Attachment 1

Docket No. 40550

Environmental Assessment and Alternative Route Analysis Report

for the

Proposed Bowers to Howard 115 kV Transmission Line Project in Gray and Wheeler Counties, Texas

Southwestern Public Service Company
Amarillo, Texas

Project No. 62799

July 2012

Environmental Assessment and Alternative Route Analysis Report

for the

Proposed Bowers Substation to Howard Substation 115 kV Transmission Line Project in Gray and Wheeler Counties, Texas

prepared for

Southwestern Public Service Company
Amarillo, Texas

July 2012

Project No. 62799

prepared by

Burns & McDonnell Engineering Company, Inc.

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Acronyms and Abbreviations

AM	Amplitude Modulation (Radio)
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CCAA	Candidate Conservation Agreements with Assurances
CCN	Certificate of Convenience and Necessity
CTT	Cross Texas Transmission
EOR	Estimated Occupied Range
EPA	Environmental Protection Agency
ERCOT	Electric Reliability Council of Texas
ESA	Endangered Species Act
ESSS	Ecologically Sensitive Stream Segment
ESRI	Environmental Systems Research Institute, Inc.
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FM Road	Farm-to-Market Road
FM Tower	Frequency Modulation (Radio)
ft.	Feet/Foot
GIS	Geographic Information System
HPA	High Probability Area
ISD	Independent School District
kV	Kilovolt
LPC	Lesser Prairie Chicken
NAIP	National Agriculture Imagery Program
NESC	National Electric Safety Code
NFDC	National Flight Data Center
NHD	National Hydrology Dataset
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTC	Notification to Construct
NWI	National Wetland Inventory
NWP	Nationwide Permit
OLEPCSPT	Oklahoma Lesser Prairie-Chicken Spatial Planning Tool
PUCT	Public Utility Commission of Texas
PURA	Public Utility Regulatory Act
RRC	Railroad Commission of Texas
ROW	Right-of-way
SH	State Highway
SPP	Southwest Power Pool
SPS	Southwestern Public Service Company
STEP	SPP Transmission Expansion Plan
SWPPP	Storm Water Pollution Prevention Plan
TCEQ	Texas Council on Environmental Quality
THC	Texas Historical Commission

TOES	Texas Organization for Endangered Species
TPWD	Texas Parks & Wildlife Department
TV	Television
TWDB	Texas Water Development Board
TXDOT	Texas Department of Transportation
TXNDD	Texas Natural Diversity Database
USCB	U.S. Census Bureau
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
Y62 line	An existing 69 kV transmission line that is proposed to be replaced with a double circuit 115/69 kV line as part of this project

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1.0 PROJECT DESCRIPTION

1.1 SCOPE OF THE PROJECT

Southwestern Public Service Company (SPS), a subsidiary of Xcel Energy, Inc., (Xcel) proposes to design and construct a new 115 kilovolt (kV) transmission line connecting SPS's existing Bowers Substation located approximately three miles northwest of Lefors in Gray County, Texas, to its existing Howard Substation located on the southwest side of Wheeler in Wheeler County, Texas (Figure 1-1). The proposed transmission line was identified by Southwest Power Pool (SPP) as needed for reliability to address low voltage issues in the Gray-Wheeler counties service area during contingency events. The proposed transmission line would be approximately 35 - 44 miles in length.

SPS retained Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) to prepare an Environmental Assessment and Alternative Route Analysis Report for this project. This report was produced by Burns & McDonnell, with input from SPS siting and Land Rights personnel. The objective of this study was to identify and evaluate alternative transmission line routes for SPS's proposed 115 kV transmission line project. Burns & McDonnell used a comprehensive transmission line routing and evaluation methodology to identify and evaluate alternative transmission line routes in accordance with Public Utility Regulatory Act (PURA) § 37.056 (c)(4)(A)-(D), the Public Utility Commission of Texas (PUCT) CCN Application form, and P.U.C. Subst. R. 25.101. The process consisted of study area delineation, data collection, constraints mapping, identification of preliminary alternative routes, public open house meetings, modification and addition of alternative route segments following the public open-house meetings, and alternative route evaluation. This report may also be used in support of any additional local, state, or federal permitting activities that may be required for SPS's proposed project.

1.2 PURPOSE OF AND NEED FOR THE PROJECT

The proposed transmission line was identified by SPP as needed for reliability to mitigate low voltage issues at the Bowers Substation and in the Grapevine area which could occur during an outage of either the Bowers to Grapevine 115-kV line or Bowers Substation 115/69-kV transformer. The proposed transmission line is a result of the 2012 SPP Transmission Expansion Plan (STEP) report of the SPP Open Access Transmission Tariff which is part of the annual Regional Transmission Organization Reliability Assessment 20-year planning horizon as discussed in the executive summary of the 2012 STEP Report. The proposed transmission line was also identified by SPS as a project to address potential violations on the system due to requests from Golden Spread Electric Cooperative for SPS to accommodate additional load at the Howard Substation and Miami Substation.

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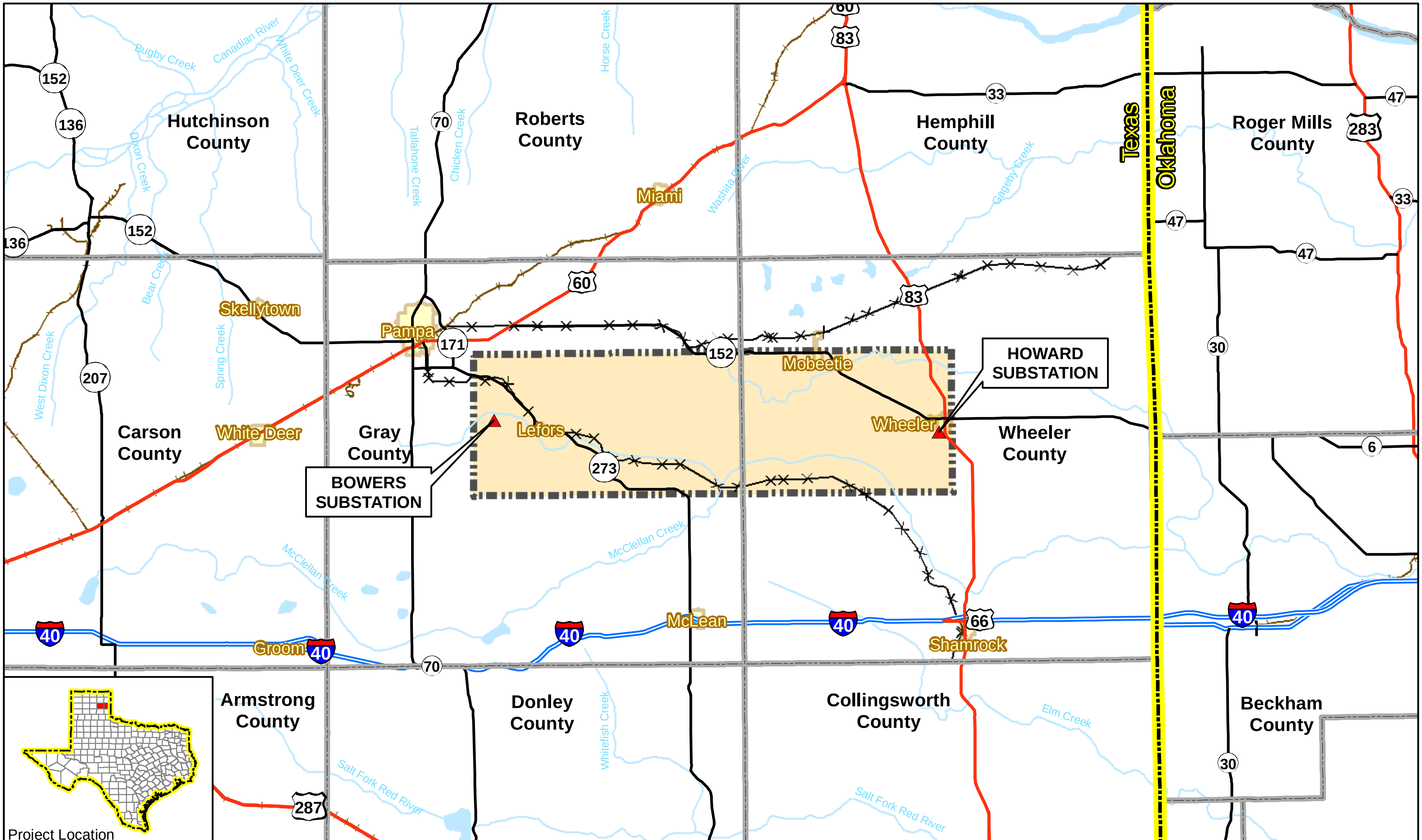

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Miles

Legend

- Study Area
- Existing Substation
- Interstate Highway
- US Highway
- State Highway and Route
- Active Railroads
- Abandoned Railroads
- City Boundary
- County Boundary
- State Boundary

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Figure 1-1
Project Area Location Map
Bowers to Howard

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1.3 DESCRIPTION OF PROPOSED CONSTRUCTION

This section provides a description and drawings of the transmission line design, including structures, conductors, right-of-way (ROW), and access for the proposed transmission line project.

1.3.1 Transmission Line Design

SPS has proposed to build the line using primarily single-pole steel structures (monopole) (Figure 1-2 and Figure 1-3); however, it is possible that some H-Frame structures (Figure 1-4 and Figure 1-5) will also be utilized. Design criteria will be in compliance with applicable statutes, the appropriate edition of the National Electrical Safety Code (NESC), and acceptable engineering design practice. Structures will be supported by foundations that are appropriate and compatible to the structure design. For monopoles, this likely will be a combination of direct-burial monopoles for in-line structures and drilled pier foundations for corner and angle structures. Highway crossings will utilize structures whose heights are greater than the minimum heights required by the Texas Department of Transportation (TxDOT) and/or the NESC.

The typical structure heights above ground will vary between 80 feet (ft.) and 140 ft. However, this height will vary depending upon terrain, span requirements, and engineering constraints.

1.3.2 Right-of-Way Requirements

The proposed ROW width for this project will be approximately 70 ft., but may be wider in exceptional circumstances. The proposed transmission line will be located along the centerline of the ROW. Additional ROW may be required at line angles and at dead-ends. The rebuild of the existing Y62 transmission line that was added after the public open houses and described in Chapter 6.0 would require less additional ROW than other proposed alternatives because the existing 30-ft. right-of-way could be used for the new line. New easements would need to be negotiated for the new line for any proposed route.

1.3.3 Clearing Requirements

The proposed transmission line project will be constructed primarily on land that has already been cleared for crops or pasture. In areas that are already cleared, very little or no clearing will be required. In the few wooded areas crossed, clearing of the ROW will be necessary. In these areas, all trees, brush, and undergrowth within the ROW, except for low growing vegetation, will be removed. Any required clearing will be conducted using techniques that are appropriate to the terrain and vegetation conditions and following applicable local, state, and federal regulations pertaining to environmental protection.

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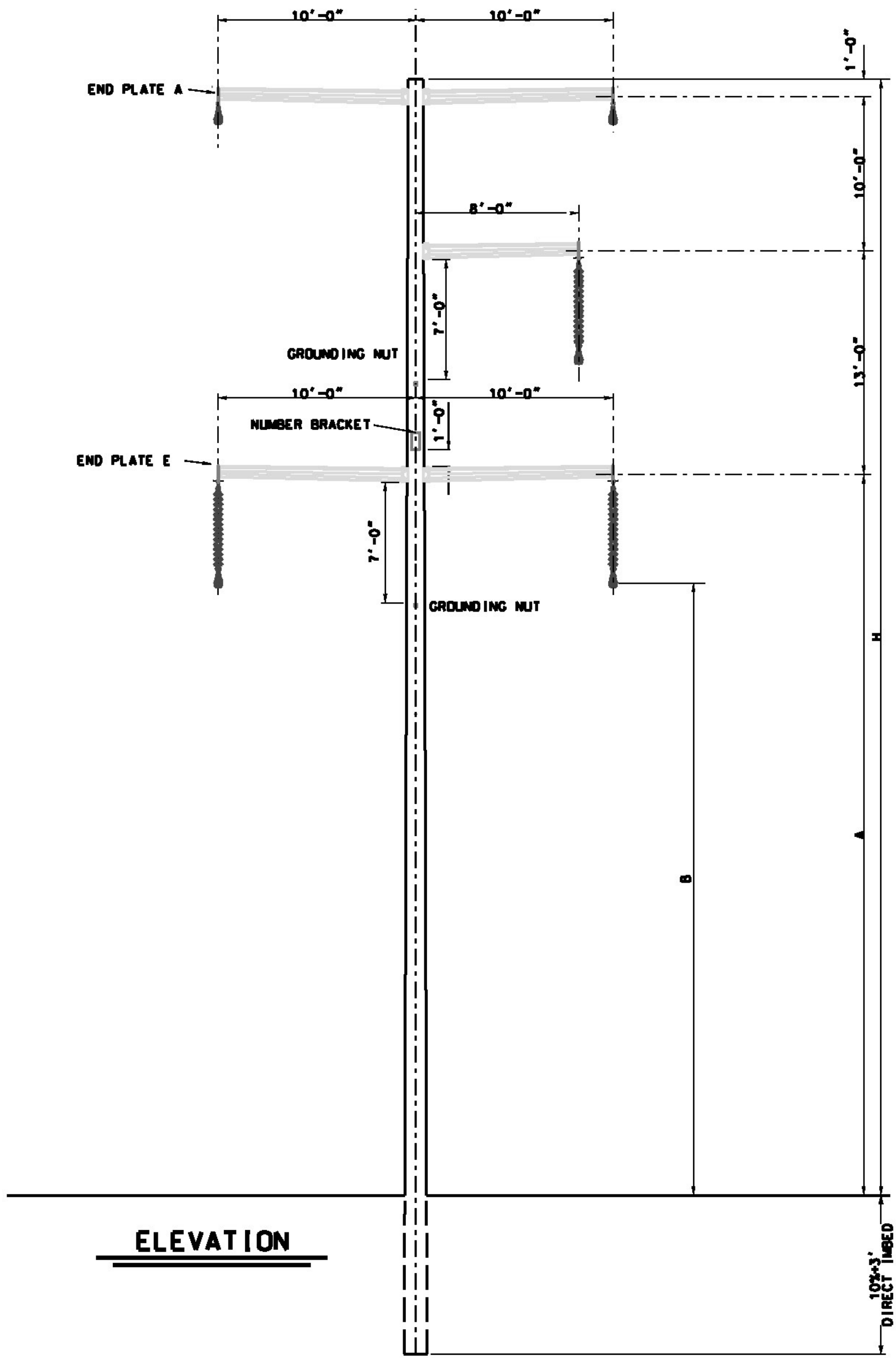

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Figure 1-2
Typical 115-kV Monopole
Delta Configuration
Bowers to Howard

