across land irrigated by traveling systems (rolling or pivot type)
Length of ROW parallel to existing pipeline ROW <500 feet from ROW centerline
Number of transmission pipeline crossings
Number of electric transmission line crossings
Number of United States (US) and state highway crossings
Number of farm-to-market road crossings
Number of Federal Aviation Administration (FAA) registered airports[4] with at least one runway more than 3,200 feet in length located within 20,000 feet of ROW centerline
Number of FAA registered airports[4] having no runway more than 3,200 feet in length located within 10,000 feet of ROW centerline
Number of private airstrips within 10,000 feet of the ROW centerline
Number of heliports within 5,000 feet of the ROW centerline
Number of commercial amplitude modulation radio (AM radio) transmitters within 10,000 feet of the ROW centerline
Number of frequency modulation radio (FM radio) transmitters, microwave towers, and other electronic installations within 2,000 feet of ROW centerline
Aesthetics
Estimated length of ROW within foreground visual zone[5] of US and state highways
Estimated length of ROW within foreground visual zone[5] of FM roads
Estimated length of ROW within foreground visual zone[5][6] of parks/recreational areas[3]
Ecology
Length of ROW across upland forest
Length of ROW across bottomland/riparian forest (feet)
Length of ROW across National Wetland Inventory mapped wetlands (feet)
Length of ROW across known habitat of federally-listed endangered or threatened species
Length of ROW across open water (lakes, ponds, etc.) (feet)
Number of stream crossings
Number of river crossings
Length of ROW parallel (within 100 feet) to streams
Length of ROW across 100-year floodplains

TABLE 2-1 LAND USE AND ENVIRONMENTAL EVALUATION CRITERIA

EVALUATION CRITERIA
Cultural Resources
Number of cemeteries within 1,000 feet of the ROW centerline
Number of recorded cultural resource sites crossed by ROW
Number of additional recorded cultural resources sites within 1,000 feet of ROW centerline
Number of National Register of Historic Places listed properties crossed by ROW
Number of additional National Register of Historic Places listed properties within 1,000 feet of ROW centerline
Length of ROW across areas of high archeological site potential

Notes:

[1]Single-family and multi-family dwellings, and related structures, mobile homes, apartment buildings, commercial structures, industrial structures, business structures, churches, hospitals, nursing homes, schools, or other structures normally inhabited by humans or intended to be inhabited by humans on a daily or regular basis within 300 feet of the centerline of a transmission project of less than 230 kV.

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

[3]Defined as parks and recreational areas owned by a governmental body or an organized group, club, or church within 1,000 feet of the centerline of the Project.

[4]As listed in the Chart Supplement South Central US (FAA 2019a; formerly known as the Airport/Facility Directory South Central US).

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

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

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

2.1.4 Data Collection and Constraints Mapping

Several methodologies were utilized to collect and review environmental and land use data, including incorporation of readily available Geographic Information System (GIS) coverage with associated metadata; review of maps and published literature; review of files and records from numerous federal, state, and local regulatory agencies; meetings with stakeholders; and reconnaissance surveys of the study area. Data collected for each resource area was mapped within the study area utilizing GIS layers.

Maps and data layers reviewed include USGS 7.5-minute topographic maps (USGS 2019b), NWI maps (USFWS 2019a), FEMA floodplain data (FEMA 2019), Texas Natural Resources Information System, Railroad Commission of Texas (RRC 2019a), TXNDD (TXNDD 2019), and TxDOT county highway maps (TxDOT 2019a). Appraisal district parcel boundary data was available for Van Zandt County and was used to identify apparent property boundaries as potential paralleling opportunity areas (Van Zandt County 2019b). USGS 7.5-minute topographic maps and aerial photography (NAIP 2018) were used as the background for several of the scaled Project maps, including the initial base map, the field maps, the public involvement display boards, and the environmental and land use constraints maps.

2.1.5 Agency Consultation

A list was developed of federal, state, and local regulatory agencies, elected officials, and organizations to receive a consultation letter regarding the proposed Project. The purpose of the letter was to inform the various agencies and officials of the proposed Project and to give them an opportunity to provide feedback regarding resources and potential issues within the study area. POWER used the Van Zandt County websites and telephone confirmations to identify local officials. Consultation letters were sent in June 2019. Copies of correspondence with the various regulatory agencies, elected officials, and organizations are included in Appendix A.

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

- United States Army Corps of Engineers (USACE)
- United States Environmental Protection Agency (USEPA)
- United States Fish and Wildlife Service (USFWS)
- United States Department of Defense (DoD) Siting Clearinghouse
- United States Geologic Survey (USGS)
- Federal Aviation Administration (FAA)
- Federal Emergency Management Agency (FEMA)
- Federal Mine Safety and Health Review
- National Park Service – Intermountain Region (NPS)
- Natural Resource Conservation Service (NRCS)
- Railroad Commission of Texas (RRC)
- Texas Commission on Environmental Quality (TCEQ)
- Texas Department of Transportation (TxDOT) – Aviation Division, Environmental Affairs Division, Planning and Programming, District Engineer
- Texas General Land Office (GLO)
- Texas Historical Commission (THC)
- Texas Parks and Wildlife Department (TPWD)
- Texas Water Development Board (TWDB)
- Van Zandt County Historical Commission
- Van Zandt County Officials (County Judge and Commissioners Court)
- Grand Saline Independent School District (ISD)
- The Nature Conservancy - Texas
- Texas Agricultural Land Trust
- Texas Land Conservancy
- Texas Land Trust Council

2.1.6 Reconnaissance Surveys

Reconnaissance surveys of the study area (from publicly accessible areas) were conducted by POWER personnel to confirm the findings of the research and data collection activities, to identify changes in land use occurring after the date of available aerial photography, and to identify potential unknown constraints that might not have been previously noted in the data. A reconnaissance survey of the study area was conducted on August 22, 2019.

2.2 Community Values

The term "community values" is included as a factor for the consideration of transmission line route approval under Section 37.056(c)(4)(A) of the Texas Utilities Code. The PUC CCN application requires information concerning the following items related to community values:

- Public open-house meeting.
- Approvals or permits required from other governmental agencies.
- Brief description of the area traversed.
- Habitable structures within 300 feet of the centerline for a 138-kV single-circuit transmission line.
- Amplitude modulation (AM) radio and frequency modulation (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.
- Parks and recreation areas.
- Historical and archeological sites.

In addition, POWER also evaluated the proposed Project for community values and resources that might not be specifically listed by the PUC, but that might be of importance to a specific community as a whole. The term "community values" is not formally defined in PUC rules. However, in several dockets the PUC and their Staff have used the following as a working definition: the term "community values" is defined as a shared appreciation of an area or other natural resource by a national, regional, or local community. Examples of a community resource would be a park or recreational area, historical or archeological site, or a scenic vista (aesthetics). POWER mailed consultation letters to various local elected and appointed officials and assisted SWEPCO personnel in hosting a public open house meeting to identify and collect information regarding community values and community resources.

2.2.1 Land Use

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

Urban/Developed

The urban/developed 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/or industrial land uses. Developed low, medium, and high intensity areas were identified using aerial photograph interpretation and reconnaissance surveys. These classifications are described below:

- **Developed Low Intensity** areas typically include rural settings with single-family housing units.
- **Developed Medium Intensity** areas typically include single-family housing units that are grouped in residential subdivisions and might include peripheral commercial structures.

- **Developed High Intensity** areas typically include highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial parks. Areas with the highest concentration of development are typically located within or near the towns and communities in the study area.

The study area is located within a rural setting. The entire area is predominantly improved pasture with woodlands interspersed primarily along creeks. Habitable structures identified within the study area are associated with rural ranches and are considered low intensity development. No developed medium intensity areas or high intensity areas were identified in the study area. The Morton Salt Mine is located in the northwest portion of the study area. Habitable structures were identified using aerial photographs (NAIP 2018), Google Earth Pro 2019, and reconnaissance surveys. The PUC defines habitable structures, as provided in 16 TAC § 25.101(a)(3), 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, business structures, churches, hospitals, nursing homes, and schools."

Schools

The study area is located within Grand Saline ISD. No schools were identified within the study area (Texas Education Agency 2019).

2.2.2 Planned Land Use

The planned land use component identifies objectives and/or 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 by goals and objectives for the individual city or county. The study area is not located within any city limits. The Van Zandt County website was reviewed, and correspondence was submitted to local and county officials to identify potential planned land use conflicts. No comprehensive land use plan was identified (Van Zandt County 2019).

Conservation Easements

A conservation easement is a restriction that property owners can 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. Land trusts facilitate the easement and ensure compliance with the specified terms and conditions.

A review of several non-governmental groups websites (e.g., National Conservation Easement Database, the Nature Conservancy, Texas Land Conservancy) indicated there are no conservation easements within the study area (National Conservation Easement Database 2019, Nature Conservancy 2019, Texas Land Conservancy 2019).

Mitigation Sites

A mitigation bank is a managed site where natural resources such as wetlands, streams and habitats are restored, established, enhanced, and/or preserved for the purpose of providing compensatory

mitigation. A review of the USACE Regulatory In-lieu Fee and Bank Information Tracking System did not indicate any mitigation banks/sites located within the study area (USACE 2019).

2.2.3 Agriculture

Agriculture is a significant segment of the economy throughout Texas, and Van Zandt 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 for Van Zandt County was $104,502,000, an increase of 11 percent over the 2012 market value of $94,330,000. Livestock sales accounted for the majority of agricultural sales in Van Zandt County at 59 percent, while crop sales were at 41 percent. The number of farms in Van Zandt County was 3,405 in 2017, an increase of 17 percent from 2012 with 2,915 (USDA 2017 and 2012).

2.2.4 Oil and Gas Facilities

Data was obtained from the RRC (RRC 2019a) 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 2019 RRC dataset along with aerial photograph interpretation and field reconnaissance were used to identify and map existing oil and gas related facilities. One pipeline was identified in the northwestern portion of the study area. Eight oil and gas wells were identified within the study area.