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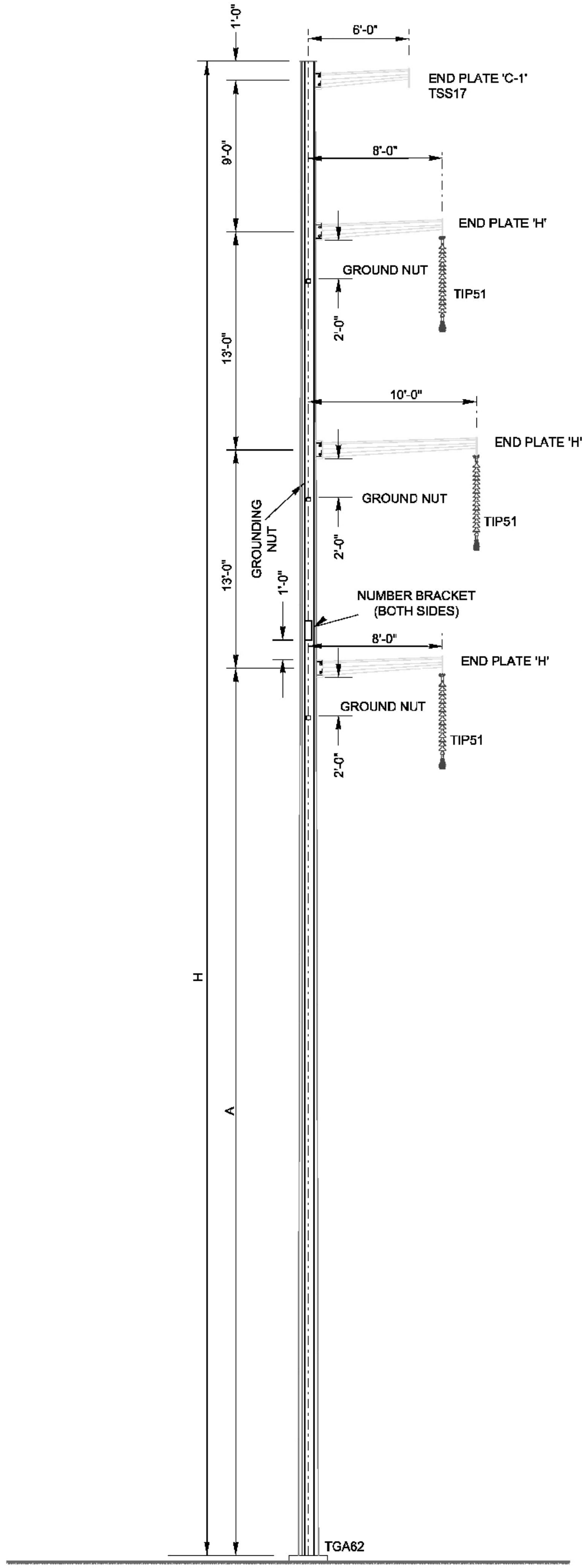

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Figure 1-3
Typical 115-kV Monopole
Vertical Configuration
Bowers to Howard

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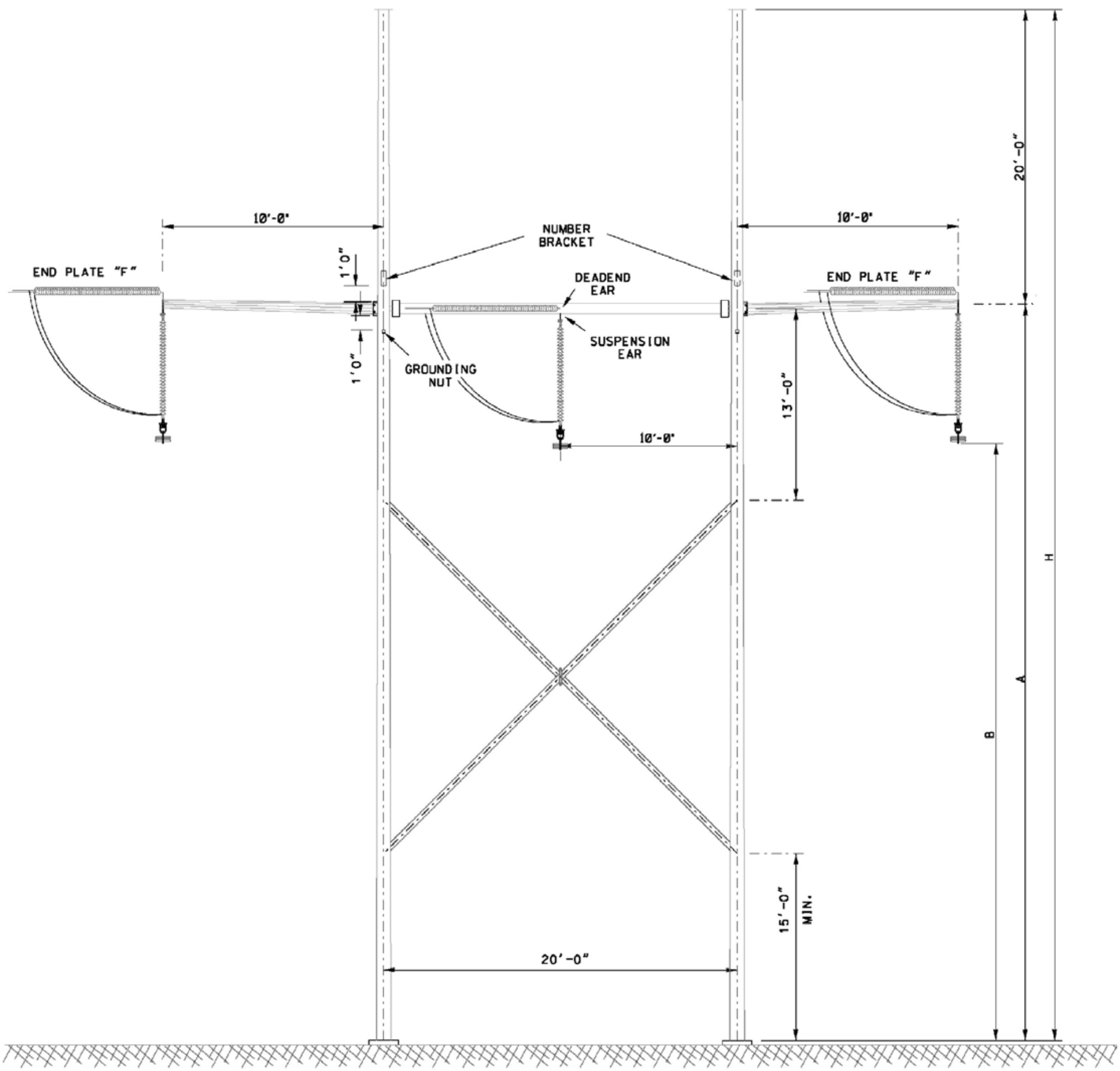

Figure 1-4
Typical 115-kV H-Frame
Bowers to Howard

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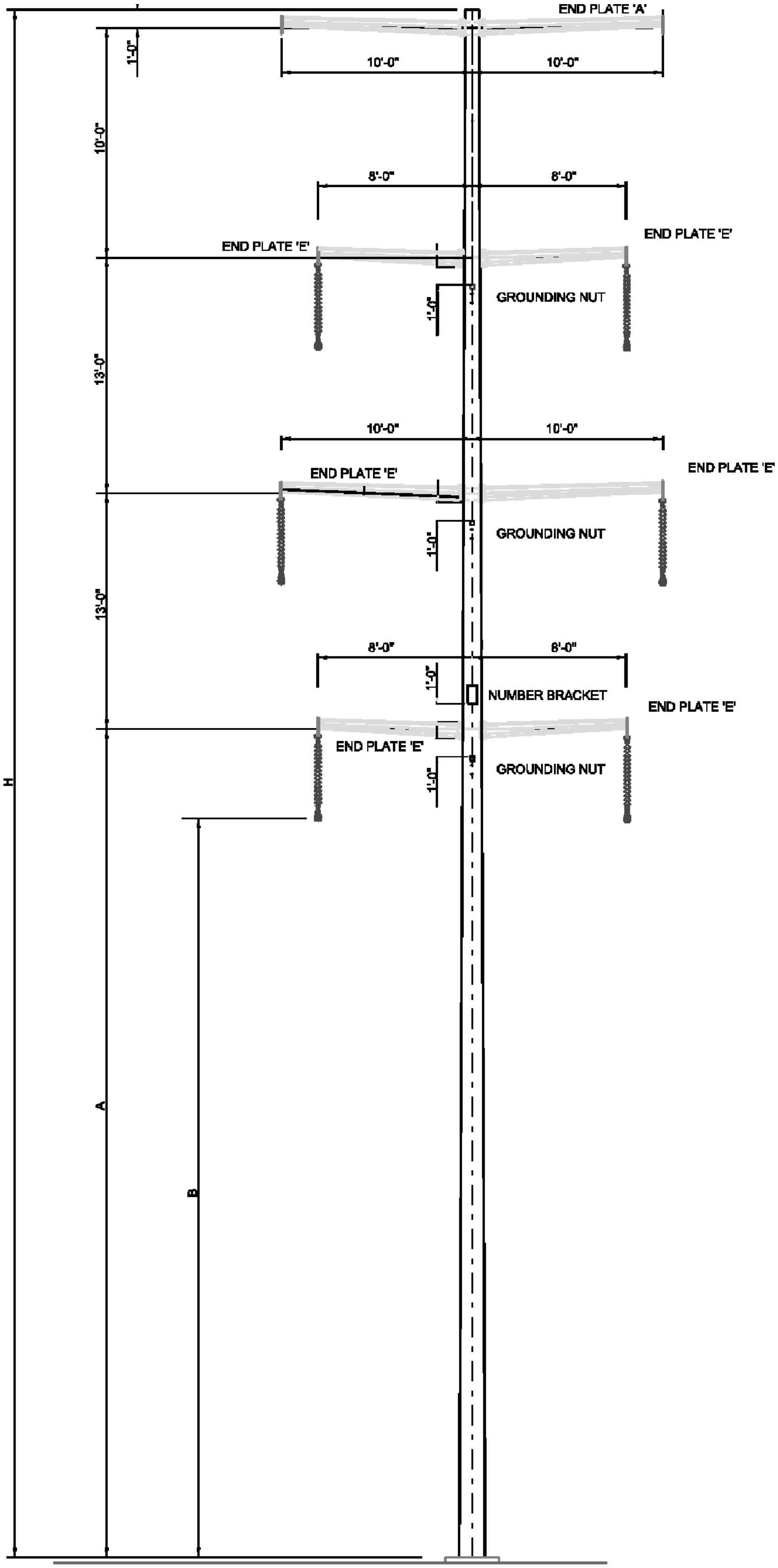

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Figure 1-5
Typical 115/69-kV Double Circuit Structures
Bowers to Howard
345 kV Transmission Line Project

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1.3.4 Access Roads

Access roads may need to be built in remote areas where the existing road infrastructure does not exist or is not adequate for equipment to access the transmission line ROW. The location and number of access roads required will be determined following the detailed engineering of the transmission line.

1.3.5 Support Structure Assembly and Erection

The first step in structure assembly and erection will be establishment of a solid foundation support system. In all cases this will begin with auger drilling of a cylindrical shaft in the soil of appropriate diameter and depth to provide necessary support to the structure. For direct-embedded monopoles, the bottom section of the monopole will be centered in this cylindrical shaft and the annulus between the monopole and the shaft will be backfilled with either crushed rock or concrete to create a strong foundation for the structure.

For base-plated monopoles, a steel reinforcing bar “cage” and an anchor bolt “cage” will be placed in the shaft and the shaft will be filled with concrete to create a sturdy foundation for the structure. Once this foundation has been constructed for each structure type, the remaining structure will be assembled and erected on top of this foundation. Equipment required for this construction will likely include a combination of cranes, trucks, and augers. Equipment will be tired or tracked according to the requirements of terrain and weather conditions.

1.3.6 Conductor Stringing

Once a series of support structures have been erected along the transmission line, the conductor stringing phase can begin. Specialized equipment will be attached to insulators that will properly support and protect the conductor during the pulling, tensioning, and sagging operations. Once the conductors and shield wire are in place, and tension and sag have been verified, suspension units are installed at each suspension point to maintain conductor position. Conductor stringing will continue until the transmission line construction is complete.

1.4 AGENCY ACTIONS AND PERMITS

Below is a summary of the various agency actions and permits likely to be required for the project. All construction documents will include any special measures required by an agency or permit as outlined below.

1.4.1 Public Utility Commission of Texas

SPS will file an application to amend its CCN at the PUCT. This environmental assessment was prepared by Burns & McDonnell to support SPS's CCN Application. This document provides information on certain land use and environmental factors as specified PURA § 37.056 (c)(4)(A)-(D), the PUCT's CCN Application form and PUCT SUBST. R. 25.101. SPS will pursue and acquire PUCT approval prior to initiating any construction activities for this project.

1.4.2 U.S. Army Corps of Engineers

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) regulates the discharge of dredged and fill material into waters of the United States, including wetlands. Any such discharge or work in waters of the United States requires a Department of the Army authorization in the form of a permit. Generally transmission lines will qualify for Nationwide Permit (NWP) for all work relating to the construction and maintenance of the line. Specifically, NWP 12 authorizes transmission lines that will result in a loss of no greater than half an acre of waters of the United States. It is not anticipated that any other NWP would need to be acquired for this project. If after final design it is determined that the project will result in a loss of greater than half an acre of waters of the United States, SPS would be required to acquire an individual permit from USACE before beginning construction activities.

1.4.3 Texas Commission on Environmental Quality

If the project will result in greater than one acre of land disturbance, including vegetation clearing, the Texas Commission on Environmental Quality (TCEQ) would require the preparation of a Storm Water Pollution Prevention Plan (SWPPP) as part of the requirements of the Texas Pollutant Discharge Elimination Program General Permit. If it is determined that more than five acres of land will be disturbed for this project, SPS will also submit the required Notice of Intent to TCEQ prior to commencing any land disturbance activities.

1.4.4 U.S. Fish and Wildlife Service

SPS will consult with the U.S. Fish and Wildlife Service (USFWS) to receive their concurrence under Section 7 of the Endangered Species Act (ESA) for impacts to threatened and endangered species prior to commencing construction. SPS will also seek concurrence under the Bald and Golden Eagle Protection Act if determined to be necessary by the USFWS. SPS will implement mitigation measures in consultation with USFWS to offset any impacts to threatened and endangered species.

1.4.5 Texas Parks and Wildlife Department

SPS will consult with Texas Parks and Wildlife Department (TPWD) to receive their concurrence on impacts to state listed threatened and endangered species prior to commencing construction. SPS will implement mitigation measures as outlined by TPWD and as required by the PUCT to offset impacts to state listed threatened and endangered species.

1.4.6 Federal Aviation Administration

SPS will determine if a Notice of Proposed Construction or Alteration (Form 7460-1) will need to be submitted to the Federal Aviation Administration (FAA) for the project for any structures that may pose a threat to navigable airspace.

1.4.7 Texas Historical Commission

Prior to construction, SPS will obtain clearance from the Texas Historical Commission (THC) on any requirements for protection of historic and prehistoric cultural resources.

1.4.8 Texas Department of Transportation

Where necessary, SPS will obtain permits from the Texas Department of Transportation (TXDOT) for any crossing of any state-maintained roadway. SPS will also obtain TXDOT permits for construction of any access roads from a state-maintained roadway.

1.4.9 Railroads

There are no active railroads found within the study area, therefore no permits are anticipated to be required by any railroad companies for the project.

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2.0 ROUTE SELECTION METHODOLOGY

The objective of this study was to identify and evaluate alternative transmission line routes for SPS's proposed 115 kV transmission line project. Throughout this report the terms "environmental" or "environment" shall include the human environment as well as the natural environment. Burns & McDonnell used a comprehensive transmission line routing and evaluation methodology to identify and evaluate alternative transmission line routes. Methods used to identify and evaluate potential routes were in accordance with PURA § 37.056 (c)(4)(A)-(D), the PUCT's CCN Application form and P.U.C. SUBST. R. 25.101.

The following sections provide a description of the process that consisted of study area delineation, data collection, constraints mapping, identification of preliminary alternative routes, public involvement program, modification and addition of alternative routes following the public open-house meetings, alternative route evaluation, and identification of proposed routes.

2.1 STUDY AREA DELINEATION

The first step in the identification of alternative routes was to select a study area. This area needed to encompass the Bowers Substation and the Howard Substation, and include an area large enough that a reasonable number of alternative routes could be identified.

The Burns & McDonnell Project Team reviewed SPS maps, Energy Velocity data, and aerial photography produced by the National Agriculture Imagery Program (NAIP) to develop and identify the study area boundary for this project. The Burns & McDonnell Project Team used Energy Velocity data and maps provided by SPS to identify the location of the Bowers Substation and the Howard Substation on the various maps, as well as existing transmission lines, and identified the major land use features in the vicinity of the proposed project, such as major roadways, municipalities, existing pipelines, and related features. Based on this evaluation, the study area boundary, as depicted in Figure 2-1, was developed. The study area is approximately 35.5 miles by 10.5 miles and encompasses approximately 240,290 acres.

The purpose of delineating a study area for the project was to establish boundaries and limits for the information gathering process (i.e., identifying environmental and land use constraints). The delineation of the study area also allowed the Burns & McDonnell Project Team to focus their evaluation on a specific area associated with the proposed project. The study area developed for this project was developed to take advantage of existing corridors which included the existing SPS and Cross Texas Transmission (CTT) transmission lines to the south, State Highway (SH) 152 to the north, and the

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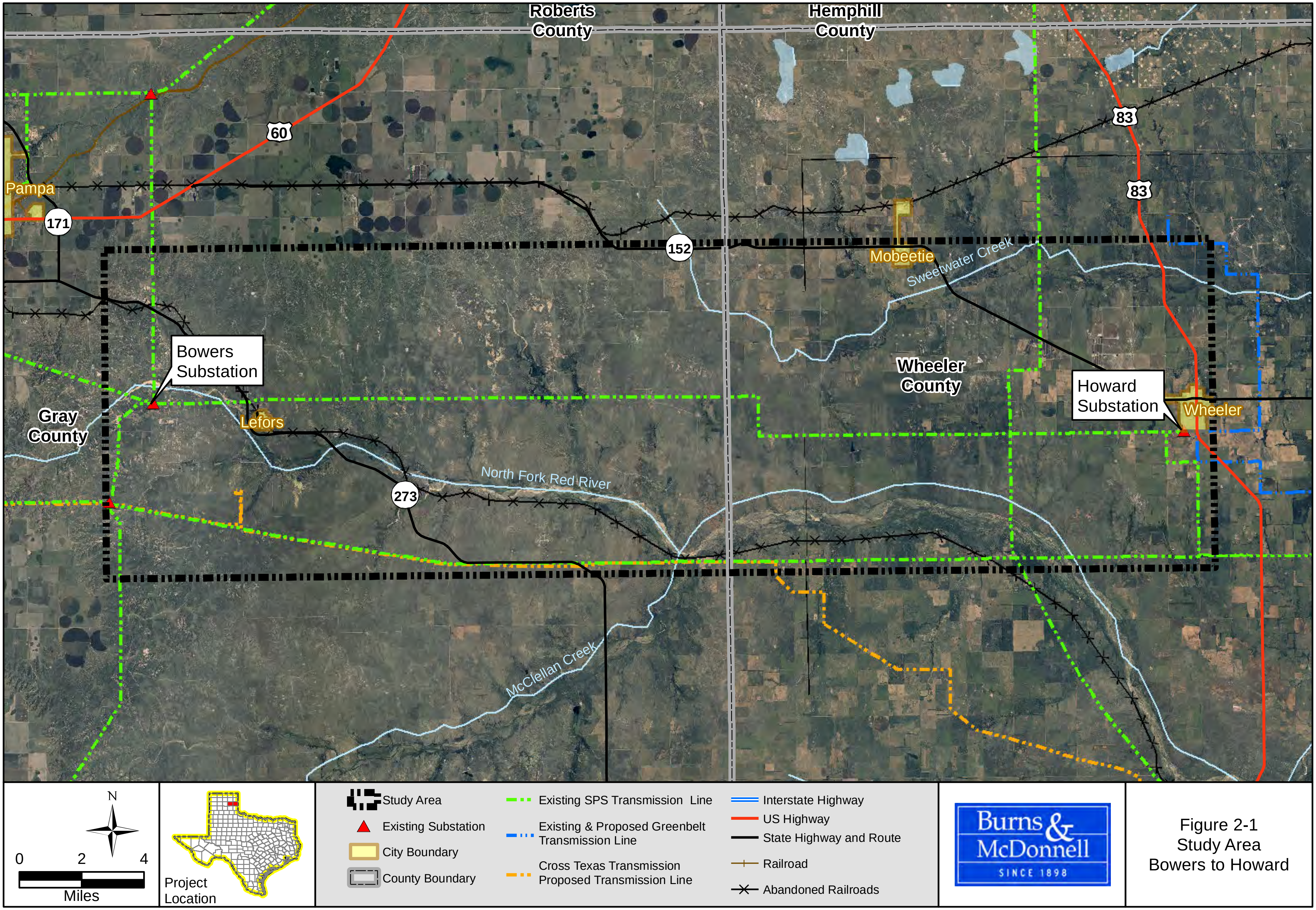

Figure 2-1
Study Area
Bowers to Howard

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existing transmission lines running north/south in the east and west portions of the study area.

2.2 DATA COLLECTION

Data was collected from local, state, and federal officials and agencies, as well as from field reconnaissance surveys as described below.

2.2.1 Request for Information from Local, State, and Federal Officials/Agencies

One of the first data collection activities for this project was the development of a list of officials to be mailed a consultation letter regarding the proposed project. The purpose of the letters was to inform the various officials and agencies of the proposed project and give them the opportunity to provide information they may have regarding the study area. Various state and/or federal agencies that may have potential permitting requirements for the proposed project were also contacted.

Other data collection activities consisted of file and record reviews conducted at various state regulatory agencies, a review of published literature, available Geographic Information System (GIS) data, and frequent review of a variety of maps, including recent color aerial photography, U.S. Geological Survey (USGS) topographic maps, various roadway maps, and county appraisal district land parcel boundary maps.

2.2.2 Field Reconnaissance Surveys

During the course of the above-mentioned data collection activities, Burns & McDonnell project team personnel conducted reconnaissance surveys of the study area to confirm the findings of the previous research and data collection activities and to identify potential constraints that may not have been previously noted. The site visit was also utilized to assist in the route selection process. Reconnaissance surveys were conducted by visual observations from public roads and public ROW located within the study area. Burns & McDonnell conducted two reconnaissance surveys: one on October 10-11, 2011 and one on May 1-2, 2012. Representatives from Manning Land also completed reconnaissance surveys over several days in November, 2011 and in April, 2012.

The data collection effort was an ongoing process. Results of the various data collection activities (i.e. request for information from local, state, and federal officials and agencies; file/records review; visual reconnaissance surveys, GIS mapping, etc.) are presented throughout Sections 3.0 and 7.0 of this report.

2.3 CONSTRAINTS MAPPING

The data and information collected during the data collection phase were utilized to develop an environmental and land use constraints map (Figure 2-2 located in map pockets at the end of this report). The constraints map, various public maps, recently flown aerial photography, and reconnaissance surveys were used to identify and select potential preliminary alternative routes within the study area. The geographic locations of exclusionary areas, avoidance areas, and opportunity areas, as well as environmentally sensitive areas within the study area, were located and considered during transmission line route identification. Burns & McDonnell was able to identify and select alternative routes that minimized and reduced potential impacts.

An exclusion area is defined as an area that cannot be crossed by a transmission line due to federal, state, or local laws, regulations, or ordinances. For example, the FAA is responsible for regulating most public airport facilities. It is inappropriate for an overhead electric transmission line to cross a runway due to safety concerns. Therefore, an airport runway would be considered an exclusion area.

Avoidance areas include those areas for which there is no law or regulation that prohibits the crossing of a transmission line, but that would require special considerations or mitigation measures. A few examples of avoidance areas would be a park, schools, cemeteries, federally-owned land (i.e. USACE land), or environmentally sensitive areas (i.e. habitat for threatened or endangered species). Avoidance areas can be generally broken down into different levels (i.e. low, medium, and high) depending upon the type of constraint. For example, a forested wetland might be classified as a high avoidance area due to the requirement to obtain a permit and required mitigation measures for impacts, while an archeological site may be considered a low or medium avoidance area since actual disturbance of the site could likely be avoided by spanning the transmission line over the site. A transmission line route through a residential subdivision might not adhere to the policy of prudent avoidance if reasonable and otherwise acceptable alternatives exist in opportunity areas.

In addition to identifying constraint areas, the project team also identified opportunity areas which included existing corridors like SH 152, the existing Y62 transmission line (*see* Section 6.0), and the existing SPS and CTT transmission lines in the southern portion of the study area. Opportunity areas are considered to be lower-impact areas, or those areas with a relatively low likelihood of containing existing natural, human, or cultural resources that could be negatively impacted by a transmission line.

2.4 IDENTIFICATION OF PRELIMINARY ALTERNATIVE ROUTES

Upon completion of the various data collection activities and constraint mapping process, the next step in the project was to identify preliminary alternative routes to connect the project end points. Burns & McDonnell utilized the following to identify the alternative routes:

- Input received from the various correspondence with local officials and others as described in Section 2.2.1;
- Input received from the two public open-house meetings;
- Results of the visual reconnaissance activities of the study area;
- Review of recent aerial photography;
- Findings of the various data collection activities;
- Environmental and land use constraints;
- Apparent property boundaries;
- Existing compatible corridors; and
- Location of towns and cities.

The preliminary alternative routes were identified in accordance with PURA § 37.056 (c)(4)(A)-(D) and P.U.C. SUBST. R. 25.101, including the PUCT policy of prudent avoidance. It was Burns & McDonnell's intent to identify an adequate number of alternative routes which were environmentally acceptable, considering such factors as community values, park and recreational areas, historical and aesthetic values, environmental integrity, length of route parallel to or utilizing existing compatible ROWs, length of route parallel to apparent property boundaries, and the PUCT's policy of prudent avoidance.

The preliminary alternative routes identified by Burns & McDonnell, as shown on Figure 2-3, were then presented at two public open-house meetings. A more detailed discussion of the preliminary route identification process is provided in Chapter 4.0.

2.5 PUBLIC INVOLVEMENT PROGRAM

Once the preliminary alternative routes were identified, two public open-house meetings were held. The two open-house meetings were held on October 11 and 13, 2011 between the hours of 5:30 p.m. and 7:30 p.m., at the following locations:

October 11 – Wheeler: Wheeler County Ag & Family Life Center, 7939 U.S. Highway 83, Wheeler, Texas

October 13 – Pampa: AmericInn Event Center 1101 N. Hobart, Pampa, Texas

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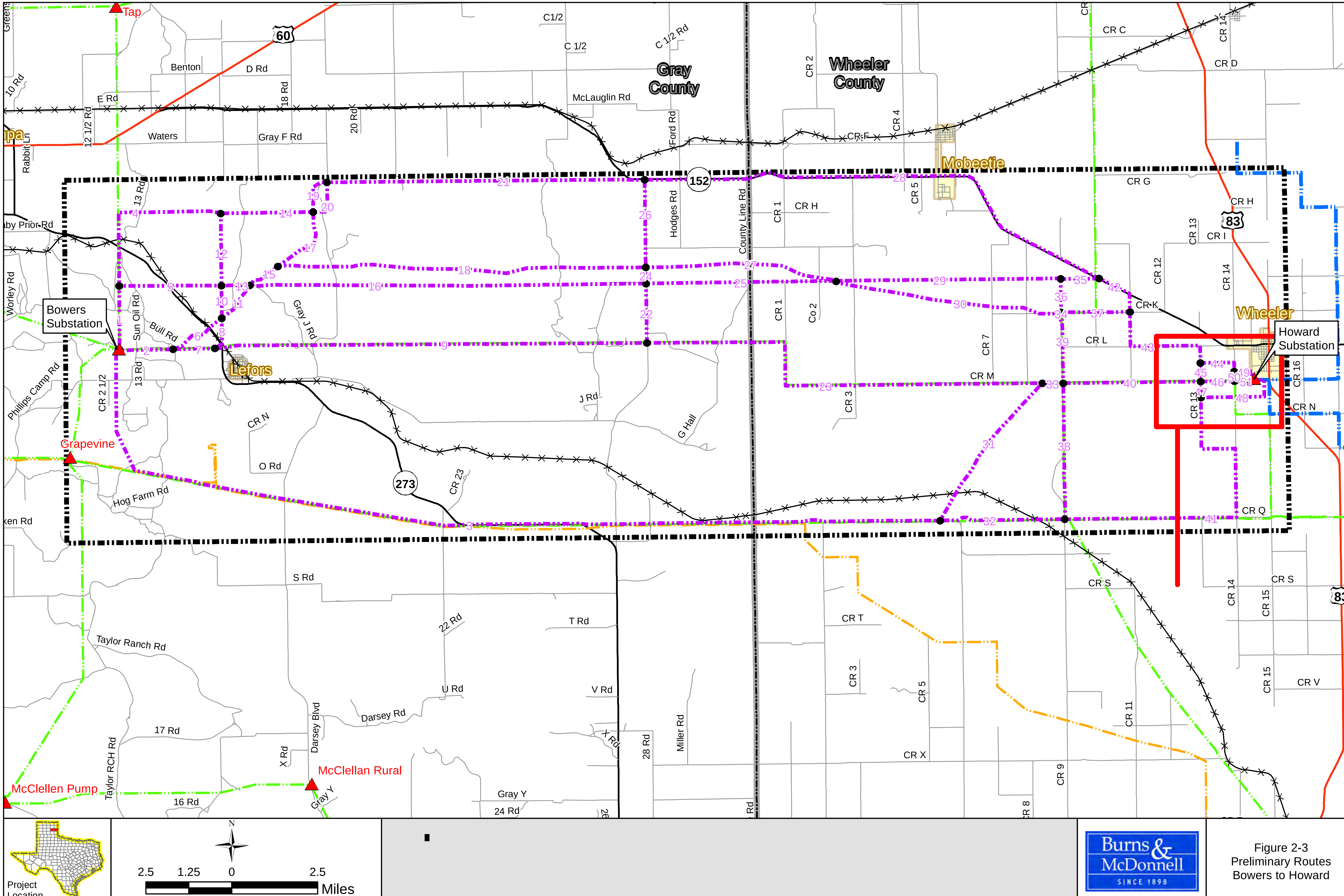

Figure 2-3
Preliminary Routes
Bowers to Howard

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The purpose of the meetings was to solicit comments and input from residents, landowners, public officials, and other interested parties concerning the proposed project, the preliminary alternative routes, and the overall transmission line routing process; promote a better understanding of the proposed project including the purpose, need, schedule, routing procedure, potential benefits and impacts, and the decision-making process; encourage public involvement in the routing and certification process; and ensure that the decision-making process adequately identifies and considers the values and concerns of the public and community leaders.

SPS mailed written notice of the meetings to all owners of property within 300 ft. of the centerline for the preliminary alternative route segments as delineated at the time of the public open house meetings (488 notices were mailed). Additionally, agencies and other organizations were mailed written notice of the meetings.

At each open-house meeting, SPS set up information stations in the meeting space. Each station was devoted to a particular aspect of the project and was staffed by SPS (Welcome Table, Engineering, and Purpose/Need of the Project), Burns & McDonnell (Environmental and Routing), and Manning Land (Landowner Identification and ROW).

Each station had maps and illustrations and/or text explaining each particular topic. Interested citizens and property owners were encouraged to visit each station in order, so that the entire process could be explained in the general sequence of project development. The information station format is advantageous because it allows attendees to process information in a more relaxed manner and also allows them to focus on their particular area of interest and ask specific questions. Furthermore, the one-on-one discussions with the SPS team encouraged more interaction from those citizens who might be hesitant to participate in a speaker-audience format.

After the public open-house meetings, Burns & McDonnell reviewed and evaluated each questionnaire that was submitted at the meetings (or mailed at a later date) as well as all routing maps that had areas of interest identified by the attendees. Attendee comments were evaluated, considered, and factored into the overall evaluation of the alternative routes.

A more detailed discussion of the public involvement activities is provided in Chapter 5.0.

2.6 ADDITION/MODIFICATION OF ALTERNATIVE ROUTES FOLLOWING THE OPEN-HOUSE MEETINGS

Following the open-house meetings, as a result of input from the meeting attendees, additional evaluation of the preliminary alternative routes by Burns & McDonnell, and additional input provided by SPS, some segments were removed from consideration, modifications were made to the location of portions of one existing segment, and a rebuild alternative was added. The additions and modifications to the existing segment occurred in various portions of the study area and are further described in Section 6.0.

2.7 EVALUATION OF THE ALTERNATIVE ROUTES

After modifications to the existing segments were made, a total of 137 alternative preliminary routes were identified. The Burns & McDonnell Project Team then initiated a detailed evaluation of each alternative route/segment (see Chapter 7.0 for a detailed discussion of the evaluation and results). In evaluating the alternative routes/segments, a variety of environmental and land use criteria were considered as well as the results of the public involvement program. As shown in Table 2-1, 37 environmental and land use criteria were utilized. The criteria were based on routing factors set forth in PURA § 37.056 (c)(4)(A)-(D), the PUCT CCN Application form, P.U.C. SUBST. R. 25.101, as well as additional factors Burns & McDonnell considered to be appropriate for this project.