2.2.5 Transportation/Aviation/Utility Features

Transportation Features

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, US Hwys or SHs. Roadways located within the study area include: FM 857, CR 1701, CR 1702, CR 1703, CR 1705, and CR 1605. Numerous local roads (paved and unpaved) were also identified in the study area (TxDOT 2019a).

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 indicated that there are no roadway repair or construction projects currently planned within the study area (TxDOT 2019b).

Additionally, the website for the North East Texas Regional Mobility Authority, an independent government agency created to accelerate the development of transportation projects, was reviewed. There were no planned roadway projects identified within the study area (North East Texas Regional Mobility Authority 2019).

One local railroad, servicing the Morton Salt Mine, was identified within the northwestern portion of the study area (United States Department of Transportation (USDOT) 2019; TxDOT 2019a).

Aviation Facilities

POWER reviewed the Chart Supplement for the South Central US (formerly the Airport/Facility Directory) (FAA 2019a) and the Dallas-Fort Worth Sectional Aeronautical Chart (FAA 2019b) 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.

No public-use or military FAA registered airports were identified within the study area or within the FAA notification buffer (FAA 2019a and 2019b).

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 2019a and 2019b).

In addition, POWER also reviewed the FAA database (FAA 2019c), 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. No private-use airstrips or private-use heliports were identified within the study area.

Utility Features

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 three 138-kV transmission lines within the study area. Distribution lines are prevalent throughout the developed portions of the study area and were mapped.

In addition, four public service water wells and several domestic, industrial and irrigation water wells are located throughout the study area (TWDB 2019a).

2.2.6 Communication Towers

Review of the Federal Communication Commission (FCC) database did not indicate any AM radio transmitters identified within the study area or within 10,000 feet of the study area (FCC 2019). However, the FCC did indicate that there is one cell tower identified within the study area (FCC 2019).

2.2.7 Parks and Recreation Areas

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

[1] The Chart Supplement for the South Central US used in conjunction with the Dallas-Fort Worth 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.

National/State/County/Local Parks

No national or state parks were identified within the study area (NPS 2019a; TPWD 2019a).

No local parks were identified within the study area (Van Zandt County 2019).

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

Wildlife Viewing Trails

Review of the TPWD *Great Texas Wildlife Trails Prairies and Pineywoods East* did not indicate any wildlife viewing trails located within the study area (TPWD 2019b).

2.3 Socioeconomics

This section presents a summary of economic and demographic characteristics for Van Zandt County based on most recent data available to the general public and describes the socioeconomic environment of the study area. Literature sources reviewed include publications of the United States Census Bureau (USCB), and the Texas State Data Center (TxSDC).

2.3.1 Population Trends

Van Zandt County experienced a population increase of 9.2 percent between the years of 2000 and 2010. By comparison, population at the state level increased by nearly 21 percent during the same time period (USCB 2000 and 2010).

According to TxSDC projections, Van Zandt County is projected to experience population growth during the next 30 years. The population increases for the next three decades are projected to be at 5.5 percent, 4.2 percent, and 1.1 percent, respectively. By comparison, the population of Texas is expected to experience population increases of 15 percent, 15 percent, and 14 percent over the same three decades, respectively (TxSDC 2018). Table 2-2 presents the past population trends and projections for Van Zandt 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	29,677,772	34,894,429	40,686,490
Van Zandt County	48,140	52,579	55,469	57,780	58,403

Sources: USCB 2000 and 2010; TXSDC 2018

2.3.2 Employment

The civilian labor force in Van Zandt County increased 1.5 percent (343 people) from 2010 to 2017. By comparison, the civilian labor force at the state level grew by 11% (1,511,110 people) over the same time period (USCB 2010 and 2017). Table 2-3 presents the civilian labor force for Van Zandt County and the state of Texas for the years of 2010 and 2017.

Between 2010 and 2017, Van Zandt County experienced a decrease in its unemployment rate from 6.7 percent in 2010, to 5.9 percent in 2017. By comparison, the state of Texas experienced a decrease in the unemployment rate during the same time period. The state's unemployment rate decreased

from 7.0 percent in 2010 to 5.8 percent in 2017 (USCB 2010 and 2017). Table 2-3 presents the employment and unemployment data for the study area county and the state of Texas for the years of 2010 and 2017.

TABLE 2-3 CIVILIAN LABOR FORCE AND EMPLOYMENT

STATE/COUNTY	2010	2017
Texas		
Civilian Labor Force	11,962,847	13,473,957
Employment	11,125,616	12,689,069
Unemployment	837,231	784,888
Unemployment Rate	7.0%	5.8%
Van Zandt County		
Civilian Labor Force	23,448	23,791
Employment	21,880	22,384
Unemployment	1,568	1,407
Unemployment Rate	6.7%	5.9%

Source: USCB 2010 and 2017

2.3.3 Leading Economic Sectors

The major occupations in Van Zandt County in 2017 are listed under the category of Management, business, science and arts occupations, followed by the category of sales and office occupations (USCB 2017). Table 2-4 presents the number of persons employed in each occupation category during 2017 in the study area county.

TABLE 2-4 OCCUPATIONS IN VAN ZANDT COUNTY

OCCUPATION	VAN ZANDT COUNTY
Management, business, science, and arts occupations	6,713
Service occupations	4,421
Sales and office occupations	5,078
Natural resources, construction, and maintenance occupations	3,258
Production, transportation, and material moving occupations	2,914

Source: USCB 2017

In 2010 and 2017, the industry group employing the most people in Van Zandt County was educational services, and health care and social assistance. The industry group that experienced the most growth in Van Zandt County from 2010 to 2017 was information, which experienced an 88 percent increase (214 people). Table 2-5 presents the number of persons employed in each of the industries within Van Zandt County for the years 2010 and 2017.

TABLE 2-5 INDUSTRIES IN THE COUNTY WITHIN THE STUDY AREA

INDUSTRY GROUP	VAN ZANDT COUNTY	
	2010	2017
Agriculture, forestry, fishing and hunting, and mining	1,048	1,490
Construction	2,279	1,917
Manufacturing	2,164	2,270
Wholesale trade	805	464
Retail trade	2,655	3,005
Transportation and warehousing, and utilities	1,414	1,005
Information	242	456
Finance and insurance, and real estate and rental and leasing	1,142	960
Professional, scientific and management, and administrative and waste management services	1,376	1,533
Educational services, and health care and social assistance	4,905	4,776
Arts, entertainment, and recreation, and accommodation and food services	1,446	2,010
Other services, except public administration	1,413	1,472
Public administration	994	1,026

Source: USCB 2010 and 2017

2.4 Historical (Cultural Resource) 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 Official Texas Historical Marker (OTHM). Other cemeteries may also be documented as part of the THC's Record, Investigate, and Protect program.

2.4.1 Cultural Background

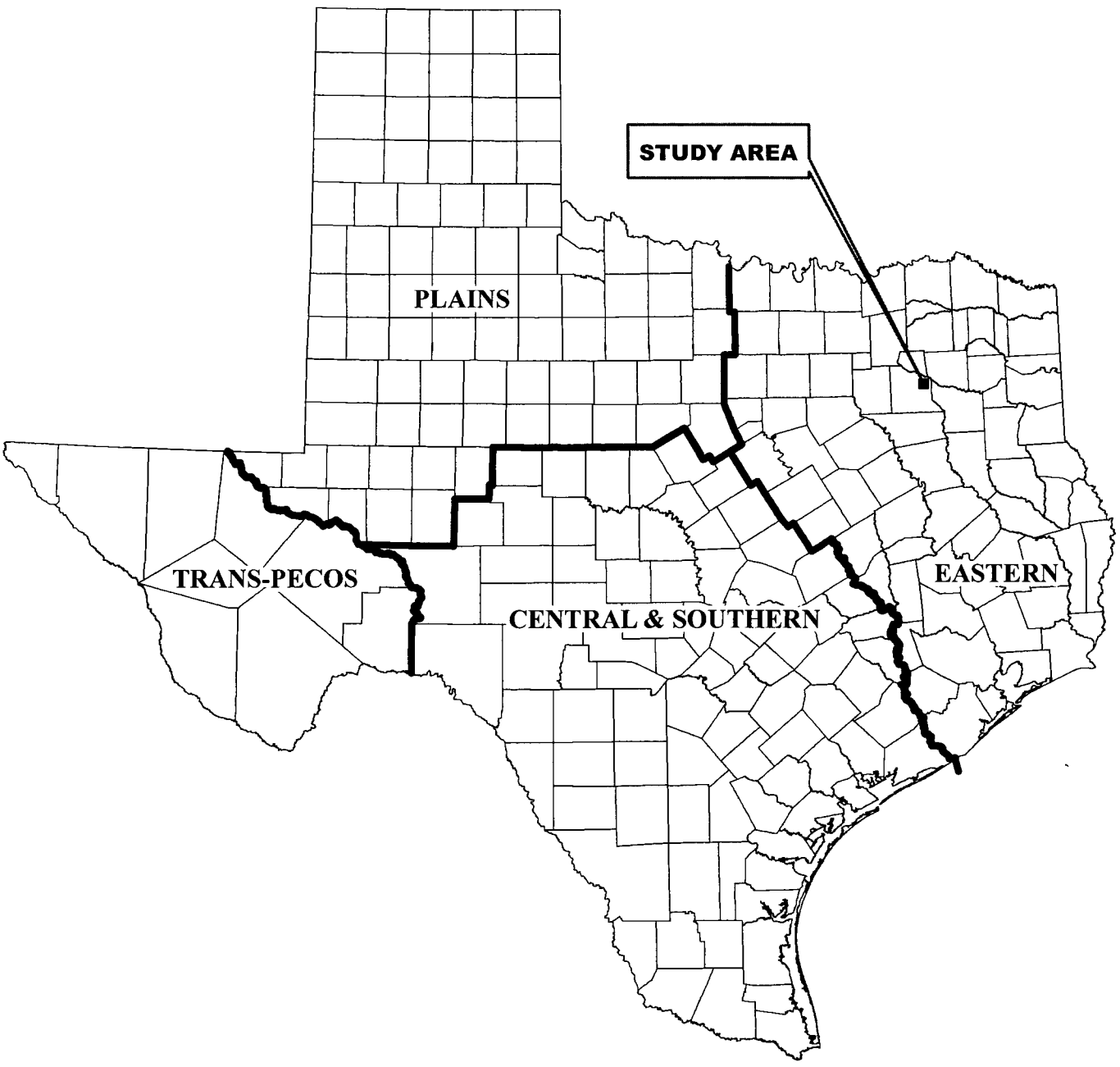
The study area is within the northeast Texas Archeological Region, a subset of the larger Eastern Planning Region as delineated by the THC (Mercado-Allinger et al. 1996) and shown in Figure 2-2. Northern Texas consists of a diverse environment including the Backland Prairie, Post Oak Savannah, and Pineywoods vegetational areas. The study area is located within the northern Post Oak Savannah region, abutting the Backland Prairie. The prehistoric culture history of this area is divided into the Paleoindian Period (11,500 to 8,000 years before present [BP]), the Archaic Period (8,000 to 2,200 BP), the Woodland Period (2,200 to 1,200 BP), and the Late Prehistoric Period (1,200 to 270 BP). The Historic Period, which follows the prehistoric periods, reflects both the effect of European immigration on the native populations and the settlement of the region by Europeans and immigrants from the eastern United States. These periods are artificial constructs developed by archeologists to provide an ordered and useful model for describing prehistoric development in East Texas, and represent cultural adaptations to environmental, social, and/or technological changes.