The analysis of each alternative route/segment involved taking inventory and tabulating the number or quantity of each environmental and land use criterion located along the centerline of each route (i.e. number of stream crossings, the length across agricultural land, etc.). These criteria were developed and tailored to the specific characteristics that were identified in the study area. For instance, Burns & McDonnell identified a number of county and Farm-to-Market roads (FM roads) as well as existing transmission lines as existing corridors within the study area. Paralleling and/or utilizing existing compatible corridors are desirable criteria to be considered in the selection and evaluation of alternative routes. The number or amount of each criteria was determined primarily by reviewing recent color aerial photography and by reconnaissance surveys, where possible. Burns & McDonnell was able to verify a majority of these criteria within the study area during the reconnaissance surveys.

2.8 IDENTIFICATION OF THE PROPOSED ROUTES

Burns & McDonnell used a z-score screening methodology using the 37 different environmental and land use criteria that were calculated for each route; as well as the results of the public involvement program, to identify 13 routes to carry forward through the rest of the evaluation process and to be submitted to the

Table 2-1
Environmental and Land Use Criteria

1. Total length (ft.)
2. Length parallel to existing transmission lines (ft.)
3. Length parallel to existing roads (ft.)
4. Length parallel to existing pipelines (ft.)
5. Length parallel to apparent property lines (ft.)
6. Length parallel to existing railroads (ft.)
7. Total length parallel to existing facilities (ft.)
8. Habitable structures within 300 ft. of the centerline (count)
9. Length across parks and recreation areas (ft.)
10. Parks and recreation areas within 1,000 ft. of the centerline (count)
11. Rangeland within ROW (acres)
12. Cultivated land in ROW (acres)
13. Length across mobile irrigation systems (ft.)
14. Wooded areas within ROW (acres)
15. Forested/scrub-shrub wetlands within ROW (acres)
16. Emergent & riverine wetlands within ROW (acres)
17. Number of streams crossed (count)
18. Number of ecologically significant stream segments crossed (count)
19. Length parallel to streams within 100 ft. (ft.)
20. Known rare/unique plant species within ROW (count)
21. Length through potential threatened and endangered species habitat (ft.)
22. Lesser prairie chicken habitat score (score)
23. Number of recorded cultural sites crossed (count)
24. Number of recorded cultural sites within 1,000 ft. (count)
25. Length through high probability areas (HPAs) for historical or cultural sites (ft.)
26. Number of FAA registered airstrips within 10,000 ft. with runway lengths less than 3,200 ft. in length (count)
27. Number of FAA registered airstrips within 20,000 ft. with runway lengths greater than 3,200 ft. in length (count)
28. Number of private airstrips within 10,000 ft. (count)
29. Number of heliports within 5,000 ft. (count)
30. Length across open water (ft.)
31. Number of AM towers within 10,000 ft. (count)
32. Number of Frequency Modulation (FM) towers within 2,000 ft. (count)
33. State and federal highway crossings (count)
34. Other public road crossings (count)
35. Length of route within foreground visual zone (1/2 mile) of state and federal highways (ft.)
36. Length of route within foreground visual zone (1/2 mile) of park/recreational areas (ft.)
37. Length through off road erosional hazard areas (ft.)

PUCT in the Application (Figure 2-4). These proposed routes represented the top-ranking route in each corridor (Northern, Central, South-Central, and Southern – see Chapter 4.0) and additional lower-ranking routes (that were the highest ranked routes that used all acceptable segments). When combined, all segments considered acceptable (see Section 6.0) were included in the proposed routes for evaluation and review. Table 2-2 lists the proposed route designations, their component segments, and their lengths.

The Burns & McDonnell Project Team then evaluated the advantages and disadvantages of each proposed route using the environmental and land use criteria, input from the agencies, and public input. Potential environmental and land use impacts of the proposed routes are addressed in Section 7.0 of this document. After Burns & McDonnell made its route recommendations, SPS completed further evaluations using Burns & McDonnell's environmental information and evaluation and SPS's constructability, maintenance, and operational requirements to select a preferred route.

Table 2-2
Proposed Routes and Lengths

Routes	Segments	Length (ft.)	Length (miles)
A	2a,7a,9a,23a,33a,40a,46a,50,49	183,640	34.8
B	2,7,9,23,33,40,46,51	182,160	34.5
C	1,5,13,16,22,23,33,40,46,50,49	202,120	38.3
D	2,7,9,23,33,40,45,44,49	186,880	35.4
E	2,7,9,23,33,40,47,48	186,360	35.3
F	1,5,13,16,25,29,36,37,43,44,49	199,300	37.7
G	2,7,8,10,13,16,22,23,33,40,46,50,49	202,340	38.3
H	1,5,13,16,25,29,36,34,39,40,46,51	200,330	37.9
I	1,5,13,16,25,29,35,42,43,44,49	197,510	37.4
J	1,4,14,20,21,26,24,22,23,33,40,46,50,49	233,860	44.3
K	3,32,38,40,46,50,49	216,270	41.0
L	3,32,41,47,46,50,49	226,790	43.0
M	2,7,8,10,12,14,20,21,28,42,43,44,49	220,310	41.7

Detailed descriptions of the 58 segments comprising the 13 proposed routes are included in Appendix D.

* * * * *

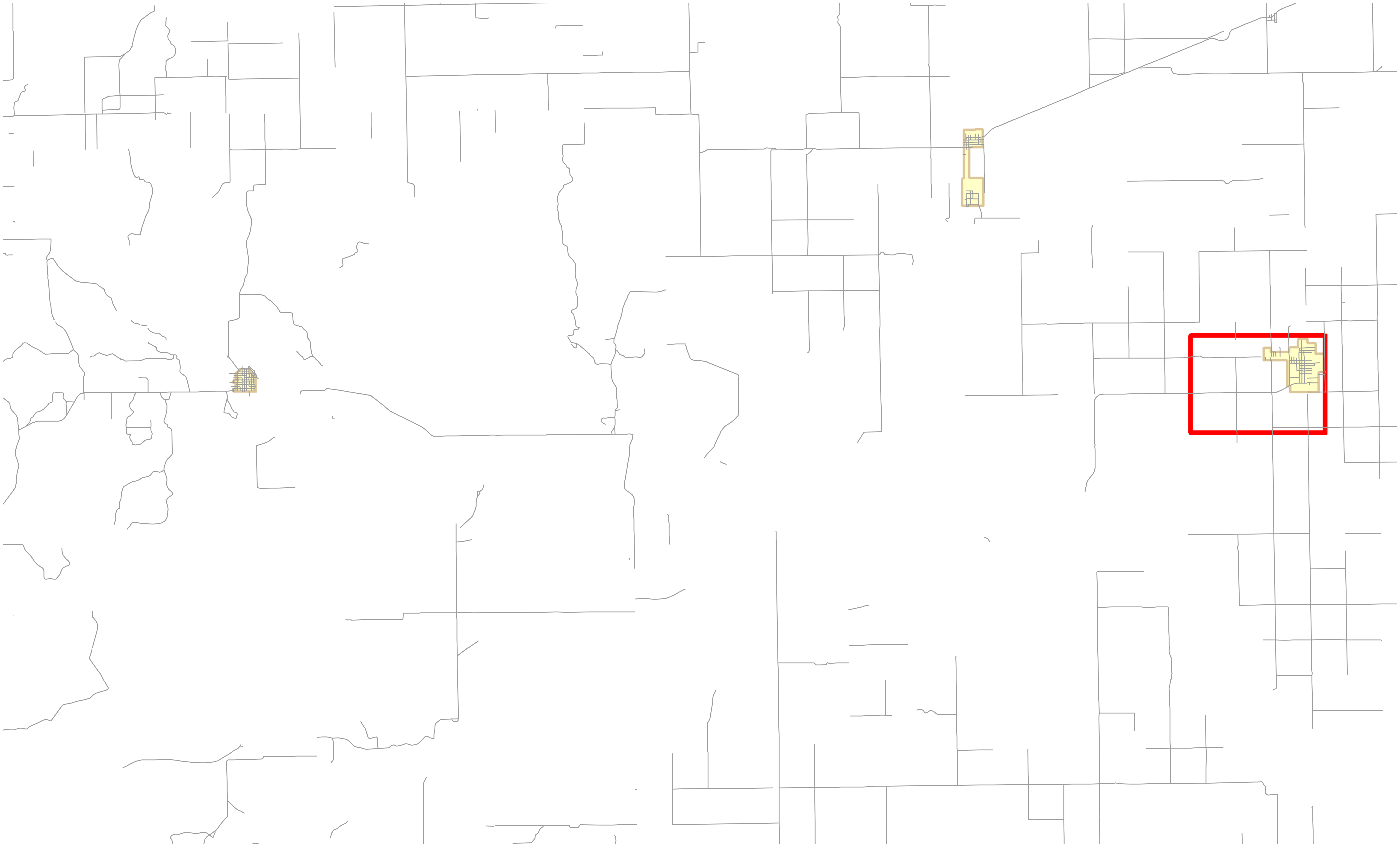

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Figure 2-2 Environmental and Land Use Constraints Map

3.0 DESCRIPTION OF THE STUDY AREA

3.1 CONSTRAINTS MAPPING

As described in Chapter 2.0, after the study area boundary was identified (Figure 2-1), the Burns & McDonnell Project Team initiated the information gathering process and the identification of environmental and land use constraints within the study area. The result of the information gathering process was a constraint map that plotted environmental and land use constraints and was utilized in identifying preliminary alternative routes. The geographic locations of environmentally sensitive areas, restrictive areas, exclusion areas, land use constraints, etc., within the study area were identified on an aerial photograph base map (Figure 2-2) that is located in map pockets at the end of this report.

3.2 NATURAL RESOURCES

The following is a description of the natural resources in the study area. These resources include topography, soils, hydrology, vegetation, wetlands, wildlife, and threatened and endangered plant and animal species. An evaluation of the potential impacts of this project upon these resources is described in Chapter 7.

3.2.1 Topography and Physiography

The study area is situated within the Rolling Plains and the High Plains ecoregions. More specifically, the study area is primarily located within two level III ecoregions: the Central Great Plains and the Southwestern Tablelands, with a very small portion located in the High Plains. The High Plains are comprised largely of slightly irregular plains with a high percentage of cropland. This ecoregion comprises only small areas of the northwestern portion of the study area. The Southwestern Tablelands ecoregion covers the majority of the central and western portions of the study area. The majority of this ecoregion has significantly more relief than the High Plains; this relief is associated with the various rivers and tributaries that run throughout this region. Compared to the High Plains, very little of this ecoregion is used as cropland. The Central Great Plains ecoregion occurs in the eastern portion of the study area. This ecoregion is somewhat lower and wetter than the High Plains and is largely covered in cropland. The topography in this portion of the study area is less pronounced than in the Southwestern Tablelands ecoregion (U.S. Environmental Protection Agency (EPA), 2012).

The study area is located within the southern portion of the Anadarko Basin, a region rich in natural gas. According to data acquired from the Railroad Commission of Texas (RRC), the study area contains approximately 2,270 active oil and gas wells.

3.2.2 Soils

Land use patterns in the study area are influenced by the suitability and limitations of soil properties for development. The U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), has surveyed and mapped the soil units in each of the counties based on the physical properties and composition of the soil and the amount of slope and drainage where the soil is located. These soil maps are helpful in planning future land use and development.

Specific soil classifications are called soil map units. Soil map units describe the soil characteristics in a specific geographic area. The study area is dominated by Devol, Grandfield, Likes, Mobeetie, Potter, and Tivoli soil series. Table 3-1 provides a detailed description of the dominant soil associations located in the study area. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. It also is well suited for cropland, pastureland, rangeland, or forestland. It has the soil quality needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods (Soil Survey Division Staff, 1993). Table 3-1 includes prime farmland information for dominant soils located in the study area.

Table 3-1
Dominant Soil Map Units in the Study Area

Soil Map Units	Characteristics
Devol	• Nearly level to moderately steep dunes • Well drained, moderately rapid permeable soils • Very deep, loamy soils • Used mainly as cropland
Grandfield	• Nearly level to moderately steep sloping • Well drained, moderately permeable soils • Very deep • Associated with stream terraces • Used mainly for cropland • Prime farmland if irrigated
Likes	• Nearly level to moderately sloping • Excessively drained, rapidly permeable • Very deep • Associated with valley flats and valley sides • Used exclusively for grazing
Mobeetie	• Nearly level to gently sloping • Well drained, moderately rapid permeable soils • Very deep, loam soils • Associated with valley flats, valley sides, and scarp • Used mainly for grazing • Prime farmland if irrigated

Table 3-1
Dominant Soil Map Units in the Study Area

Soil Map Units	Characteristics
Potter	• Gently sloping to steep slopes • Well drained, moderate slowly permeable • Very deep • Associated with draws, scarps, or valley sides • Used exclusively for grazing
Tivoli	• Nearly level to steep slopes • Excessively drained, rapidly permeable • Very deep • Associated with stream terraces • Used mainly for grazing

Source: NRCS, 2011b

3.2.3 Hydrology

According to the Texas Water Development Board (TWDB) GIS data, the study area receives an average of approximately 20-24 inches of rain per year (TWDB, 2011). The entire study area is located within the Red River watershed. Other rivers and streams are labeled on Figure 2-2. The North Fork of the Red River runs easterly through the southern portion of the study area in both Gray and Wheeler counties. Other major drainages in the study area include various tributaries to the North Fork of the Red River, and Graham and Sweetwater Creeks that run easterly through the northern portion of the study area. TPWD indicated in their September 16, 2011, letter (Appendix A, page A-7) that there are three Ecologically Significant Stream Segments (ESSS) (Graham Creek, Sweetwater Creek, and McClellan Creek) within the study area. TPWD defines an ESSS as a segment of a river that meets one of the following criteria:

- Displays significant overall habitat value including both quality and quantity;
- Fringed by habitats that perform valuable hydrological functions;
- Fringed by significant areas in public ownership;
- Segments that are significant due to unique or critical habitats and exceptional aquatic life uses dependent on high water quality; and,
- Segments where water development projects would have significant detrimental effects on state or federally listed threatened or endangered species (TPWD, 2012).

According to the TWDB, Gray and Wheeler counties are part of the Panhandle (Region A) Regional Water Planning Area. Its total existing water supply is projected to be 1,094,863 acre-ft in 2020, decreasing 27 percent to 799,058 acre-ft in 2060. Surface water supplies, approximately three percent of the total water supply to the region, come from two reservoirs (Greenbelt and Meredith). The Ogallala Aquifer is the source of most of the groundwater in the region, with 88 percent of the total water supply coming from the Ogallala aquifer and 7 percent of the total water supply coming from other aquifers (Blaine, Dockum, Seymour, and Rita Blanca) (TWDB, 2012).

The Ogallala Aquifer is a major aquifer extending through the High Plains of Texas and supplies water to all or parts of 46 counties. The aquifer is composed primarily of sand, gravel, clay, and silt. Water moves slowly through the Ogallala formation in a southeastward direction toward the caprock edge. Water quality is generally fresh with both dissolved solids and chloride concentrations increasing from north to south. Almost all of the groundwater pumped from the aquifer, 95 percent, is used for irrigation, with the remainder primarily used for municipal supply (Ashworth & Hopkins, 1995).

Several small lakes occur within the study area. From west to east they include Franklin Lake, Gething Lake, Haynes Lake, and Tadpole Lake. The TPWD and TWDB have designated portions of certain streams within Texas as ESSS (TPWD, 2012).

Federal Emergency Management Agency (FEMA) has only mapped floodplains within the portion of the study area that is within Gray County. The floodplains are typically associated with the North Fork of the Red River and its tributaries. Most of the floodplains as mapped by FEMA are narrow and could be spanned by the transmission line; however, any routes that cross the North Fork of the Red River may require structures be placed within the floodplains due to the wide nature of the floodplain associated with this river.

3.2.4 Vegetation

Based on TPWD’s September 16, 2011, letter (Appendix A, page A-7), five main plant communities, defined by the TPWD, are located within the study area. These plant communities are: Crops, Mesquite (*Prosopis glandulosa)* Shrub, Cottonwood (*Rosopis glandulosa)* – Hackberry (*Celtis* sp.) – Saltcedar (*Tamarix* sp.) Brush/Woods, Sandsage (*Artemisia filifolia*) – Harvard Shin Oak (*Quercus havardii*) Brush, and Sandsage – Mesquite Brush.

Commonly associated plants of the Crops community typically include cultivated cover crops and row crops for food or fiber. Crop rotation may also result in grassland within this community.

Commonly associated plants of the Mesquite Shrub plant community typically include narrow-leaf yucca (*Yucca angustissima*), tasajillo (*Cylindropuntia leptocaulis*), juniper (Juniperus), grassland pricklypear (*Opuntia cymochila),* cholla (*Cylindropuntia),* blue grama (*Bouteloua gracilis*), hairy grama (*Bouteloua* *hirsute*), purple three-awn (*Aristida purpurea*), Roemer three-awn (*Aristida roemeriana*), buffalograss (*Bouteloua dactyloides*), little bluestem (*Schizachyrium scoparium*), western wheatgrass (*Pascopyrum smithii*), Indiangrass (*Sorghastrum*), switchgrass (*Panicum virgatum*), James rushpea (*Hoffmannseggia*), scurfpea (*Psoralidium*), lemon scurfpea (*Psoralidium lanceolatum*), sandlily (*Leucocrinum montanum*), plains beebalm (*Monarda pectinata*), scarlet gaura (*Stenosiphon linifolius*), yellow evening primrose (*Oenothera flava*), sandsage (*Artemisia filifolia*), and wild buckwheat (*Polygonum convolvulus*) (TPWD, 2008).

Commonly associated plants of the Cottonwood – Hackberry – Saltcedar Brush/Woods plant community typically include black willow (*Salix nigra*), buttonbush (*Cephalanthus*), groundsel-tree (*Baccharis halimifolia*), rough-leaf dogwood (*Cornus drummondii*), Panhandle grape (*Vitis acerifolia*), heartleaf ampelopsis (*Ampelopsis cordata)*, false climbing buckwheat (*Polygonum scandens)*, cattail (*Typha)*, switchgrass (*Panicum virgatum)*, prairie cordgrass (*Spartina pectinata)*, salt grass (*Distichlis)*, alkali sacaton (*Sporobolus airoides)*, spikesedge (*Kyllinga)*, horsetail (*Equisetum)*, bulrush (*Scirpus)*, coarse sumpweed (*Cyclachaena xanthifolia)*, and Maximilian sunflower (*Helianthus maximiliani*) (TPWD, 2008).

Commonly associated plants of the Sandsage – Harvard Shin Oak Brush plant community typically include skunkbush sumac (*Rhus trilobata)*, Chickasaw plum (*Prunus angustifolia)*, Indiangrass (*Sorghastrum)*, switchgrass (*Panicum virgatum)*, sand bluestem (*Andropogon hallii)*, sand lovegrass (*Eragrostis trichodes)*, big sandreed (*Calamovilfa gigantean)*, sideoats grama (*Bouteloua curtipendula)*, hairy grama (*Bouteloua hirsute)*, sand dropseed (*Sporobolus cryptandrus)*, sand paspalum (*Paspalum maritimum)*, scurfpea (*Psoralidium)*, scarletpea (*Indigofera miniata)*, slickseed bean (*Strophostyles leiosperma*), wild blue indigo (*Baptisia australis)*, wild buckwheat (*Polygonum convolvulus)*, and bush morning-glory (*Ipomoea leptophylla)* (TPWD, 2008).

Commonly associated plants of the Sandsage – Mesquite Brush plant community typically include skunkbush sumac (*Rhus trilobata)*, Chickasaw plum (*Prunus angustifolia)*, catclaw (*Uncaria tomentosa*), little bluestem (*Schizachyrium)*, sand bluestem (*Andropogon hallii)*, silver bluestem (*Bothriochloa saccharoides)*, sand dropseed (*Sporobolus cryptandrus)*, red three-awn (*Aristida purpurea*), slickseed bean (Strophostyles leiosperma), sensitive briar (*Mimosa nuttallii*), wild blue indigo (*Baptisia australis)*, sandlily (*Leucocrinum montanum)*, spearleaf ground cherry (*Physalis longifolia)*, wild buckwheat (*Polygonum convolvulus*), spinytooth gumweed (*Grindelia papposa)*, common sunflower (*Helianthus annuus)*, spectacle pod (*Dimorphocarpa)*, and hierba del pollo (*Commelina erecta)* (TPWD, 2008).

In addition to the five main communities, TPWD indicated in their September 16, 2011, letter (Appendix A, page A-7) that the Cottonwood (*Poulus deltoides*) – Tallgrass Series natural community has also been documented within the study area. Commonly associated plants of the Cottonwood – Tallgrass Series natural community typically include big bluestem (*Andropogon gerardii*), sand bluestem (*Andropogon hallii)*, alkali sacation (*Sporobolus airoides*), Indiangrass (*Sorghastrum nutans*), gammagrass (*Tripsacum dactyloides*); Harvard shin oak (*Quercus havardii*), little bluestem (*Schizachyrium)*, and sand sage (*Artemisia filifolia*) (Texas Organization for Endangered Species [TOES], 1992).

3.2.5 Threatened and Endangered Plant Species

According to TPWD and the USFWS, no state- or federally listed threatened or endangered plant species are known or likely to occur within the study area.

3.2.6 Wetlands

Wetlands are especially valued because of their location on the landscape, the wide variety of ecological functions they perform, the ability for storing or conveying floodwaters, and the uniqueness of their vegetation and animal communities. Wetlands also provide high-quality habitats for wildlife, including foraging and nesting areas for birds and spawning and nursery areas for fish sites for educational research. Figure 2-2 shows the USFWS National Wetland Inventory (NWI) data where it is digitally available within the study area.

Based on the NWI data, there are eight distinctive types of wetland categories in the study area. These eight wetland types fall into two broad categories, palustrine and riverine. The palustrine system includes all non-tidal wetlands dominated by trees, shrubs, and emergents (herbaceous plants). The riverine system includes all wetlands and deepwater habitats contained within a channel except for wetlands dominated by trees, shrubs, persistent emergents, emergent moss, or lichens, and habitat with water containing ocean-derived salts in excess of 0.5% (Cowardin et al, 1979). The study area contains five main groups of palustrine wetlands: emergent, forested, scrub-shrub, unconsolidated shore, and unconsolidated bottom. The riverine wetlands include intermittent streambed, lower perennial unconsolidated shore, and lower perennial unconsolidated bottom. Most of these wetlands are associated with the streams in the study area.

Playas are ephemeral lakes that form in small depressions and have impermeable clay bottoms that hold water for long periods through rainless months. These isolated ephemeral wetlands support a diversity of wildlife species, especially waterfowl. Few playas occur within the study area but are numerous to the north and west of the study area.

3.2.7 Wildlife

The study area is primarily used for crop cultivation or grazing cattle. Much of the native wildlife that occurs within the area of the proposed project has to compete with cattle ranching and agricultural land uses. Native wildlife within the study area is typically restricted to unused wooded and scrubby areas along streams and in river floodplains.

Mammals that are likely to occur within the study area include white-tailed deer (*Odocoileus virginianus*), pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), armadillo (*Dasypus novemcinctus*), cottontail rabbit (*Sylvilagus floridanus*), fox squirrel (*Sciurus niger*), thirteen lined ground squirrel (*Spermophilus tridecemlineatus*), plains pocket gopher (*Geomys bursarius*), least shrew (*Cryptotis parva*), eastern mole (*Scalopus aquaticus*), white-footed mouse (*Peromyscus leucopus*), and deer mouse (*P. maniculatus*) (TPWD, 2011a).

Birds commonly encountered within the study area include the northern cardinal (*Cardinalis cardinalis*), American robin (*Turdus migratorius*), scissor-tailed flycatcher (*Tyrannus caudifasciatus*), tufted titmouse (*Parus bicolor*), summer tanager (*Piranga rubra*), blue-gray gnatcatcher (*Polioptila caerulea*), Carolina wren (*Thryothorus ludovicianus*), brown-headed cowbird (*Molothrus ater*), eastern meadowlark (*Sturnella magna*), red-winged blackbird (*Agelaius phoeniceus*), eastern bluebird (*Sialia sialis*), northern mockingbird (*Mimus polyglottos*), and turkey vulture (*Cathartes aura*). Rio Grande turkey (*Meleagris gallopavo intermedia*), northern bobwhite (*Colinus virginianus*), and mourning dove (*Zenaida macroura*) are common game birds present in the study area (TPWD, 2011a).

Amphibians and reptiles likely to occur within the study area include the Texas toad (*Bufo speciosus*), Woodhouse's toad (*Bufo woodhousii*), ornate box turtle (*Terrapene ornate*), tiger salamander (*Ambystoma tigrinum*), checkered garter snake (*Thamnophis marcianus*), prairie kingsnake (*Lampropeltis calligaster*), gopher snake (*Pituophis catenifer*), and western diamondback rattlesnake (*Crotalus atrox*) (TPWD, 2011a).

Fish likely to occur within the study area lakes and rivers/creeks include the spotted gar (*Lepisosteus oculatus*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), green sunfish (*Lepomis cyanellus*), bowfin (*Amia calva*), flathead catfish (*Pylodictis olivaris*), white crappie (*Pomoxis annularis*), freshwater drum (*Aplodinotus grunniens*), channel catfish (*Ictalulrus punctatus*), white bass (*Morone chrysops*), walleye (*Sander vitreum*), and black crappie (*Pomoxis nigromaculatus*) (TPWD, 2011a).

Various species throughout the study area are considered recreationally or commercially valuable. These species provide human benefits as a result of both non-consumptive recreational activities and hunting activities. Non-consumptive activities include bird-watching, wildlife photography, etc. These types of activities apply to all wildlife within the study area. The majority of recreational activity in the study area consists of hunting. Commonly hunted animals within the study area include white-tailed deer, mule deer, pronghorn, Rio Grande turkey, squirrel, rabbit, dove, pheasant, quail, and various types of migratory waterfowl. The relative small size and overall scarcity of streams and lakes in the study area make the area generally insignificant as a recreational or commercial fishery. Major rivers, such as the North Fork of the Red River, provide recreational fishing but have no known commercial fisheries. Common game fish in Tadpole Lake, Gething Lakes, Franklin Lakes, and other smaller study area lakes include largemouth bass, white bass, channel catfish, crappie, sunfish, and saugeye (TPWD, 2011a).

3.2.8 Threatened and Endangered Animal Species

According to TPWD and USFWS, 10 threatened or endangered species are known or likely to occur in Wheeler and Gray counties (Table 3-2). One additional species, the lesser prairie chicken (LPC), is listed as a candidate by the USFWS. Figure 2-2 depicts the Texas Natural Diversity Database (TXNDD) data received from TPWD; however, it contains no known occurrences of state and federally listed threatened and endangered species locations within the study area. The current estimated occupied range of the LPC is also shown on Figure 2-2.

Only those species listed as threatened or endangered by USFWS are protected by federal law. A brief description of habitats used by the protected species listed by TPWD and USFWS is provided below.

The peregrine falcon inhabits open areas usually associated with high cliffs and bluffs over rivers and coasts but they may also nest on buildings and bridges in urban areas. These falcons are observed most often during the spring and fall migration, especially in areas with high concentrations of shorebirds and waterfowl (TPWD, 2009a).

During winter, bald eagles congregate near rivers and reservoirs with open water and often near large concentrations of waterfowl. They usually perch within a riparian corridor or along lake shores where there is limited human activity. In addition to feeding on fish, bald eagles also feed on dead or crippled waterfowl, small mammals and carrion. During winter nights, bald eagles may congregate at communal roosts (TPWD, 2009b).

Table 3-2
Protected Species that are Known or Likely to Occur within the Study Area

Species	State Status	Federal Status	Counties of Occurrence	Potential for Occurrence in Study Area *
Bald Eagle (*Haliaeetus leucocephalus*)	Threatened	Delisted	Gray and Wheeler	Likely
Interior Least Tern (*Sterna antillarum*)	Endangered	Endangered	Gray	Likely
Lesser Prairie Chicken (*Tympanuchus pallidicinctus*)	None	Candidate	Gray and Wheeler	Likely
Peregrine Falcon (*Falco peregrinus*)	Threatened	Delisted	Gray and Wheeler	Not Likely
Piping Plover (*Charadrius melodus*)	Threatened	Threatened	Gray	Likely
Whooping Crane (*Grus Americana*)	Endangered	Endangered	Gray and Wheeler	Likely
Black-footed Ferret (*Mustela nigripes*)	None	Endangered	Gray and Wheeler	Not Likely (extirpated)
Gray Wolf (*Canis lupus*)	Endangered	Endangered	Gray and Wheeler	Not Likely (extirpated)
Texas Horned Lizard (*Phrynosoma cornutum*)	Threatened	None	Gray and Wheeler	Likely

Sources: USFWS, 2011 and TPWD, 2011b
* Burns &McDonnell's professional assessment of the likelihood of occurrence of these species in the study area.

Interior least terns nest in small colonies on sandbar islands in major rivers and sand and gravel pits. Suitable nesting sites have sparse or no vegetation and are well back from the water line. Interior least terns forage along shorelines, sandbar margins, backwaters, and chutes usually within a few hundred meters of the nesting colony. Their diet consists almost entirely of small fish, primarily minnows (TPWD, 2011c).

The LPC is a ground-nesting bird that is native to the shrub-mixed grass vegetation of the Texas Panhandle. The climate range of the LPC varies from arid to semi-arid, and significant droughts often devastate habitat and production. Conversion of native prairies to cropland and intensive grazing is also a significant impact to habitat. Wherever possible, they avoid nesting or rearing near manmade structures and roads. Therefore, the LPC is dependent on open, well-managed prairie. They feed on ants and other small insects, seeds, leaves, buds, acorns, and cultivated grains (Elmore et al, 2009).

Piping plovers have similar habitat requirements to the Interior least tern and are often found nesting in close proximity to the Interior least tern. Piping plovers live on open sandy beaches or rocky shores, often in high, dry sections away from water. Nests are typically located near small clumps of grass, drift, or other windbreak. They mainly eat small insects, marine worms, and crustaceans (TPWD, 2009c).

Whooping cranes nest in Canada and winter in coastal marshes in Texas. The migration route of this population passes through north-central Texas and migrating whooping cranes often are sighted at and along reservoirs, large ponds, rivers, and wetlands at stop-over habitats. They feed on crustaceans, mollusks, fish, berries, small reptiles and aquatic plants (TPWD, 2009d).

Black-footed ferrets inhabit short and middle grass prairies. Their diet consists mainly of prairie dogs. A single black-footed ferret eats approximately 100 prairie dogs a year and struggles to survive without access to large colonies of them. They are also known to eat other small mammals, birds, and insects (TPWD, 2009e). This species is considered extirpated from the project area.

Wolves inhabit forests, brushlands, and grasslands but prefer broken, open country in which suitable “hideouts” and denning sites are available. Gray wolves have been extirpated from most of Texas and currently only occupy areas in south Texas and along the Texas-Mexico border (Davis and Schmidly, 1994).

Texas horned lizards are found in arid and semiarid habitats in open areas with sparse plant cover. They feed on ants and other small insects and are found on loose sand or loamy soils and dig burrows for hibernation and nesting (Davis and Schmidly, 1994).

3.3 HUMAN RESOURCES

The following is a description of the human resources located in the study area. Topics addressed include patterns of community values and resources, land use, visual character, socioeconomic patterns, and cultural resources.

3.3.1 Community Values and Community Resources

The term “community values” is included as a factor for the consideration of transmission line certification under PURA § 37.056(c)(4)(A)-(D). Community values have been interpreted in different ways. Recent decisions by the PUCT have included the following within the discussion of community values.