Paleoindian Period (11,500 to 8,000 Years BP)

The earliest well-established human occupations of North America are referred to as Paleoindian, which includes populations that inhabited North America from the Late Pleistocene epoch to the early Holocene epoch. Isolated Paleoindian chipped stone projectile points have been found in East Texas, typically in surficial or mixed contexts. Because such limited data exist for the Paleoindian Period in this area, only certain assumptions can be made regarding 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 the collection of readily available plant foods probably also contributed to the diet (Collins 2002). Early Paleoindian materials include Clovis and Folsom lanceolate fluted projectile points and scraping tools. Unfluted lanceolate projectile points, such as Dalton, San Patrice, and Scottsbluff points, as well as Albany beveled bifaces, dominate late Paleoindian assemblages.

Archaic Period (8,000 to 2,200 BP)

During the early Archaic Period, subsistence became more generalized than during the Paleoindian Period as populations could no longer rely on extinct Pleistocene megafauna. Much of the long-lasting Archaic Period between 8,000 and 4,000 years ago was drier than today, with expanded prairie habitat along the western edge of the Pineywoods region (Ferring 1995). Although evidence of early Archaic (8,000 to 6,000 BP) cultures is scarce, research suggests that early Archaic populations maintained a generalized hunting and gathering subsistence and a minimum band level of social organization similar to their predecessors (Fields 2004; Perttula 2004; Story 1990). Characteristic projectile points of the Early Archaic Period in East Texas include Palmer, Kirk, Cossatot, Big Sandy, Calf Creek, and Johnson types.



N

0 50 100 200

Miles

Source. Mercado - Allinger et. al., 1996

Date: 2/18/2020

Legend

Cultural Resource Planning Region Boundary

County Bounday

E BURGES 138 - kV
TRANSMISSION LINE PROJECT

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

SOUTHWESTERN ELECTRIC POWER COMPANY

POWER ENGINEERS

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By the middle Archaic (6,000 to 4,000 BP), substantial and extensive occupations are recognized along major rivers in the region with assemblages dominated by hunting and cutting/scraping tools, along with pitted manos and other milling implements. The presence of burned rock features in middle Archaic contexts suggest that small groups cooked and processed plants at short-term-use sites (Perttula 2004), suggesting an increased reliance on native plants. Characteristic projectile points of the Middle Archaic include types such as Carrollton, Morrill, Johnson, Lange, Evans, Trinity, and Neches River types.

Late Archaic (4,000 to 2,200 BP) sites are widely distributed in the region, including along major streams, near streams of all sizes, springs, and on upland ridges, suggesting these groups exploited almost every part of the region (Perttula 2004). Story (1990) suggests that late archaic groups depended on seasonal food sources and moved as food sources became scarce. In the northern Post Oak Savannah region, there is an increase in frequency of burned rock concentrations and shallow backing pits compared to earlier Archaic occupations. Settlement data from Late Archaic sites indicate higher population densities, decreasing group mobility, and longer occupations of sites. (Fields 2004). Characteristic projectile points of the Late Archaic include Gary, Kent, Ellis, Palmillas, and Edgewood types.

Woodland Period (2,200 to 1,200 BP)

Ceramics became widespread in the region during the Woodland Period (2,200 to 1,200 BP), also referred to as the Early Ceramic Period. Site use intensity increased substantially compared to the previous period, suggesting that population density increased, and group mobility continued to decrease (Fields 2004). Social and ritual ceremonies and a reliance on cultigens are evident in the archeological record from the Woodland Period. Gary, Kent, and Dawson dart points continue into the Woodland Period, and following the introduction of the bow and arrow during this period, corner-notched arrow points are characteristic of Woodland assemblages in the region (Story 1990). Goose Creek Plain ceramics and Lower Mississippi Valley ceramic types, such as Tchefuncte Stamped and Marksville Stamped are found in Woodland contexts in northeast Texas. Mossy Grove tradition ceramics are also found along the Attoyac River, which is adjacent to the study area (Story 1990). Common Woodland ceramic vessel forms in the region include thick bowls and flower-pot shaped jars (Perttula 2004). Woodland sites tend to be found on sandy interfluves, suggesting that groups were becoming increasingly tied to significant plant resources in valley margins, and the use of these plants was facilitated by cooking them in ceramic vessels. The presence of stone axes and hoe-shaped tools in Woodland sites suggests that horticultural practices and forest clearing may have begun during the Woodland Period.

Late Prehistoric Period (1,200 to 270 BP)

Around 1,200 years ago, small, light, straight and expanded stem arrow points began to appear in archeological assemblages, indicating the introduction of the bow and arrow – a hallmark of the Late Prehistoric period in southeast Texas. Findings at the Mitchell Ridge site on Galveston Island suggest that the Late Prehistoric 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 final Late Prehistoric period in southeast Texas correlates with changes taking place throughout much of Texas. These changes include the appearance of bison bone in archeological 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).

Although the adoption of the bow and arrow and shift to bison and large game hunting was occurring across much of eastern Texas, some areas adapted more slowly to the new technology and subsistence strategy. In the northern Post-Oak Savannah region, the continued presence of large dart points in archeological assemblages indicates that the atlatl continued to be a popular tool even after the bow and arrow were introduced. This was particularly during the first half of the Late Prehistoric period. Ceramics were introduced to inland populations several centuries after they appeared on the East Texas Coast. Archeological evidence also indicates that the use of ceramics remained comparatively unimportant to inland groups into the Late Prehistoric period. Ceramic sherds in Late Prehistoric context at Jewett Mine and Gibbons Creek Mine sites are generally equal in number to shaped stone tools. The ratio of ceramic sherds to shaped stone tools is significantly higher in the Sabine River valley and the area of Cooper Lake (Fields 2004).

Historic Period

The earliest report of European exploration activity in East Texas comes from the 1685 landing of René Robert Cavelier Sieur de La Salle's misguided expedition to find the mouth of the Mississippi River. After establishing a small fortification on the eastern end of Matagorda Island and suffering greatly at the hands of hostile natives, members of this shipwrecked expedition traveled through East Texas trying to reach Canada (Weddle 2019). A remnant of the earlier De Soto/Moscoso expedition may have reached the area in the early 1540s after entering the state from modern day Oklahoma. Following trails linking Caddo villages, members of the expedition traveled to near modern-day Nacogdoches and as far as the Guadalupe River before turning back to the Mississippi River (Bruseth 2019). It is likely that this earlier party encountered Caddo groups, whereas LaSalle's expedition may have encountered groups that had been reduced in number and sociopolitical complexity after being subjected to European diseases during earlier expeditions.

LaSalle's landing prompted the Spanish to colonize the territory in response to France's incursion. In 1690, Alonso de Leon led an expedition to establish a Spanish mission in East Texas to counter the French threat, following an Indian trail that later became La Bahia Road, a portion of the Camino Real de los Tejas, or King's Highway (NPS 2019b). The trail became the initial route used by missionaries attempting to Christianize native groups in Texas. In 1690, the first mission in East Texas, the San Francisco de los Tejas, was founded near modern day Weches. The mission was abandoned three years later due to hostilities from native groups.

Between 1691 and 1788, Spanish expeditions crossed through what would become East Texas. These expeditions were carried out by Domingo Terán de los Ríos in 1691, Domingo Ramón in 1717, and Fray José Calahorra y Saenz in 1760. Calahorra's expedition was an attempt to restore peace between the Spanish and northern tribes such as the Tawakonis and Yscanis, who occupied the region (Handbook of Texas Online 2019a). Another expedition in 1788 was led by Pedro Vial. None of these expeditions led to permanent Spanish settlements (Knapp and Biesele 2019).

During the 1820s and 1830s Cherokee tribes, united under Chief Bowl, dominated eastern Van Zandt County and effectively prevented European settlement of the area (Kozlowski 2019). In 1822, Chief Bowl negotiated a land grant with the Mexican government for the areas occupied by the tribes in east Texas (Everett 2019). Chief Bowl aided the Mexican government during the Fredonian Rebellion, an 1826 uprising of recent Anglo-American immigrants near Nacogdoches in response to opposition from older inhabitants to an empresario land grant. The early revolutionists fled when Mexican officers and militia and members of Stephen F. Austin's colony reached Nacogdoches in late January 1827 (McDonald 2019).

In 1836, Chief Bowl signed a treaty with Sam Houston that granted the Chief and his council the lands occupied by the tribes in East Texas, but this treaty was invalidated by the Senate of the Republic of Texas after the Texas Revolution (Everett 2019). Chief Bowl allied with Mexican insurgents during the Córdova Rebellion, attempting to reoccupy Texas (Everett 2019; Herring 2019). The Cherokee were suspected of colluding with an attempted Mexican insurgency (Handbook of Texas Online 2019b). Though these claims were denied (Benham 2019), attempts at negotiations failed and the tribes were ordered to leave. In retaliation to the forced expulsion, the tribes organized to resist (Everett 2019), leading to the Cherokee War in 1839 (Handbook of Texas Online 2019b). The Battle of the Neches in 1819, the defining engagement of the Cherokee war (Everett 2019; Gray and Campbell 2019), ultimately led to the expulsion of the Shawnee and Cherokee tribes from east Texas (Handbook of Texas Online 2019b).

The expulsion of the tribes in the area opened the land to immigrating white settlers. A post office was established in 1845 and a salt works, gristmill, and sawmill were established. Van Zandt County was established in 1848 and Jordan's Saline, modern day Grand Saline, located northeast of the study area, was named the county seat. In 1850, Wood County was created from part of Van Zandt County, and the Van Zandt County seat moved to Canton. At this time, many of the county residents had moved from Tennessee and Alabama along with a smaller number of European immigrants. These two groups would clash over views on slavery as the Civil War began (Kozlowski 2019).

Because it was far removed from the major cotton-producing areas along the Red, Brazos, and lower Trinity Rivers, Van Zandt County had very few slaves and few large plantations (Beck and Cliff 2010). Despite this, approximately two-thirds of the county voted for secession from the Union in 1861 and locals volunteered for military service. A group of Norwegian settlers and small farmers spoke openly against the war, against slavery and against the authority of the large plantation holders. Tensions peaked when three Unionists were lynched, and others were arrested (Kozlowski 2019).

The end of the Civil War and Reconstruction did not quell the violence and animosity in Van Zandt County, and the postbellum depression stifled economic growth. Officials attempted to implement federal policies, but political murders occurred frequently. In 1868, a freedman was killed, and Unionists were harassed by a group of vigilantes. Numerous other murders were attributed to white supremacist groups including the Ku Klux Klan. Money was scarce, and land dropped in value while taxes remained high. Subsistence farming dominated the economy producing mainly corn and pigs (Kozlowski 2019).

In 1873, when the Texas and Pacific Railway was completed, an expanding railroad connected the northern portions of the county to outside markets, resulting in a rapid expansion of the local farming economy (Beck and Cliff 2010). Jordan's Saline was renamed Grand Saline with the arrival of the railroad (Kleiner 2019). The population began to increase, nearly doubling to over 12,000 during the 1870s and 1880s (Beck and Cliff 2010). During this expansion, in 1877 the "Wills Point War" occurred, precipitated by a vote to move the county seat to Wills Point. Irregularities in several voting locations caused several voting boxes to be thrown out and Wills Point was declared the county seat. After the county records were moved to the new seat, a group of 500 men took it upon themselves to recover the records and take them back to Canton. Military intervention temporarily restored order and a supreme court voided the election results. The entire ordeal resulted in the records being returned to Canton and its subsequent restoration as the county seat (Kozlowski 2019).

During the 1880s and 1890s, there was a succession of political movements including the Grange, Greenback Party, and the Farmers' Alliance. The People's Party was popular in Van Zandt County, as well, and led to the county being one of the only counties in North and East Texas to not institute a White Primary. During this time the county also instituted a public-school system and developed telephone services (Kozlowski 2019).

In the 1900s, the population and economy in Van Zandt County continued to expand. Livestock became more important, but salt production and farming continued to be strong drivers of the economy. Cotton began to be grown on a large scale, but with the onset of the Great Depression production decreased and many tenants were forced off their land. The economic stress brought on by the Depression was mitigated by the expansion of the Morton Salt Works at Grand Saline and the discovery of oil in 1929. The New Deal brought relief to county residents as work programs drained swamps to control mosquito borne diseases and funds were provided to supplement the loss of cotton production (Kozlowski 2019).

The economy revived as World War II loomed on the horizon. Agriculture, salt, and oil production steadily grew during the war. After the end to the hostilities, the economy began to diversify, with an emphasis on cattle, dairy production, and the cultivation and shipping of agricultural products. This diversification extended into the 1990s with the additional development of Lake Tawakoni and the completion of Interstate Highway 20. Economic drives into the early twentieth century were agribusiness, tourism, and oil and gas production (Kozlowski 2019).

2.4.2 Previous Investigations

Three professional cultural resource management investigations have taken place within the study area, beginning in 1986. Two surveys were undertaken in advance of Rural Electrification Administration projects, and one in 1997 for Rural Utility Service (THC 2019a).

2.4.3 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 June 11, 2019, 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 was obtained from the Texas Archeological Sites Atlas (TASA) in June 2019. The locations of, and information pertaining to, State Antiquities Landmarks, NRHP properties, Historic Texas Cemeteries, and OTHMs within the study area were obtained from the TASA (THC 2019a), and the Texas Historic Sites Atlas (THC 2019b). The TASA, Texas Historic Sites Atlas, 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. At the national level, the NRHP database (NPS 2019c) and NPS websites for National Historic Landmarks (NPS 2019d), and National Historic Trails (NPS 2019e) were reviewed.

The review of the TASA and TARL data indicates that two previously identified archeological sites and two OTHMs, one a Registered Texas Historic Landmark, have been recorded in the study area. Review of the NRHP database indicated that no NRHP properties are within the study area. No State Antiquities Landmarks, NRHP-listed or determined-eligible bridges, National Historic Trails, or cemeteries are recorded within the study area. Sites 41VN92 and 41VN93 are both prehistoric lithic scatters. Site 41VN92 consists of six chert flakes and 41VN93 consists of a debitage, a biface fragment, and a bone fragment (THC 2019a).

Two OTHMs are located within the study area. One commemorated the town of Jordan's Saline, Texas, which is now Grand Saline. The second is the Morton Salt Company Building marker, a Registered Texas Historic Landmark, and commemorates the importance of salt extracting in the area (THC 2019b).

Review of previously recorded cultural resource sites 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.

Historic age resources are also likely to be found near water sources. However, they will also be located in proximity to primary and secondary roads, which 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 the Grand Saline (USGS 1959a) and the Van (USGS 1959b) quadrangles show numerous structures within the study area.

2.5 Aesthetic Values

Section 37.056(c)(4)(C) of the Texas Utilities Code incorporates aesthetics as a consideration when evaluating proposed electric transmission facilities. There are currently no formal guidelines provided for managing visual resources on private, state, or county owned lands. For the purposes of this study, the term aesthetics is defined by POWER as "to accommodate the subjective perception of natural beauty in a landscape and measure an area's scenic qualities." The visual analysis was conducted by describing the regional setting and determining a viewer's sensitivity. Related literature, aerial photograph interpretation, and field 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) that would help define a viewer's sensitivity. POWER considered the following aesthetic criteria that combine to give an area its aesthetic identity:

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

The study area is primarily rural with some scattered low-density residential development. The predominant land use within the study area is cropland and pastureland/rangeland. Most of the study area has been impacted by land improvements associated with agriculture, residential structures, and roadways. Overall, the study area viewscape consists of open pastureland with woodland areas located along fence lines and streams. Several small lakes and ponds are also located within the study area.

No known high-quality aesthetic resources, designated views, or designated scenic roads or highways were identified within the study area (America's Scenic Byways 2019). The study area is located within the Texas Lakes Trail Region; however, there are no sites designated of interest located within the study area (THC 2019c).

A review of the NPS website did not indicate any National Wild and Scenic Rivers System, National Parks, National Monuments, National Memorials, National Historic Sites, National Historic Trails, or National Battlefields within the study area (National Wild and Scenic Rivers System 2019; NPS 2019a, 2019f, and 2019g).

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

2.6 Environmental Integrity

2.6.1 Physiography and Geology

As shown in Figure 2-3, the study area is located within the Interior Coastal Plains Subprovince of the Gulf Coastal Plains Physiographic Province. The Interior Coastal Plains is comprised of alternating belts of resistant sands among weaker shales that erode into a terrain of long parallel sandy ridges (questas) and valleys. The study area is located within the northeastern extent of the subprovince, with elevations ranging from 350 feet above mean sea level in the north to 460 feet above mean sea level in the south (Bureau of Economic Geology 1996).

Geologic formations occurring within in the study area include the Wilcox Group and Quaternary-aged alluvium. The Wilcox Group is a Tertiary formation underlying much of the study area and is composed primarily of silty and sandy clay. Plant fossils and siltstone and ironstone concretions commonly occur throughout the formation. Quaternary alluvium is comprised of mud, silt and sand and is mapped within floodplains along major streams within the study area (Bureau of Economic Geology 1975).

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 faults, active or historical coal and uranium mining locations, gravel quarries, and potential subsurface contamination.

The study area occurs within the Quaternary-aged Gulf-margin normal faults region in Texas (USGS 2019a). Review of Bureau of Economic Geology (1975) maps did not identify any known faults within the study area.