- A shared appreciation of an area or other natural or human resource by members of a national, regional, or local community;
- Amplitude Modulation (AM), Frequency Modulation (FM), microwave, and other electronic installations in the area;
- Approvals or permits required from governmental agencies;
- Comments received from community leaders and the public;

- Description of the area traversed;
- FAA-registered airstrips, private airstrips, and heliports in the area;
- Habitable structures within 300 ft. of the centerline of the proposed project;
- Irrigated pasture or croplands utilizing center-pivot or other traveling irrigation systems;
- Public meeting or public open-house participation.

In addition to the above mentioned items, Burns & McDonnell also evaluated the proposed project for community resources that may be important to a particular community as a whole, but may not be specifically identified by the PUCT, such as: parks or recreational areas, historical and archeological sites, or scenic vistas within the study area.

Burns & McDonnell mailed consultation letters to federal, state, and local officials (Appendix A) and attended two public open-house meetings hosted by SPS to identify and collect information regarding community values and community resources. The above referenced community values and community resources are discussed in the following sections.

3.3.1.1 Land Use and Development Patterns

Land use throughout the study area is dominated by rangeland with some smaller areas of cultivated land. The majority of cultivated land is located primarily in the eastern half of the study area near SH 152. The developed land is primarily found around the various towns in the study area. The largest percentage of the land found in the study area is used as pasture or rangeland.

3.3.1.2 Agriculture

Agriculture in Gray County consists primarily of the production of beef cattle. According to the 2007 Census of Agriculture, the total number of cattle and calves in Gray County was 103,999. The top crop items were wheat and corn. The total acreage of wheat was 41,033 acres and the acreage of corn was 6,066 acres. The acreage of agricultural land in the county is slowly increasing. In 2007, land in farms was up 12 percent from 452,820 acres in 2002 to 509,367 acres (USDA, 2007 & 2002).

The main agricultural enterprise in Wheeler County in 2007 was also the production of beef cattle. According to the 2007 Census of Agriculture, the total number of cattle and calves produced in Wheeler County was 91,397 from 296 beef cattle production farms. The number of forage production farms ranked second, and the number of wheat production farms ranked third in the county. Other agricultural income was derived from the production and sale of swine, sheep, eggs, sorghum, cotton, and peanuts.

The acreage of agricultural land in the county has increased. In 2007, land in farms was up nine percent from 533,569 acres in 2002 to 583,222 acres (USDA, 2007 & 2002).

3.3.1.3 Urban and Residential Areas

According to the U.S. Census Bureau (USCB), the resident population for Texas in 2010 was 25,145,561. In 2010, Gray County had a resident population of 22,535 with approximately 24.2 people per square mile and Wheeler County had a resident population of 5,410 with approximately 5.9 people per square mile (USCB, 2010). The total number of housing units follows the same trend as the total population. Wheeler County had the lowest number of housing units for the study area with 2,730. Gray County had a total number of housing units of 10,158 (USCB, 2010).

The only urban development primarily occurs within the various municipalities located in the study area. The majority of the study area consists of scattered rural residences.

Both counties have independent school districts (ISDs) located within the study area. Gray County has the greatest number of schools among the two counties with ten combined schools within Pampa, Lefors, Grandview-Hopkins, and McLean ISDs. Wheeler County has six combined schools within Wheeler, Shamrock, Kelton, and Fort Elliott Consolidated ISDs (Texas Education Agency, 2008).

3.3.1.4 Park and Recreation Areas

No park and recreation areas were identified within the study area. Private landowners within the study area often use their land for hunting, fishing, wildlife, bird watching, and other recreational activities that are not available to the general public.

3.3.1.5 Transportation and Aviation

The study area is traversed by U.S. and state highways, county roads, FM roads, and local streets as shown on Figure 2-2. Two state highways (SH 273 and SH 152) are located in the project area. SH 273 and SH 152 both run southeast through the study area. U.S. Highway 83 runs through the eastern portion of the study area roughly from north to south and is the only U.S. highway located within the study area.

A review of the FAA National Flight Data Center (NFDC) GIS data identified one public and no private airports within 20,000 ft. of the study area (NFDC, 2011). Field reconnaissance resulted in the identification of two private airstrips and one private heliport located within the study area that are not registered with the FAA. Wheeler Municipal Airport is the only identified public airport within 20,000 ft. of the study area and is located approximately 18,000 ft. east of the study area.

One abandoned railroad traverses the study area roughly parallel to SH 273.

3.3.1.6 Visual Character

The visual character of an area is a function of the terrain, land cover and land use. Throughout the study area, the land cover is comprised primarily of prairie grasslands with intermittent patches of mesquite and other brush vegetation. Much of the natural vegetation within the region has been converted to agricultural cropland or pasture. Land is dominated agriculturally by livestock production and small grain production. There are scattered residential areas and municipalities. The terrain within the study area varies. In the eastern portion of the study area, it is relatively flat where the land cover is predominately cropland. In the central and western portions of the study area, the terrain is more pronounced where it is associated with various rivers and tributaries that run through this region.

3.3.1.7 Utilities

Existing utilities within the study area include existing 69 kV, 115 kV, and 230 kV electric transmission lines and associated substations primarily owned and operated by SPS (Figure 2-2). In addition, Competitive Renewable Energy Zone lines currently being constructed by CTT will be located within the southern portion of the study area. Cooperative utilities, such as Greenbelt Electric Cooperative, also own and operate transmission lines, distribution lines, and substations within the study area, primarily near Wheeler. There are multiple oil and gas collection, transmission, and distribution-level facilities throughout the study area. The study area contains a large number of oil and gas wells as well as associated collection lines, pump stations, and compressor stations owned and operated by a number of different pipeline companies.

3.3.2 Socioeconomic Patterns

The following is a description of the socioeconomic patterns in the study area. These resources include population and the employment and income of the residents within the study area. An evaluation of the potential impacts of this project upon these resources is described in Chapter 7.

3.3.2.1 Population

According to the USCB, the resident population for Texas in 2010 was 25,257,114 (USCB, 2010). In 2010, the estimated population of Gray County was significantly higher than Wheeler County. Between the 2000 census and the 2010 census the Gray county population decreased slightly and the Wheeler county population increased slightly. Table 3-3 shows the change in populations of the counties found in the study area.

Table 3-3
Population Data by County

County	2000 Population	2010 Population	Percent Change
Gray	22,744	22,535	-0.9%
Wheeler	5,284	5,410	2.4%

Source: USCB, 2000 & 2010

3.3.2.2 Employment and Income

According to USCB data, Gray County had approximately 8,349 persons in the civilian work force with an unemployment rate of 7.9 percent in 2009. Gray County had approximately 26 percent of the civilian work force employed in the sales and office occupations sector. The mean household income for Gray County was $53,586 per year.

Wheeler County had approximately 2,229 persons in the civilian work force with an unemployment rate of 3.6 percent in 2009. Wheeler County also had approximately 23 percent of the civilian work force employed in the management, professional, and related occupation sector. The mean household income for Wheeler County was slightly higher than Gray County, at $62,804 per year.

Table 3-4 summarizes employment sectors by county for the study area.

Table 3-4
Employment by Sector

Sector	Gray County		Wheeler County	
	Number	Percentage	Number	Percentage
Management, professional, and related occupations:	1,759	21.1%	529	23.7%
Service occupations:	1,459	17.5%	478	21.4%
Sales and office occupations:	2,189	26.2%	401	18.0%
Farming, fishing, and forestry occupations	216	2.6%	79	3.5%
Construction, extraction, maintenance, and repair occupations:	1,367	16.4%	424	19.0%
Production, transportation, and material moving occupations:	1,359	16.3%	318	14.3%
Total Employed Population 16 Years and Over	8,349	--	2,229	--

Source: USCB, 2000

3.3.3 Communication Towers

Several communication towers were identified within the study area. The communication towers are primarily located near towns, cities, and main highways and appear to be primarily microwave communication towers (Federal Communications Commission (FCC), 2008). Other than microwave communication towers, several cellular, Citizens Band Radio, Television (TV), and AM and FM radio installations were also identified in the study area.

3.4 CULTURAL RESOURCES

Cultural resources are defined as sites, features, structures, or properties that are 50 years old or older and that may hold significant cultural, historical or scientific value. Section 106 of the National Historic Preservation Act secures the protection and review of cultural resources by ensuring that they are considered as part of federal project planning, funding, and permitting. Regulations developed by the Advisory Council on Historic Preservation direct the implementation of the Section 106 process. The National Register of Historic Places (NRHP), administered by the Secretary of Interior, establishes significance criteria for inclusion on the register. Cultural resources are evaluated based on these criteria, and may be considered historic properties if they meet the criteria and are determined eligible for inclusion or if they are placed on the NRHP by the Secretary of the Interior. In addition, cultural resources that have not been discovered or evaluated but may meet eligibility criteria, are considered historic properties.

3.4.1 Pre-Historic Cultural Background

The Texas archaeological record is divided into four periods: Paleo-Indian (beginning 9200 B.C., perhaps earlier, and lasting to around 6000 B.C.), Archaic (commencing around 6000 B.C. and lasting up to A.D. 700 or the beginning of the Christian era in some locales), Late Prehistoric (beginning approximately A.D. 700 and lasting until A.D. 1600) and Historic. The beginning and ending of an archaeological period is not clearly defined, and is affected by a variety of influences, including the size of the area in question, diversity in both local and regional ecosystems, and the amount of archaeological work conducted in an area.

Initial human occupation in the Americas has been the subject of numerous debates in American archaeology. There is currently no agreement on the timing of human entry into the New World. Current estimates vary from 11,200 to 200,000 years ago. However, the earliest, most well-documented evidence is the Clovis Complex, so named for the diagnostic artifact of the period. Sites with these distinctive lanceolate-shaped, fluted points and other chipped stone artifacts in the Clovis toolkit (e.g. side scrapers, end scrapers, drills, burins, gravers, and knives) are distributed throughout every geographic region of the country. The better-known Clovis sites in Texas include the Gault Site in Central Texas, the Aubrey Site in Denton County, and the Miami site, a mammoth kill site in Roberts County (none of which are in the study area). The Clovis period occurred during the Late Pleistocene, and tight dating of such sites, combined with widespread Clovis point distribution, makes the type an excellent horizon marker. The Folsom Complex follows the Clovis Complex, beginning around 8800-8200 B.C., named for the type site and distinctive projectile point. Folsom points are also lanceolate-shaped, fluted points with concave bases. The differences between the two are in the morphology. Clovis fluting consists of the removal of several flakes whereas Folsom fluting consists of the removal of one long flake covering nearly the entire surface of the point.

Other projectile points that define subsequent Paleo-Indian occupations include: Dalton, San Patrice, and Plainview, which similarly all coincide with the terminal Pleistocene-emergent Holocene geologic period. This period was a time of great environmental change (Delcourt and Delcourt, 1981). During the same time as this epic vegetation change, the megafauna were vanishing and the hunter-gatherers were adapting to a warmer and more diverse environment. Also during this period, humans began exploiting forest mammals and increasing their reliance on plant foods. A change in lithic technology reflects adaptations for the exploitation of available resources. Scottsbluff, Golodondrina, and Angostura are examples of this change, with Angostura marking the end of the period (Hester and Turner, 2000). At the end of the period there is great diversification of point types and some groups appear to retain their tool manufacturing and settlement patterns (Hester and Turner, 2000).

The Archaic period is marked by the start of the Hypsithermal climatic episode. This episode was a period of warmer and drier climates that led to a vegetation shift. As a result of the climatic change, previously-exploited larger species became extinct, necessitating the exploitation of smaller mammals, such as white-tail deer, rabbits, and squirrels. The Archaic peoples continued with hunting and gathering practices, exhibiting changes in the style of projectile points and tools, the distribution of site types, and introduction of grindstone tools and implements. These changes indicate a gradual population increase and greater reliance on abundant plant and animal resources. The Archaic period covers a broad span of prehistory in Texas and is divided into three periods: Early, Middle, and Late. Each period is defined by changes in cultural patterns which include specific artifact forms, methods of hunting, types of sites utilized, and other elements (Hester and Turner, 2000).

Early Archaic dating from 6000 to 2500 B.C. is the least understood. Settlements during this time appear to be small, dispersed, and highly mobile. Distinctive artifacts include Martindale, Uvalde, Early Triangular, Andice, and Bell or Calf Creek projectile points. The Middle Archaic, beginning around

2500 B.C. and continuing up to 1000 B.C., is typified by significant population growth, increased site densities, and occurrence of Fary and Kent, Pedernales, Langtry, and Tortugas projectile points. In addition, associated burnt rock middens begin to appear. The Late Archaic, dating from 1000 B.C. to A.D. 700, maintains settlement and subsistence patterns of the previous period but is marked by distinctive projectile points, such as Ensor, Darl, Frio, and Fairland. Diversity is represented regionally with cemeteries more prominent in the southeast; bison kill sites occurring in Central Texas, lower Pecos, the Panhandle, and the South Plains; the emergence of more permanent settlements in east Texas; and the occurrence of many rock art sites, particularly in the lower Pecos (Hester and Turner, 2000).

The Late Prehistoric period (A.D. 700 to the historic) is distinguished by the emergence of pottery and the appearance of small arrow points which mark the introduction of the bow and arrow across the region. Bison hunting was popular throughout the period, while more sedentary villages, ceremonial centers, and established social hierarchies emerged in some groups, such as the Caddoan. Local types of projectile points include Livermore in the Trans-Pecos, Friley and Catahoula on the Texas-Louisiana border, Lott and Garza on the Llano Estacado, and McGloin and Bulbar Stemmed on the coast. Some styles that developed with the use of the bow and arrow include the Scallorn and Perdiz. Late Prehistoric people also participated in long distance trade as indicated by the presence of obsidian, with some of the obsidian coming from as far as Wyoming, Idaho, and Central Mexico (Hester and Turner, 2000).

3.4.2 Historic Cultural Background

The Historic Period is marked by changes in the native population brought on by Spanish and French expeditions, as well as the intrusion of the Apache and later, the Comanche. In the Caddo areas, there are recognizable changes in the pottery and some prominent projectile point types, such as Harrell and Washita. Rock art records the changes that occurred with the inclusion of churches and horse-riding Indian warriors or Spaniards. By the late 18th century, chipped stone tools are replaced by worked glass, brass, and iron, particularly for arrow points. The historic period was experienced similarly with slight variations by the counties in the study area. A summary of each county's history is provided below.

3.4.2.1 Gray County

The Apache occupied Gray County until around 1700 when the Comanche and Kiowa controlled the area. The tribes were defeated during the Red River War, after which white settlement began to creep into the area. The earliest settlers were ranchers setting up large, open-range ranches. These first settlements began in the late 1870s, but within 20 years smaller farms and ranches were started. Population increases from farms and ranches, combined with the arrival of the railroad, spurred the building of towns and larger trading centers. Crops consisting of mostly cotton, corn, and wheat were introduced. A great deal of ranch land was plowed up to accommodate the growing agricultural industry. By the 1930s, farms replaced ranches, increasing the need for railroads and improved roads. Agricultural revenues dropped along with population numbers during the Great Depression. Although many farms were lost at this time, some were sustained and even prospered with the discovery of oil, bringing a boom to the county. For the most part, agriculture has prevailed as the primary source of revenue through the 20th century. The county has 26 recorded historical markers (THC Atlas, 2012).

3.4.2.2 Wheeler County

Like Gray County, Wheeler County was occupied by the Apache until around 1700 when the Comanche and Kiowa occupied the area. The tribes were defeated during the Red River War, after which white settlement began to creep into the area. The first white settlers were buffalo hunters following the large herds roaming the plains. Once the buffalo were killed off, ranchers began moving in and setting up large, open range ranches. These were followed within 20 years by smaller farms and ranches. Population increases from farms and ranches, combined with the arrival of the railroad, spurred the building of towns and larger trading centers. Crops consisting of mostly cotton, corn, and wheat were introduced. A great deal of ranch land was plowed up to accommodate the growing agricultural industry. By the 1930s, farms replaced ranches, increasing the need for railroads and improved roads. Agricultural revenues dropped along with population numbers during the Great Depression. Although many farms were lost at this time, some were sustained and even prospered with the discovery of oil in the county. The county has 28 recorded historical markers (THC Atlas, 2012).