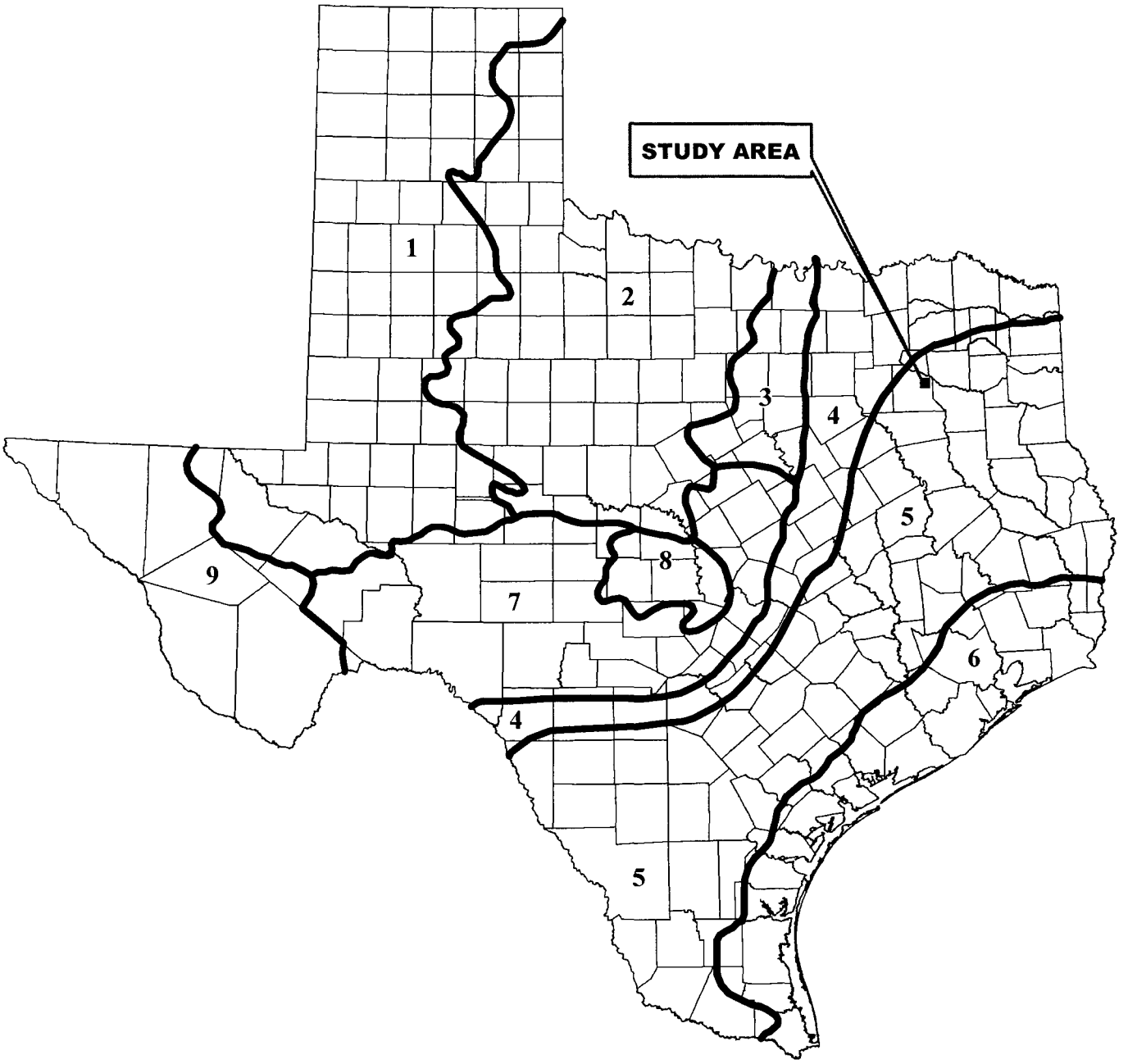
Review of the Texas RRC website identified several well locations scattered throughout the study area (RCC 2019a). No historical (RRC 2019b) or current mining (RRC 2019c and 2019d) or uranium exploration (RRC 2019e) activities were identified within the study area. However, a salt mine and facility owned by Morton Salt is located in the northwest corner of the study area. The mine is located over an interior salt dome named the Grand Saline Salt Dome. Grand Saline Salt Dome is located approximately 213 feet beneath the soil surface and is topped by a caprock that is located at a depth of approximately 171 feet (Beckman and Williamson 1990).

No borrow pits or rock quarries (USGS 2019b), municipal waste facilities (TCEQ 2019), or superfund sites (TCEQ 2019; USEPA 2019a) were identified within the study area.

2.6.2 Soils

Soil Associations

The NRCS Web Soil Survey (NRCS 2019) data was reviewed for Van Zandt County to identify and characterize the soil associations mapped within the study area. A soil association is a group of soils geographically associated in a characteristic repeating pattern and defined as a single unit. Soil



0 50 100 200

Miles

Source Texas Bureau of Economic Geology, 1996

Date: 2/18/2020

Legend

Physiographic Region Bounday
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

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Figure 2-3
Location of the Study Area In Relation to the Physiographic Regions of Texas

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associations occurring within the study area are listed in Table 2-6 which summarizes each soil association and indicates if any mapped units are considered prime farmlands and/or hydric (NRCS 2019).

TABLE 2-6 MAPPED SOIL UNITS WITHIN THE STUDY AREA

MAP UNIT NAME	LANDFORM	HYDRIC STATUS	FARMLAND CLASSIFICATION
Bernaldo fine sandy loam, 1 to 3 percent slopes	Stream terraces	No	All areas are prime farmland
Derly, occasionally ponded-Raino complex, 0 to 1 percent slopes	Depressions on stream terraces	Yes	No
Freestone fine sandy loam, 1 to 3 percent slopes	Stream terraces	No	All areas are prime farmland
Gallime fine sandy loam, 1 to 3 percent slopes	Stream terraces	No	All areas are prime farmland
Nahatche loam, frequently flooded	Floodplains	No	No
Nahatche loam, saline, frequently flooded	Floodplains	No	No
Pickton fine sand, 1 to 5 percent slopes	Ridges	No	No
Pickton fine sand, 5 to 15 percent slopes	Ridges	No	No
Salt flats	Flats	No	No
Wolfpen loamy fine sand, 1 to 5 percent slopes	Ridges	No	No
Woodtell loam, 2 to 5 percent slopes	Ridges	No	No
Woodtell loam, 5 to 12 percent slopes	Ridges	No	No
Woodtell loam, 2 to 8 percent slopes, extremely bouldery	Ridges	No	No

Source: NRCS 2019

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 2019).

Map units that are dominantly comprised of hydric soils might have small inclusions of non-hydric soils in higher positions on the landform, and map units dominantly comprised of non-hydric soils might have inclusions of hydric soils in lower positions on the landform. According to NRCS (2019) Web Soil Survey data for the study area, the Derly, occasionally ponded-Raino Complex is classified as hydric.

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. Additional potential prime farmlands are those soils that meet most of the requirements of prime farmland but fail because they lack the installation of water management facilities, or they lack sufficient natural moisture. The USDA would consider these soils as prime farmland if such practices were installed, and these soils are incorporated as Prime Farmland soils in Table 2-6.

According to NRCS Web Soil Survey data for the study area (NRCS 2019), there are multiple soil series designated as prime farmland soils located within the study area. Transmission line projects are typically not subject to the requirements of the Farmland Protection Policy Act because they are not federally funded projects nor considered a conversion of Important Farmlands, and a site can still be used for farming after construction is complete.

2.6.3 Water Resources

Surface Water

The study area is located within Sabine River Basin (TWDB 2019a) and the Town of Grand Saline-Sabine River sub-basin (USEPA 2019b). Surface waters within the study area generally flow in a north or east direction, towards the Sabine River located northeast of the study area. Named surface waters include Grand Saline Creek, Chrestman Branch, and Big Lake. Additional unnamed streams, small lakes and ponds occur throughout the study area (USGS 2019b).

Under 31 TAC 357.8, the TPWD has designated Ecologically Significant Stream Segments based on habitat value, threatened and endangered species, species diversity, and aesthetic value criteria. Review of the TPWD information did not indicate any designated Ecologically Significant Stream Segments within the study area (TPWD 2019c).

In accordance with Section 303(d) and 304(a) of the CWA, the TCEQ identifies surface waters for which effluent limitations are not stringent enough to meet water quality standards and for which the associated pollutants are suitable for measurement by maximum daily load. Review of the TCEQ website and most recent TCEQ (2016), 303(d) list did not identify any impaired surface waters within the study area.

Ground Water

The major ground water aquifer mapped within the study area is the Carrizo-Wilcox Aquifer. No minor aquifers were identified. The Carrizo-Wilcox Aquifer is contained within sand interbedded with gravel, silt, clay, and lignite of the Wilcox Group and the overlying Carrizo Formation of the Claiborne Group. Freshwater-saturated thickness of the aquifer is only about 670 feet, compared to a total thickness of 3,000 feet. The water is generally hard but fresh with high iron and manganese levels that exceed secondary drinking water standards. Parts of the aquifer are slightly to moderately saline. Water is primarily used for irrigation and secondarily used for municipal purposes (TWDB 2011). Four public service water wells and several domestic, industrial and irrigation water wells occur throughout the study area (TWDB 2019b). No natural springs were identified as occurring in the study area (TWDB 1975 and 2019b).

Floodplains

The 100-year flood (one percent flood or base flood) represents a flood event that has a one percent chance of being equaled or exceeded for any given year. FEMA 100-year floodplain data are mapped along Grand Saline Creek, Chrestman Branch, and unnamed associated tributaries (FEMA 2019).

Future Surface Water Developments

No reservoir or other future surface water development projects were identified within the study area (TWDB 2016 and 2017).

2.6.4 Ecological Resources

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

Ecological Region

The study area lies within the East Central Texas Plains Level III Ecoregion and Northern Post Oak Savanna Level IV Ecoregion (USEPA 2013). The East Central Texas Plains are generally characterized by gently rolling plains and acidic soils. The Northern Post Oak Savanna ecoregion landscape is described as a level to gently rolling landscape. Soils within the ecoregion are dominantly finer textured loams with an udic moisture regime (Griffith et al. 2007).

Vegetation Types

Post Oak Savannah

The study area is mapped within the Post Oak Savannah vegetational area of Texas (Gould et al. 1960) (Figure 2-4). The Post Oak Savannah is characterized by rolling hills moderately dissected by drainages. The ecoregion was once dominated by post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), and black hickory (*Carya texana*) with an herbaceous to shrubby understory and scattered prairie openings. Dominant herbaceous species include little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*). Dominant shrub species include American beautyberry (*Callicarpa americana*), possumhaw (*Ilex decidua*), yaupon (*Ilex vomitoria*), gum bumelia (*Sideroxylon lanuginosum*), and farkleberry (*Vaccinium arboretum*) (TPWD 2019d). Today much of the oak savannah has been cleared and converted to pasture or range (Griffith et al. 2007).

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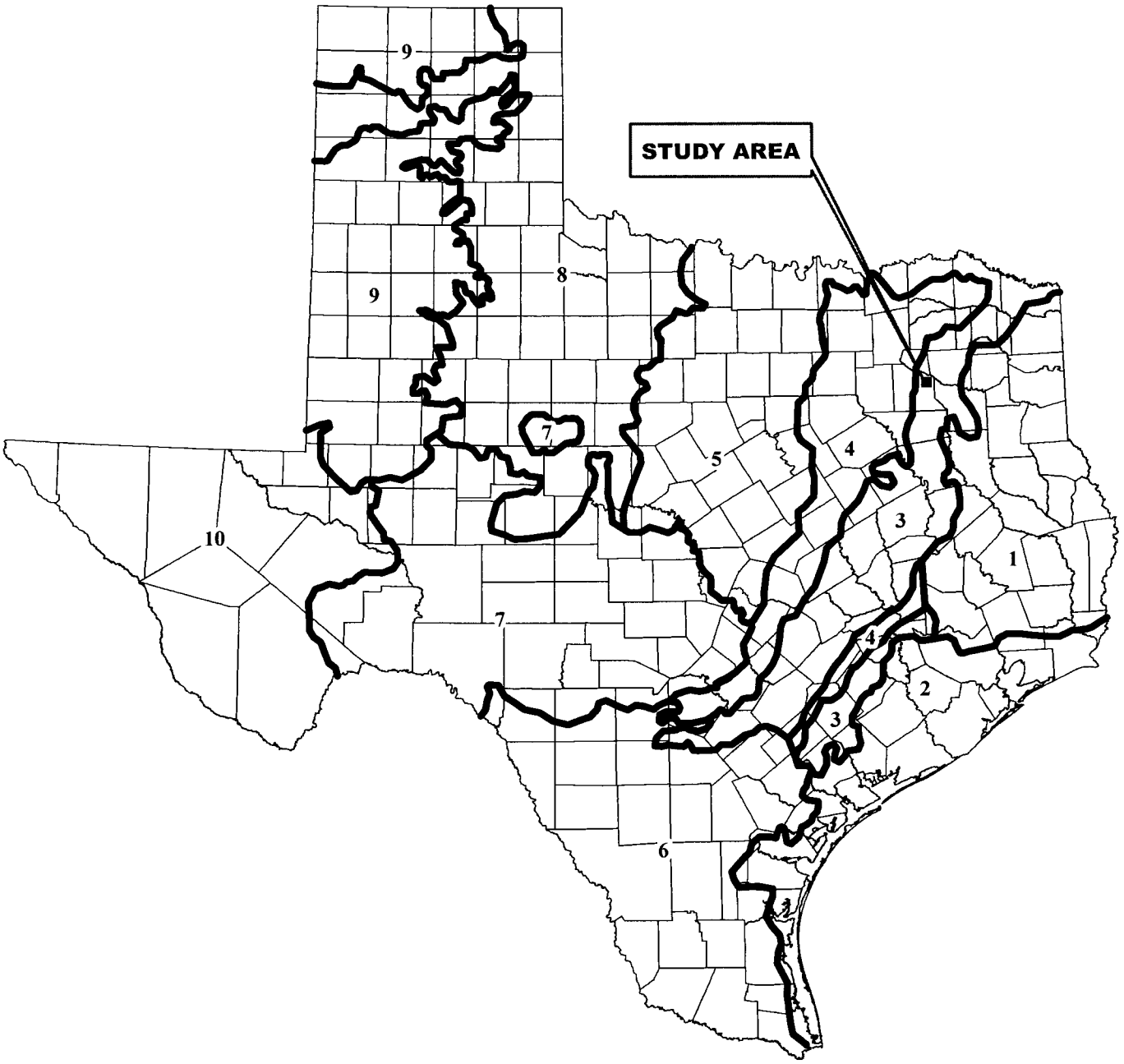

0 50 100 200

Miles

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

Date: 2/18/2020

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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Small Stream and Riparian Hardwood Forest

Small stream and Riparian Hardwood Forest occupy the bottomland areas within small stream flood plains. Dominant hardwood species include sweetgum (*Liquidambar styraciflua*), sugar hackberry (*Celtis laevigata*), green ash (*Fraxinus pennsylvanica*), river birch (*Betula nigra*), water oak (*Quercus nigra*), willow oak (*Q. phellos*), laurel oak (*Q. laurifolia*), cherrybark oak (*Q. pagoda*), southern red oak (Q. falcata), American sycamore (*Platanus occidentalis*), American elm (*Ulmus americana*), winged elm (*Ulmus alata*), cedar elm (*Ulmus crassifolia*), and red maple (*Acer rubrum*). Common herbaceous species may include slender woodoats (*Chasmanthium laxum*), creek oats (*Chasmanthium latifolium*), Cherokee sedge (*Carex cherokeensis*), false nettle (*Boehmeria cylindrica*), and white avens (*Geum canadense*) (TPWD 2019d).

Wetlands

NWI wetland types identified within the study area include freshwater palustrine emergent (PEM) and palustrine forested (PFO). The largest mapped PEM wetlands occur in association with the Grand Saline Salt Dome in the northwest corner of the study area (USFWS 2019a). Due to the presence of salt, a salt marsh has been described as occurring east of the center of the dome. Brackish springs also occur in the area and brine from the salt works contributes to salinity of the marsh (Powers and Hopkins 1922). Other PEM wetlands may occur in depressional areas associated with streams, ponds, and small lakes throughout the study area. The mapped PFO wetlands within the study are primarily along Grand Saline Creek. PFO wetlands can also occur in other riparian areas near any stream, pond, or lake as well as in overgrown depressional areas (USFWS 2019a).

Emergent Wetlands

Within the study area palustrine emergent wetlands may be dominated by maidencane (*Panicum hemitomon*), cattails (*Typha spp.*), rushes (*Juncus spp.*), sedges (*Carex spp.*), arrowheads (*Sagittaria spp.*), water-willows (*Justicia spp.*), water-primrose (*Ludwigia spp.*), and smartweeds (*Polygonum spp.*). Woody species such as buttonbush (*Cephalanthus occidentalis*) and water elm (*Planera aquatica*) may also be present as a minor component (TPWD 2019d). Salt-tolerant plants such as seashore saltgrass (*Distichlis spicata*) may occur in emergent wetland areas near the Grand Saline Salt Dome (USDA 1998).

Forested Wetlands

Forested wetlands within the study area are described as mixed broadleaf deciduous forest dominated by hardwood species such as overcup oak (*Quercus lyrata*), water oak, willow oak, water tupelo (*Nyssa aquatica*), black willow (*Salix nigra*), sweetgum, American elm, and green ash. Softwood species such as baldcypress (*Taxodium distichum*) and slash pine (*Pinus elliottii*) may be present as a minor component. Common herbaceous species may include slender woodoats, creek oaks, false nettle, and white avens (TPWD 2019d).

Wildlife and Fisheries

Wildlife

The study area is located on the boundary between the Texan and Austroriparian biotic provinces (Figure 2-5) as described by Blair (1950).