3.4.3 Records Search

In an effort to identify known cultural resources that could be affected by this project, an on-line search of the THC Texas Atlas was conducted by Burns & McDonnell archaeologists in August 2011 and was followed up by a file search at the Texas Archaeological Research Laboratory. The search also included state archaeological landmarks, historical markers, NRHP properties, cemeteries, military sites, sawmills, and bridges. In addition, a search of the National Park Service NRHP database was conducted.

* * * * *

4.0 IDENTIFICATION OF PRELIMINARY ALTERNATIVE ROUTES

After completion of the data gathering and constraint mapping process, the project team identified numerous preliminary alternative routes to connect the Bowers Substation to the Wheeler Substation as previously described in Section 2.4.

Based on the findings of the various ground reconnaissance surveys and the various data collection activities, and utilizing the environmental and land use constraints map and property boundary maps, the Burns & McDonnell Project Manager and Assistant Project Manager identified preliminary alternative routes on aerial photography (NAIP flown in 2010). The property boundary maps that were utilized to locate apparent property boundaries consisted of the general land surveys as provided by the RRC and other sources as supplied to Burns & McDonnell by Manning Land (a third party land information company). Burns & McDonnell obtained digital gas pipeline data and oil/gas well data from the GIS of the RRC. The digital gas pipeline data and the oil/gas well data were intended for the internal use of the RRC and therefore, the RRC makes no claim as to its accuracy or completeness. Burns & McDonnell used the RRC data as a resource to identify potential compatible pipeline corridors (that could be paralleled by potential preliminary alternative routes) as well as to identify the location of oil and gas wells (to be avoided by potential preliminary alternative routes). Where possible, Burns & McDonnell verified the location of certain pipelines and oil/gas wells by reviewing the aerial photography and inspection during the various reconnaissance surveys and corrected the digital pipeline data where it was obviously inconsistent.

Based on the data obtained, the Burns & McDonnell project team identified preliminary route segments that, when combined, would connect the Bowers Substation and the Howard Substation. Route segments are typically short sections between branches of other segments that, when combined with other segments, provide a complete route between the project endpoints. To the extent possible, route segment development was based on avoiding the environmental and land use constraints within the study area while also taking advantage of routing opportunities, such as existing transmission lines, pipeline corridors, public roads, and apparent property boundaries, in accordance with PUCT SUBST. R. 25.101.

Burns & McDonnell evaluated numerous segments that could be developed into alternative routes to connect the Bowers Substation to the Howard Substation. These preliminary segments were refined and altered to develop the segment network that was presented at the open-house meetings and were subsequently developed into preliminary alternative routes. These preliminary alternative routes are shown on Figure 2-3.

The preliminary alternative routes developed by Burns & McDonnell can generally be classified into five corridors of routes: Northern, North-Central, Central, South-Central, and Southern. In addition to the five general corridors, Burns & McDonnell also developed several segments that connect these five corridors.

4.1 NORTHERN ROUTES

The Northern routes (Segments 1, 2, 4-8, 10-15, 17, 19, 20-30, 33-37, 39, 40, and 42-51) generally leave the Bowers Substation toward the north or east, parallel to a combination of property boundaries, existing pipelines, and existing transmission lines. The Northern routes continue east primarily parallel to property boundaries and SH 152. The Northern routes then turn south parallel to roads and property boundaries as they approach the Howard Substation.

4.2 NORTH-CENTRAL ROUTES

The North-Central routes (Segments 1, 2, 5, 7, 8, 10, 13, 15, 18, 22-30, 33-37, 39, 40, and 42-51), like the Northern routes, generally leave the Bowers Substation toward the north or east, parallel to a combination of property boundaries, existing pipelines, and existing transmission lines. The North-Central routes then continue east primarily parallel to an existing pipeline corridor. The North-Central routes continue east parallel to existing pipelines and property boundaries before turning south, primarily parallel to roads and property boundaries as they approach the Howard Substation.

4.3 CENTRAL ROUTES

Like the Northern and North-Central routes, the Central routes (Segments 1, 2, 5, 7, 8, 10, 13, 16, 22-30, 33-37, 39, 40, and 42-51) generally exit the Bowers Substation toward the north or east, parallel to a combination of property boundaries, existing pipelines, and existing transmission lines. The Central routes continue east primarily parallel to existing property boundaries and existing pipelines before turning south, primarily parallel to roads and property boundaries as they approach the Howard Substation.

4.4 SOUTH-CENTRAL ROUTES

The South-Central routes (Segments 2, 7, 9, 22, 23, 33, 40, and 44-51) exit the Bowers Substation and proceed in an easterly direction, parallel to or along the centerline (using the existing ROW) of an existing 69 kV transmission line running between the Bowers and Howard Substation. As the South-Central routes approach the Howard Substation, some South-Central routes deviate from the existing transmission line and parallel property boundaries and roads before entering the Howard Substation.

4.5 SOUTHERN ROUTES

The Southern routes (Segments 3, 31-33, 38, 40, 41, and 44-51) exit the Bowers Substation and proceed in a southerly direction parallel to apparent property boundaries until reaching the existing transmission line corridor that includes an SPS 230 kV transmission line and the approved Gray to White Deer (Docket 38650) CTT 345 kV transmission line and later the approved Gray to Tesla CTT 345 kV transmission line (Docket 37956). At this point, the Southern routes turn east, paralleling the northern side of the existing transmission line corridor. The route continues east, parallel to a combination of the existing transmission corridor, apparent property boundaries, and roads (SH 273 and Ranch Road 2473). As the Southern routes approach the Howard Substation, they parallel a variety of existing pipelines, existing transmission lines, apparent property boundaries, and roads before entering the Howard Substation.

4.6 ROUTE MODIFICATIONS AND THE REBUILD OPTION

After developing the preliminary alternative routes described above, the routes were then presented at two public open-house meetings, as further discussed in Chapter 5.0. The 11x17 figures located in Appendix B depict the preliminary alternative routes that were presented at the public open-house meetings. After the public open-house meetings, based on the input and comments received from the meeting attendees, Burns & McDonnell removed certain segments that paralleled pipelines, made modifications to portions of Segment 49, and added a rebuild option of the existing SPS transmission line that extends between the Bowers and Howard substations. Chapter 6.0 provides a detailed description of the additions and adjustments to the preliminary alternative routes that were made following the public open-house meetings. Appendix D also provides detailed descriptions of the final proposed routes by segment.

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5.0 PUBLIC INVOLVEMENT PROGRAM

5.1 CORRESPONDENCE WITH AGENCIES AND OFFICIALS

One of the first data collection activities for this project was the development of a list of officials to be mailed a consultation letter regarding the proposed project. The purpose of the letters was to inform the various officials and agencies of the proposed project and give them the opportunity to provide information they may have regarding the study area. Burns & McDonnell utilized websites from area counties and various municipalities, as well as confirmation via telephone calls, to identify local officials. Various state and/or federal agencies that may have potential permitting requirements for the proposed project were also contacted. Copies of correspondence sent to and received from the following local officials, departments, and various state/federal regulatory agencies are included in Appendix A.

State/Federal agencies that were mailed a consultation letter include:

- FEMA;
- NRCS;
- USACE (Tulsa District);
- USFWS;
- FAA (Southwest Region);
- TXDOT (Amarillo District, Childress District, Environmental Affairs Division, and Aviation Division);
- Texas General Land Office (Survey / Asset Management);
- TWDB;
- Texas Parks & Wildlife Department (TPWD);
- THC;
- Panhandle Regional Planning Commission;
- County Officials in Gray and Wheeler Counties (including Farm Bureaus and Historical Commissions for both counties); and,
- Greater Pampa Area Chamber of Commerce.

City Officials with the following cities were mailed a consultation letter:

- Pampa;
- Lefors;
- Mobeetie; and,

- Wheeler.

The following independent school districts were mailed a consultation letter:

- Fort Elliott;
- Shamrock;
- Wheeler;
- Pampa;
- Miami;
- Mclean; and,
- Lefors.

5.2 CORRESPONDENCE SUMMARY

Responses to the consultation letters were received from the following agencies and or officials: USACE, FEMA, USFWS, NRCS, TXDOT Aviation Division, THC, GLO, TPWD, Gray County, Wheeler County, City of Lefors, and McLean ISD. Copies of all consultation letter responses are available in Appendix A. All agency comments and concerns were taken into account during the development of routes and this environmental assessment. Below is a summary of the consultation responses received.

5.2.1 U.S. Army Corps of Engineers

USACE responded that due to lack of detailed project information in the consultation letter, a determination of an authorization and what type of authorization would be required for the project could not be made. USACE assigned an internal project number and requested, when available, additional information including detailed maps showing where the line would cross waters of the United States or where structures would be placed within waters of the United States. This level of detailed information is not available until a route is certified by the PUCT and final design is completed. USACE also requested that during project planning, the routes avoid and minimize adverse impacts to streams, wetlands, and other waters of the United States.

5.2.2 Federal Emergency Management Agency

FEMA requested that the local flood plain administrator be contacted for review and for information regarding the possible permits required for the project.

5.2.3 U.S. Fish and Wildlife Service

USFWS responded that the following federally listed endangered and candidate species are known to occur in both counties in the study area: interior least tern, LPC, and whooping crane. They also stated that the bald eagle was recently removed from the list of federally threatened and endangered species but is still protected under both the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The interior least tern may occur along the North Fork of the Red River where suitable habitat is present. The USFWS recommended that construction in these areas be avoided during the nesting season (May through August) and that the lines be marked with bird flight diverters. They also stated that the project does not lie within the 200-mile wide corridor in which 94% of whooping crane sightings have occurred during migration. Despite this, whooping cranes may occur within the study area when searching for stop-over habitat. For this reason, the USFWS recommended marking transmission lines with bird flight diverters near wetlands and riparian corridors. They stated that the LPC, being a candidate species, is not afforded protection under the Endangered Species Act, yet they recommended that potential impacts to the species be considered during project development. They also recommended that the study area be surveyed for the presence of the LPC and its habitat.

The USFWS also stated that clearing for transmission line rights-of-way at riparian corridors can result in significant impacts to fish and wildlife habitat. Thus, they recommended avoiding riparian areas to the greatest extent possible. The USFWS was also concerned with new transmission line rights-of-way that extend for miles creating new linear corridors which may fragment valuable habitats.

5.2.4 Natural Resources Conservation Service

The NRCS responded that there should be no significant adverse impact on the environment or natural resources in the area from the project.

5.2.5 Texas Department of Transportation Aviation Division

The TXDOT Aviation Division responded that there are no public use airports or heliports in the study area. Further conversations with both the Aviation Division and the local office resulted in the discovery of a heliport, located west of Mobeetie, which was not present in the TXDOT system.

5.2.6 Texas Historical Commission

The THC responded that there are important prehistoric and historic sites documented in this portion of Texas. They recommended that a professional archaeologist develop HPAs for further investigation and to submit any findings to THC for their review and concurrence.

5.2.7 Texas General Land Office

The GLO responded that the project does not appear to conflict with the Permanent School Fund properties.

5.2.8 Texas Parks and Wildlife Department

The TPWD responded by reiterating the project description and then outlining the various laws and permits that may apply to the project. Under the discussion of the ESA, TPWD indicated that the project is located within the Estimated Occupied Range (EOR) of the LPC, a federal candidate for listing under the ESA. The LPC is currently declining across its entire range due primarily to loss of suitable habitat and through fragmentation of the remaining habitat. In January 2011, the USFWS began the formal process of listing the LPC under the ESA and it is estimated that this process will take approximately 18 months. They stated their preference that the project avoid and minimize impacts to the LPC over compensation. TPWD also stated that due to state laws, they are unable to provide the requested information on known leks, species sightings, and properties with Candidate Conservation Agreements with Assurances (CCAAs). TPWD provided a link to the latest attempt at accurately modeling LPC habitat, currently being developed by the Western Governors Association Wildlife Council Project. TPWD recommended that the project avoid the LPC EOR, and that if SPS decides to use its existing ROW within the EOR, that they not widen the ROW nor raise the height of any current structures. TPWD specifically requested that SPS expand the study area to avoid the LPC EOR and that SPS and Burns & McDonnell survey the study area for LPCs and LPC habitat.

TPWD also recommended that SPS consult with the USACE for potential impacts to waters of the U.S. TPWD noted that there is a record of a Great Blue Heron rookery in the study area along Sweetwater Creek and recommended that Burns & McDonnell survey all riparian vegetation for waterbird rookeries and avoid development of routes that would affect vegetation near any identified waterbird rookeries. TPWD further recommended that any lines located near creeks, drainages, reservoirs, and playa lakes should be marked with line markers to reduce the potential for collisions with birds flying along or near drainages. They also recommended the installation of perch guards and insulated jumper wires to avoid electrocution of perching raptors.

TPWD noted that the project is likely to contain the state-listed threatened Texas horned lizard and they recommended that SPS avoid disturbance to the Texas horned lizard and its primary food source, the harvester ant (*Pogonomyrmex* sp).

TPWD advised that McClellan Creek, Graham Creek, and Sweetwater Creek have all been designated as ESSS by TPWD. TPWD recommended that measures be taken to avoid adverse impacts to these streams.

TPWD also recommended that impacts to native vegetation be minimized to the extent feasible. Any unavoidable impacts should be mitigated by revegetation with native species. TPWD noted there are records of the Cottonwood-Tallgrass series in the study area and recommended that the study area be surveyed for this and other rare native vegetation communities and that impacts be avoided.

TPWD noted that absence of species records in the TXNDD data provided to Burns & McDonnell does not indicate the absence of rare, threatened, or endangered species and recommended that a review of the habitats within the study area be undertaken to determine impacts. TPWD recommended again that impacts to the LPC be avoided, minimized, and mitigated, in this order. If impacts are unavoidable, TPWD requested that SPS coordinate with TPWD and USFWS on compensation efforts for all impacts to the LPC.

5.2.9 Gray County

Gray County responded that they received the consultation letter and have no information to provide.

5.2.10 Wheeler County

Wheeler County responded that they did not have any information directly requested in the consultation letter but provided a map of known cemetery locations. They further stated that the City of Mobeetie is home of the first jail in the panhandle of Texas and that powerlines near this would not be welcomed. They also stated that there is one airport located east of the City of Wheeler, and that if any county road will be cut or bored under, a permit would be required from the Wheeler County Commissioners Court.

5.2.11 City of Lefors

The City of Lefors called to state they have no concerns with this project.

5.2.12 McLean Independent School District

McLean ISD called and stated that they have no plans to build new buildings especially within the portion of the ISD that is located within the study area.

5.3 PUBLIC MEETINGS

To provide landowners, elected officials, and the various communities in the area with information about the project, and to gather input on preliminary alternative routes and community values, SPS held two public open-house meetings in October 2011. Open-house meeting notices were mailed to landowners within 300 ft. of any preliminary alternative route (approximately 488 notices were mailed).

The open-house meetings included displays with information on project need, engineering, and preliminary alternative routes. Representatives from SPS, Burns & McDonnell, Manning Land, and Grammer Land & Exploration were present to address the public's questions and take comments. Preliminary route segments developed for the proposed transmission line were depicted on 2010 aerial photographs (Appendix B). Drawings showing the types of structures that could be used for the project were also displayed.

Participants at the open-house meetings received a written questionnaire to communicate their opinions to the project team and provide input into the routing process. Appendix B contains a sample questionnaire.

A total of 25 people signed-in as attending the open-house meeting in Wheeler, Texas; 21 people signed-in as attending the meeting in Pampa, Texas. All of the participants were encouraged to fill out a questionnaire and return it at the meeting or by mail at a later date. In total, 12 completed questionnaires were returned either at or after the open-house meetings.

Results of the questionnaires received from people attending the meetings show that all of the respondents thought that the open-house was helpful and that approximately 77% of the respondents found that the need for the project had been adequately explained.

The questionnaires asked people to rank various routing factors from most important to least important. These factors included placing the line through undeveloped lands, next to existing transmission lines, next to existing roads, and next to existing property lines. The preferred (highest ranked) factor was to follow existing property lines and the lowest ranked factor was placing the line next to existing transmission lines.