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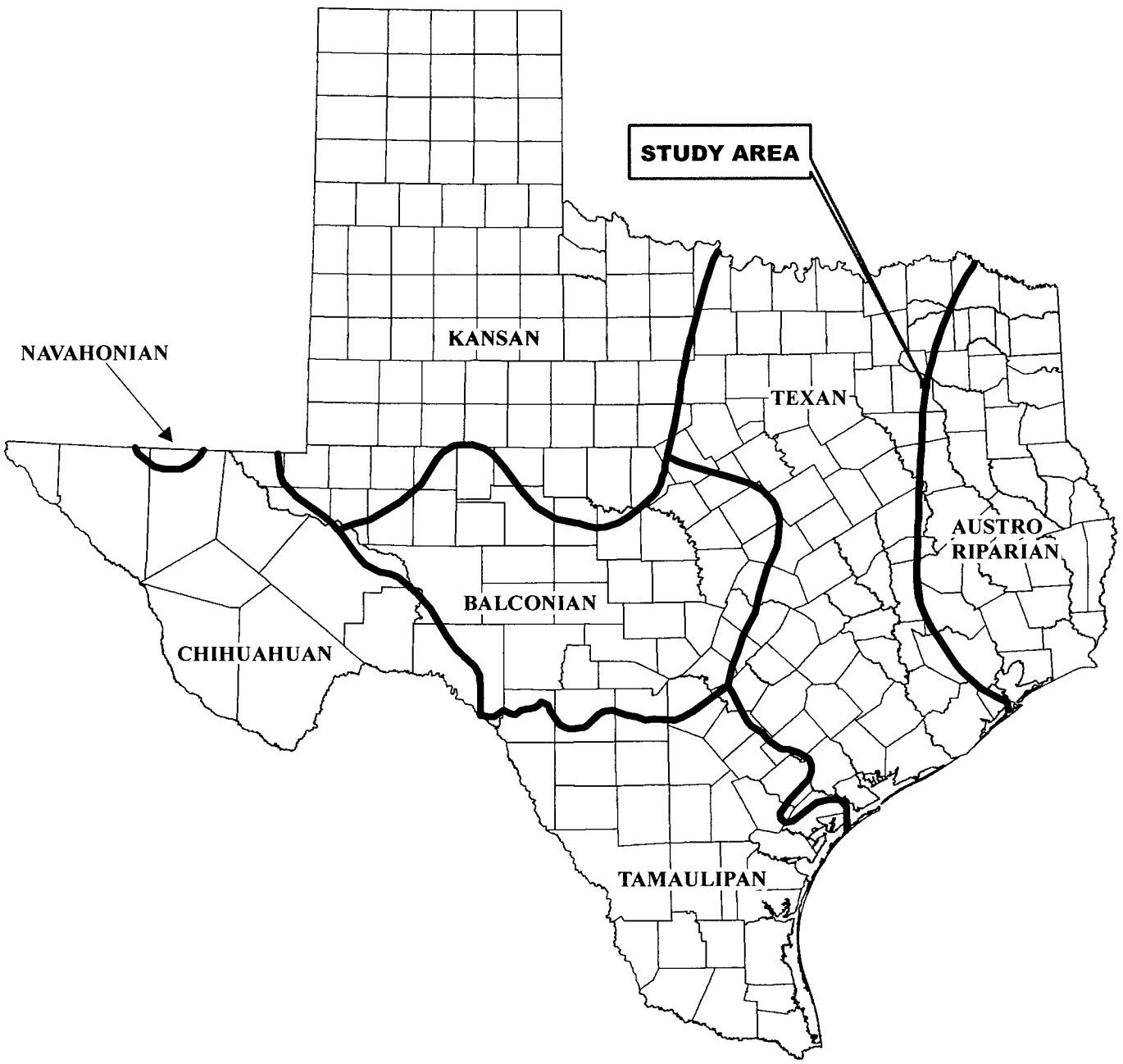

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Miles

Source: Blair, 1950, modified

Date: 2/18/2020

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, and newts) that may occur within the study area are listed in Table 2-7. Frogs and toads may occur in all vegetation types and salamanders and newts are typically restricted to moist habitats (Dixon 2013).

TABLE 2-7 AMPHIBIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Frogs/Toads	
American bullfrog	*Lithobates catesbeianus*
American toad	*Anaxyrus americanus*
Blanchard's cricket frog	*Acris crepitans*
Cajun chorus frog	*Pseudacris fouquettei*
Cope's gray treefrog	*Hyla chrysoscelis*
crawfish frog	*Lithobates areolatus*
East Texas toad	*Anaxyrus fowleri*
eastern narrow-mouthed toad	*Gastrophryne carolinensis*
gray treefrog	*Hyla versicolor*
green frog	*Lithobates clamitans*
green treefrog	*Hyla cinerea*
Gulf Coast toad	*Incilius nebulifer*
Hurter's spadefoot	*Scaphiopus hurterii*
pickerel frog	*Lithobates palustris*
southern leopard frog	*Lithobates sphenocephalus*
spring peeper	*Pseudacris crucifer*
Strecker's chorus frog	*Pseudacris streckeri*
western narrow-mouthed toad	*Gastrophryne olivacea*
Newts/Salamanders	
eastern newt	*Notophthalmus viridescens*
small-mouthed salamander	*Ambystoma texanum*
tiger salamander	*Ambystoma tigrinum*

Sources: Dixon 2013

Reptiles

Reptiles (turtles, lizards and snakes) that may typically occur in the study area are listed in Table 2-8. 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 2-8 REPTILIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Turtles	
eastern box turtle	*Terrapene carolina*
eastern mud turtle	*Kinosternon subrubrum*

TABLE 2-8 REPTILIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
snapping turtle	*Chelydra serpentina*
ornate box turtle	*Terrapene ornata*
red-eared slider	*Trachemys scripta elegans*
river cooter	*Pseudemys concinna*
spiny softshell	*Apalone spinifera*
stinkpot	*Sternotherus odoratus*
Lizards	
broad-headed skink	*Eumeces laticeps*
common five-lined skink	*Eumeces fasciatus*
green anole	*Anolis carolinensis*
little brown skink	*Scincella lateralis*
Mediterranean house gecko	*Hemidactylus turcicus*
prairie lizard	*Sceloporus consobrinus*
prairie skink	*Eumeces septentrionalis*
six-lined racerunner	*Cnemidophorus sexlineatus*
Texas horned lizard	*Phrynosoma cornutum*
Texas spiny lizard	*Sceloporus olivaceus*
Snakes	
copperhead	*Agkistrodon contortrix*
coachwhip	*Masticophis flagellum*
common kingsnake	*Lampropeltis getula*
cornsnake	*Pantherophis guttatus*
cottonmouth	*Agkistrodon piscivorus*
DeKay's brownsnake	*Storeria dekayi*
diamond-backed water snake	*Nerodia rhombifer*
eastern racer	*Coluber constrictor*
eastern hog-nosed snake	*Heterodon platirhinos*
eastern ratsnake	*Pantherophis obsoletus*
flat-headed snake	*Tantilla gracilis*
milksnake	*Lampropeltis triangulum*
plain-bellied watersnake	*Nerodia erythrogaster*
prairie kingsnake	*Lampropeltis calligaster*
red-bellied mudsnake	*Farancia abacura*
ring-necked snake	*Diadophis punctatus*
rough earthsnake	*Haldea striatula*
rough greensnake	*Opheodrys aestivus*
southern watersnake	*Nerodia fasciata*
western ribbonsnake	*Thamnophis proximus*

Source: Dixon 2013

Birds

Numerous avian species which may occur within the study area include year-round residents and summer and/or winter migrants as shown in Table 2-9. 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. Migratory bird species may be protected under the MBTA.

TABLE 2-9 COMMON AVIAN SPECIES OCCURRING WITHIN THE CROSS TIMBERS ECOREGION

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		
Mississippi kite	*Ictinia mississippiensis*		X	
northern harrier	*Circus cyaneus*			X
red-shouldered hawk	*Buteo lineatus*	X		
red-tailed hawk	*Buteo jamaicensis*			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
Canada goose	*Branta canadensis*			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		
mottled duck	*Anas fulvigula*	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

TABLE 2-9 COMMON AVIAN SPECIES OCCURRING WITHIN THE CROSS TIMBERS ECOREGION

COMMON NAME	SCIENTIFIC NAME	RESIDENT	SUMMER	WINTER
wood duck	*Aix sponsa*	X		X
APODIFORMES: Apodidae				
chimney swift	*Chaetura pelagica*		X	
APODIFORMES: Trochilidae				
black-chinned hummingbird	*Archilochus alexandri*		X	
buff-bellied hummingbird	*Amazilia yucatanensis*		X	
ruby-throated hummingbird	*Archilochus colubris*		X	
CAPRIMULGIFORMES: Caprimulgidae				
common nighthawk	*Chordeiles minor*		X	
lesser nighthawk	*Chordeiles acutipennis*		X	
CHARADRIIFORMES: Charadriidae				
killdeer	*Charadrius vociferus*	X		
semipalmated plover	*Charadrius semipalmatus*		X	
CHARADRIIFORMES: Laridae				
black tern	*Chlidonias niger*		X	
Bonaparte's gull	*Chroicocephalus philadelphia*			X
Forster's tern	*Sterna forsteri*			X
Franklin's gull	*Leucophaeus pipixcan*		X	
ring-billed gull	*Larus delawarensis*			X
CHARADRIIFORMES: Recurvirostridae				
black-necked stilt	*Himantopus mexicanus*		X	
CHARADRIIFORMES: Scolopacidae				
Baird's sandpiper	*Calidris bairdii*		X	
greater yellowlegs	*Tringa melanoleuca*		X	
least sandpiper	*Calidris minutilla*	X		
lesser yellowlegs	*Tringa flavipes*		X	
long-billed curlew	*Numenius americanus*			X
long-billed dowitcher	*Limnodromus scolopaceus*		X	
pectoral sandpiper	*Calidris melanotos*		X	
short-billed dowitcher	*Limnodromus griseus*		X	
semipalmated sandpiper	*Calidris pusilla*		X	
spotted sandpiper	*Actitis macularius*			X
stilt sandpiper	*Calidris himantopus*		X	
western sandpiper	*Calidris mauri*		X	
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		

TABLE 2-9 COMMON AVIAN SPECIES OCCURRING WITHIN THE CROSS TIMBERS ECOREGION

COMMON NAME	SCIENTIFIC NAME	RESIDENT	SUMMER	WINTER
white-winged dove	*Zenaida asiatica*	X		
CORACIIFORMES: Alcedinidae				
belted kingfisher	*Megaceryle alcyon*	X		
green kingfisher	*Chloroceryle americana*	X		
CUCULIFORMES: Cuculidae				
greater roadrunner	*Geococcyx californianus*	X		
yellow-billed cuckoo	*Coccyzus americanus*		X	
FALCONIFORMES: Falconidae				
American kestrel	*Falco sparverius*			X
crested caracara	*Caracara cheriway*	X		
GALLIFORMES: Odontophoridae				
northern bobwhite	*Colinus virginianus*	X		
scaled quail	*Callipepla squamata*	X		
GALLIFORMES: Phasianidae				
wild turkey	*Meleagris gallopavo*	X		
GAVIFORMES: Gaviidae				
common loon	*Gavia immer*			X
GRUIFORMES: Gruidae				
sandhill crane	*Grus canadensis*			X
GRUIFORMES: Rallidae				
American coot	*Fulica americana*	X		
sora	*Porzana carolina*			X
Virginia rail	*Rallus limicola*			X
PASSERIFORMES: Alaudidae				
horned lark	*Eremophila alpestris*			X
PASSERIFORMES: Bombycillidae				
cedar waxwing	*Bombycilla cedrorum*			X
PASSERIFORMES: Calcariidae				
lapland longspur	*Calcarius lapponicus*			X
McCown's longspur	*Rhynchophanes mccownii*			X
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	
summer tanager	*Piranga rubra*		X	
PASSERIFORMES: Corvidae				
American crow	*Corvus brachyrhynchos*	X		
fish crow	*Corvus ossifragus*	X		
blue jay	*Cyanocitta cristata*			
PASSERIFORMES: Emberizidae				

TABLE 2-9 COMMON AVIAN SPECIES OCCURRING WITHIN THE CROSS TIMBERS ECOREGION

COMMON NAME	SCIENTIFIC NAME	RESIDENT	SUMMER	WINTER
Cassin's sparrow	*Peucaea cassinii*		X	
chipping sparrow	*Spizella passerina*			X
clay-colored sparrow	*Spizella pallida*			X
field sparrow	*Spizella pusilla*			X
grasshopper sparrow	*Ammodramus savannarum*	X		
Harris's sparrow	*Zonotrichia querula*			X
lark bunting	*Calamospiza melanocorys*			X
lark sparrow	*Chondestes grammacus*	X		
Lincoln's sparrow	*Melospiza lincolnii*			X
savannah sparrow	*Passerculus sandwichensis*			X
song sparrow	*Melospiza melodia*			X
spotted towhee	*Pipilo maculatus*			X
vesper sparrow	*Pooecetes gramineus*			X
white-crowned sparrow	*Zonotrichia leucophrys*			X
white-throated sparrow	*Zonotrichia albicollis*			X
PASSERIFORMES: Fringillidae				
American goldfinch	*Spinus tristis*			X
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	
tree swallow	*Tachycineta bicolor*		X	
PASSERIFORMES: Icteridae				
Baltimore oriole	*Icterus galbula*		X	
Brewer's blackbird	*Euphagus cyanocephalus*			X
brown-headed cowbird	*Molothrus ater*	X		X
common grackle	*Quiscalus quiscula*	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				
brown thrasher	*Toxostoma rufum*			X
gray catbird	*Dumetella carolinensis*		X	
long-billed thrasher	*Toxostoma longirostre*	X		

TABLE 2-9 COMMON AVIAN SPECIES OCCURRING WITHIN THE CROSS TIMBERS ECOREGION

COMMON NAME	SCIENTIFIC NAME	RESIDENT	SUMMER	WINTER
northern mockingbird	*Mimus polyglottos*	X		
PASSERIFORMES: Motacillidae				
American pipit	*Anthus rubescens*			X
PASSERIFORMES: Passerellidae				
dark-eyed junco	*Junco hyemalis*			X
PASSERIFORMES: Polioptilidae				
blue-gray gnatcatcher	*Polioptila caerulea*		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	
common yellowthroat	*Geothlypis trichas*			X
hooded warbler	*Setophaga citrina*		X	
Louisiana waterthrush	*Parkesia motacilla*		X	
magnolia warbler	*Setophaga magnolia*		X	
Nashville warbler	*Oreothlypis ruficapilla*		X	
northern parula	*Setophaga americana*		X	
orange-crowned warbler	*Oreothlypis celata*			X
pine warbler	*Septophaga pinus*	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				
Bewick's wren	*Thryomanes bewickii*	X		
Carolina wren	*Thryothorus ludovicianus*	X		
house wren	*Troglodytes aedon*			X
marsh wren	*Cistothorus palustris*	X		

TABLE 2-9 COMMON AVIAN SPECIES OCCURRING WITHIN THE CROSS TIMBERS ECOREGION

COMMON NAME	SCIENTIFIC NAME	RESIDENT	SUMMER	WINTER
sedge wren	*Cistothorus platensis*			X
PASSERIFORMES: Turdidae				
American robin	*Turdus migratorius*			X
eastern bluebird	*Sialia sialis*			X
hermit thrush	*Catharus guttatus*			X
wood thrush	*Hylocichla mustelina*		X	
PASSERIFORMES: Tyrannidae				
Acadian flycatcher	*Empidonax virescens*		X	
alder flycatcher	*Empidonax alnorum*		X	
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	
least flycatcher	*Empidonax minimus*		X	
Say's phoebe	*Sayornis saya*			X
scissor-tailed flycatcher	*Tyrannus forficatus*		X	
Vermilion flycatcher	*Pyrocephalus rubinus*			X
western kingbird	*Tyrannus verticalis*		X	
willow flycatcher	*Empidonax traillii*		X	
PASSERIFORMES: Vireonidae				
white-eyed vireo	*Vireo griseus*		X	
PELECANIFORMES: Ardeidae				
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	
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: Threskiornithidae				
roseate spoonbill	*Platalea ajaja*		X	
American white pelican	*Pelecanus erythrorhynchos*			X
PICIFORMES: Picidae				
downy woodpecker	*Dryobates pubescens*	X		

TABLE 2-9 COMMON AVIAN SPECIES OCCURRING WITHIN THE CROSS TIMBERS ECOREGION

COMMON NAME	SCIENTIFIC NAME	RESIDENT	SUMMER	WINTER
ladder-backed woodpecker	*Picoides scalaris*	X		
northern flicker	*Colaptes auratus*			X
red-bellied woodpecker	*Melanerpes carolinus*	X		
PODICIPEDIFORMES: Podicipedidae				
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

Sources: Freeman 2012

Mammals

Mammals that might potentially occur in the study area are listed in Table 2-10. The occurrence of each species within the study area is dependent upon available suitable habitat.

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

COMMON NAME	SCIENTIFIC NAME
American badger	*Taxidea taxus*
American beaver	*Castor canadensis*
black-tailed jackrabbit	*Lepus californicus*
bobcat	*Lynx rufus*
Brazilian free-tailed bat	*Tadarida brasiliensis*
common gray fox	*Urocyon cinereoargenteus*
common muskrat	*Ondatra zibethicus*
common raccoon	*Procyon lotor*
cotton mouse	*Peromyscus gossypinus*
coyote	*Canis latrans*
deer mouse	*Peromyscus maniculatus*
eastern cottontail	*Sylvilagus floridanus*
eastern flying squirrel	*Glaucomys volans*
eastern fox squirrel	*Sciurus niger*
eastern gray squirrel	*Sciurus carolinensis*
eastern mole	*Scalopus aquaticus*
eastern pipistrelle	*Perimyotis subflavus*
eastern red bat	*Lasiurus borealis*

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

COMMON NAME	SCIENTIFIC NAME
eastern spotted skunk	*Spilogale putorius*
evening bat	*Nycticeius humeralis*
feral pig	*Sus scrofa*
fulvous harvest mouse	*Reithrodontomys fulvescens*
hispid cotton rat	*Sigmodon hispidus*
hispid pocket mouse	*Chaetodipus hispidus*
hoary bat	*Lasiurus cinereus*
house mouse	*Mus musculus*
Jones' pocket gopher	*Geomys knoxjonesi*
least shrew	*Cryptotis parva*
long-tailed weasel	*Mustela frenata*
marsh rice rat	*Oryzomys palustris*
mink	*Mustela vison*
mountain lion	*Felis concolor*
nine-banded armadillo	*Dasyppus novemcinctus*
Norway rat	*Rattus norvegicus*
nutria	*Myocastor coypus*
plains pocket gopher	*Geomys bursarius*
ringtail	*Bassariscus astutus*
roof rat	*Rattus rattus*
striped skunk	*Mephitis mephitis*
Texas pocket gopher	*Geomys personatus*
Virginia opossum	*Didelphis virginiana*
white-footed mouse	*Peromyscus leucopus*
white-tailed deer	*Odocoileus virginianus*

Source: Schmidly and Bradley 2016.

Fisheries

In Texas, the divisions of the biotic provinces are separated based on terrestrial vertebrate distributions; however; the distribution of freshwater fishes generally corresponds with the terrestrial biotic province boundaries. Regions showing the greatest deviation from this general rule include northeast Texas and the coastal zone. Aquatic habitats within the study area are associated with intermittent and perennial streams, lakes, and ponds (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).

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 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).

Fish that might potentially occur within the study area are listed in Table 2-11. The occurrence of each species within the study area is dependent upon available suitable habitat.

TABLE 2-11 FISH SPECIES POTENTIALLY OCCURRING WITHIN THE UPPER SABINE SUBBASIN

COMMON NAME	SCIENTIFIC NAME
ATHERINOPSIDAE: New World Silversides	
brook silverside	*Labidesthes sicculus*
inland silverside	*Menidia beryllina*
CATOSTOMIDAE: Suckers	
lake chubsucker	*Erimyzon sucetta*
river carpsucker	*Carpiodes carpio*
CENTRARCHIDAE: Sunfishes	
black crappie	*Pomoxis nigromaculatus*
bluegill	*Lepomis macrochirus*
green sunfish	*Lepomis cyanellus*
longear sunfish	*Lepomis megalotis*
orangespotted sunfish	*Lepomis humilis*
warmouth	*Lepomis gulosus*
white crappie	*Pomoxis annularis*
CLUPEIDAE: Herrings	
gizzard shad	*Dorosoma cepedianum*
CYPRINIDAE: Carps and Minnows	
blacktail shiner	*Cyprinella venusta*
bullhead minnow	*Pimephales vigilax*
ghost shiner	*Notropis buchanani*
golden shiner	*Notemigonus crysoleucas*
pugnose minnow	*Opsopoeodus emiliae*
red shiner	*Cyprinella lutrensis*
ribbon shiner	*Lythrurus fumeus*
ESOCIDAE: Pikes	
redfin pickerel	*Esox americanus*
FUNDULIDAE: Topminnows	
blackstripe topminnow	*Fundulus notatus*
ICTALURIDAE: North American Catfishes	
black bullhead	*Ameiurus melas*