In addition to paralleling corridors, the questionnaire asked people to rank land use considerations from highest to lowest importance. These factors included potential impacts to ecology, historic and cultural sites, center-pivot irrigation systems, length across cultivated land, distance from residences, distance from public facilities, total length of line, and visibility of the line. The factor that was ranked as most important was maximizing distance from residences and the factor ranked least important was to minimize length through high quality LPC habitat. The list below shows the factors as ranked (most preferred to least preferred) on the questionnaires by the public.

- Maintain reliable electric service;
- Maximize distance from residences;
- Maximize length along property boundaries;
- Maximize length along highways or other roads;
- Minimize length through wetlands and number of stream / river crossings;
- Minimize loss of trees;
- Maximize length along existing transmission lines;
- Minimize length across cropland;
- Minimize length through grassland or pasture;
- Minimize impacts to archaeological and historic sites and/or Native American lands;
- Maximize distance from public facilities (e.g., parks, schools, churches, cemeteries);
- Maximize distance from businesses;
- Minimize visibility of the line;
- Minimize total length of line (reducing the total cost); and
- Minimize length through high quality LPC habitat.

The questionnaire also allowed space for people to write in general comments and/or concerns. Below is a synopsis of typical comments and concerns received in letter or questionnaire format:

- Concern over amount of land taken from a single landowner for electric line easements;
- Concern for habitat for LPC and quail;
- Concern over fire risk from new transmission line;
- Concern over loss of trees in an area that has so few; and,
- Interest in SPS using existing ROW to construct the new line.

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6.0 MODIFICATION/ADDITION OF ALTERNATIVE ROUTES FOLLOWING THE PUBLIC INVOLVEMENT PROGRAM

Portions of a route segment were modified and several segments were added or removed from consideration following the public open-house meetings. Changes were made in response to information obtained through public comments, through agency/company contacts, and as a result of more detailed information obtained through additional field surveys and discussions with SPS planners.

A portion of Segment 49 was modified following the public open-house meetings in response to input, comments, and information received at and following the open-house meetings, as well as further review of the routes. At the request of SPS, Segment 49 was modified to parallel the west side of South Osage Street (Figure 6-1). This modification was to comply with a previous agreement with the City of Wheeler that any new lines leaving the Howard Substation to the north would parallel the eastern boundary of this property.

As a result of comments received during the public open-house meetings, SPS analyzed the feasibility of removing the existing Y62 69 kV transmission line (Y62 line), which currently runs between the Bowers and Howard substations and was built in 1930, and replacing it with a double circuit 115/69 kV line. The existing Y62 line currently supplies power to the Kellerville Substation and, as a result, cannot be taken out of service completely during the rebuild. SPS will need to sequence the construction so that one portion of the Y62 line is always in service to supply the needed power to the Kellerville Substation. While there is only one portion of the Y62 line serving the Kellerville Substation, there will be an additional risk of loss of service to the Kellerville Substation and the customers it supplies. After considering the risks and the additional construction sequencing that would be necessary, SPS determined it would be feasible to rebuild the existing Y62 line as a double-circuit line.

The decision to include the rebuild of the Y62 line as a double circuit 115/69 kV transmission line added eight new segments that were not shown at the public open house meetings. These segments include 2a, 7a, 9a, 23a, 33a, 40a, and 46a. The “a” designation following the segment number indicates they are similar to the original segments (2, 7, 9, 23, 33, 40, and 46), except those with an “a” would be rebuilt along the existing transmission line centerline (using the existing ROW), and those without the “a” would be constructed parallel to the existing transmission line ROW. Segment 51 does not have a corresponding rebuild segment because the existing line is already double-circuit at this location and it would not be feasible to construct a triple-circuit line. Therefore, only a parallel option (Segment 51) to the existing transmission line is available at this

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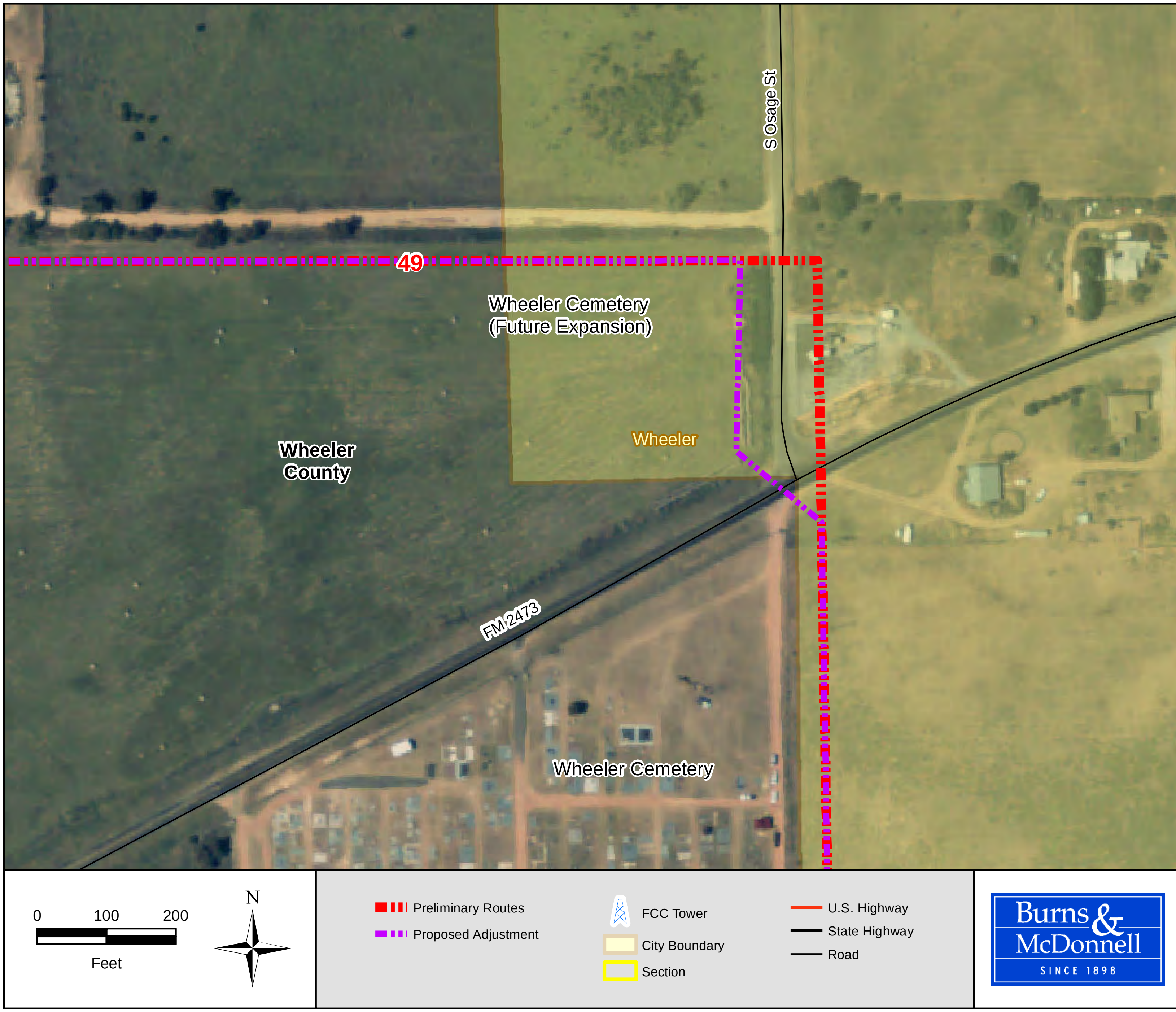

Figure 6-1
Segment 49 Adjustment
Bowers to Howard

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location. These new segments are included in the analysis of the South-Central routes in Section 7.0 of this report and are shown on Figures 6-2 through 6-8.

After consulting with the owners of the pipelines that were paralleled by Segments 6, 11, 15, 17, 18, 19, 27, 30, & 31 (North-Central routes) and the PUC, SPS dropped these segments from further consideration. SPS determined that the public opposition to these segments, combined with an additional cost of cathodic protection that may be required by the pipeline owners, made these segments unacceptable. As a result, all of the North-Central routes were removed from the route evaluation.

After all of these modifications, additions, and removals were made, a total of 49 segments were identified and combined into routes between the Bowers and Howard substations for further evaluation as discussed in Chapter 7.0.

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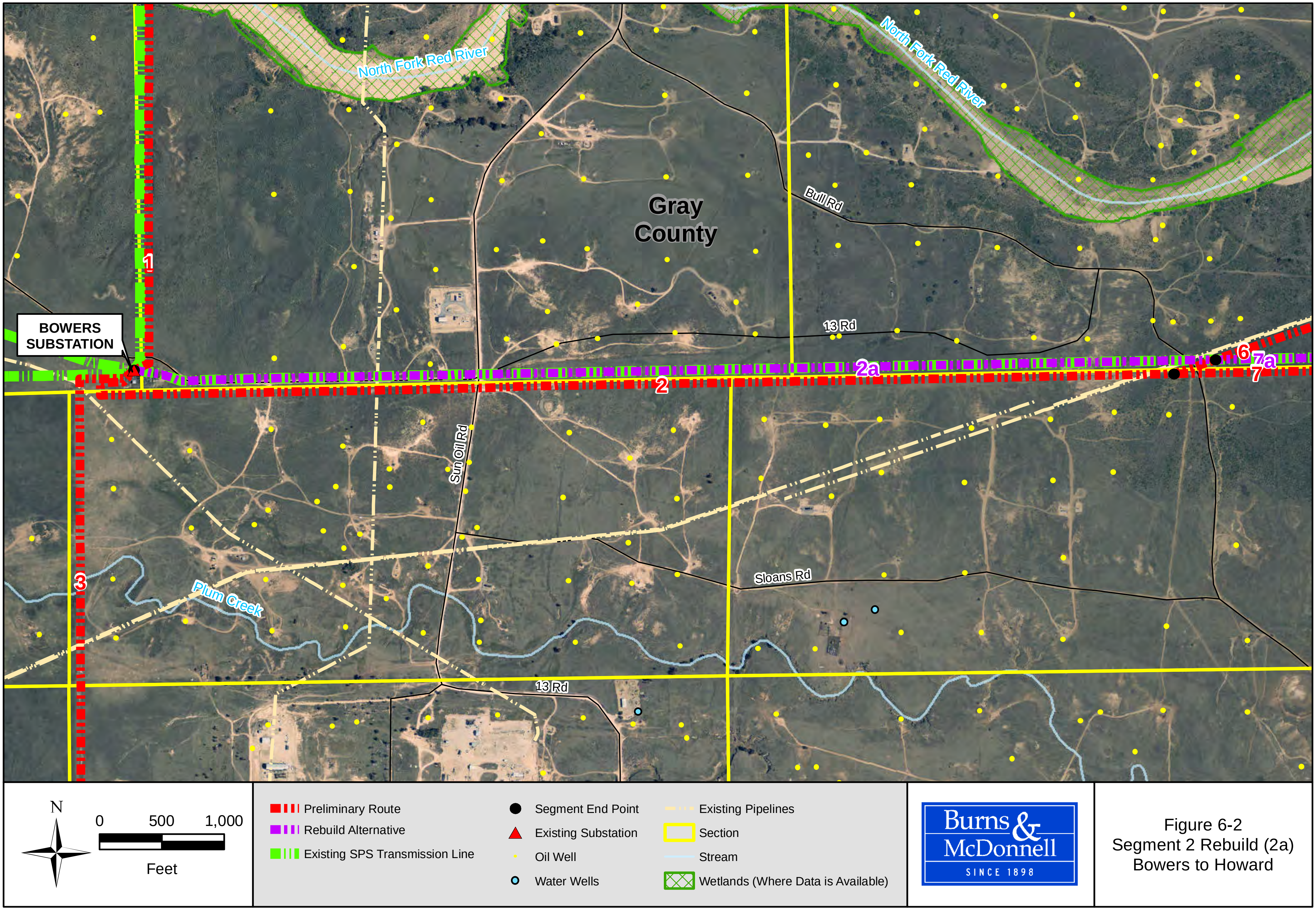

Figure 6-2
Segment 2 Rebuild (2a)
Bowers to Howard

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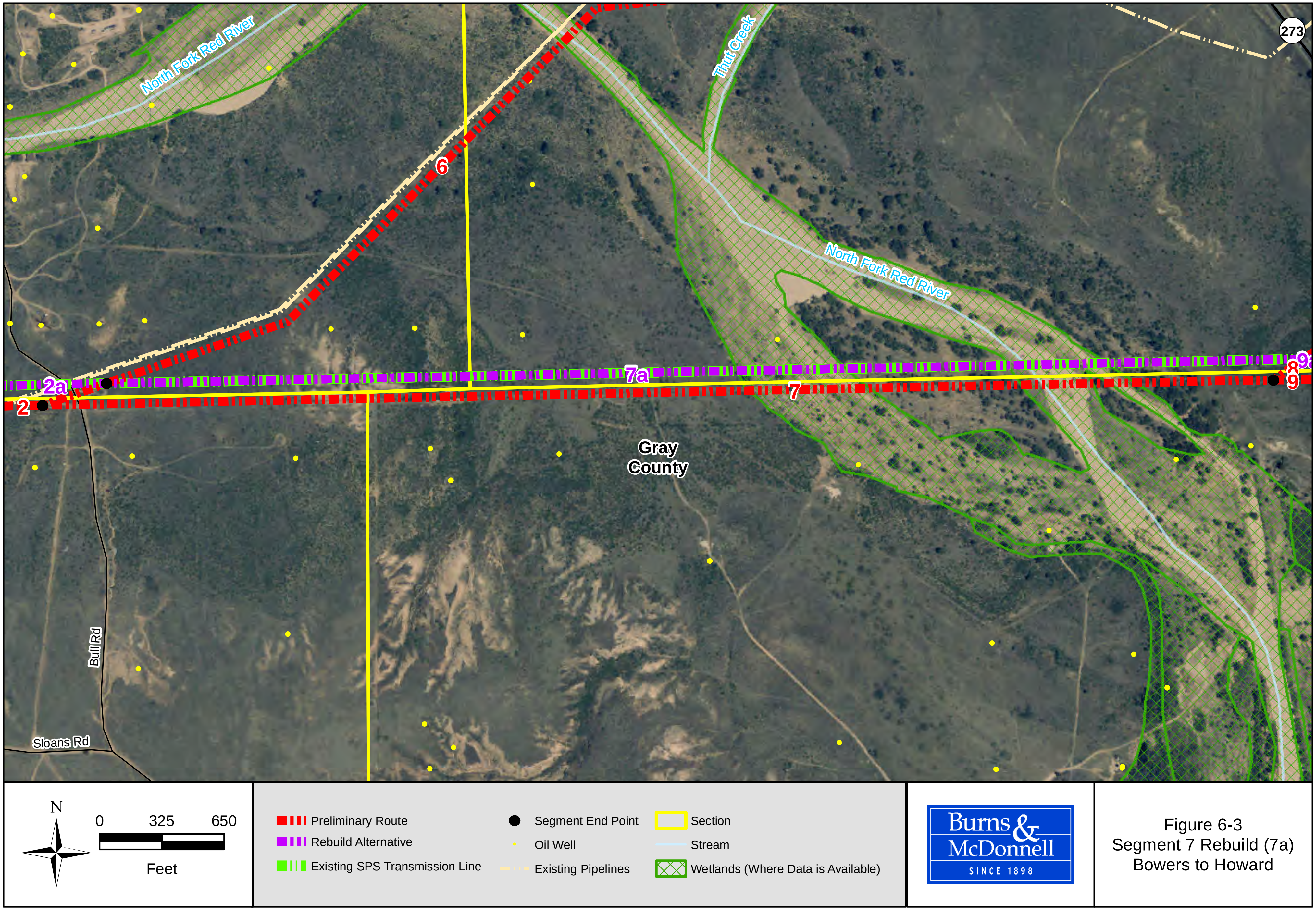

Figure 6-3
Segment 7 Rebuild (7a)
Bowers to Howard

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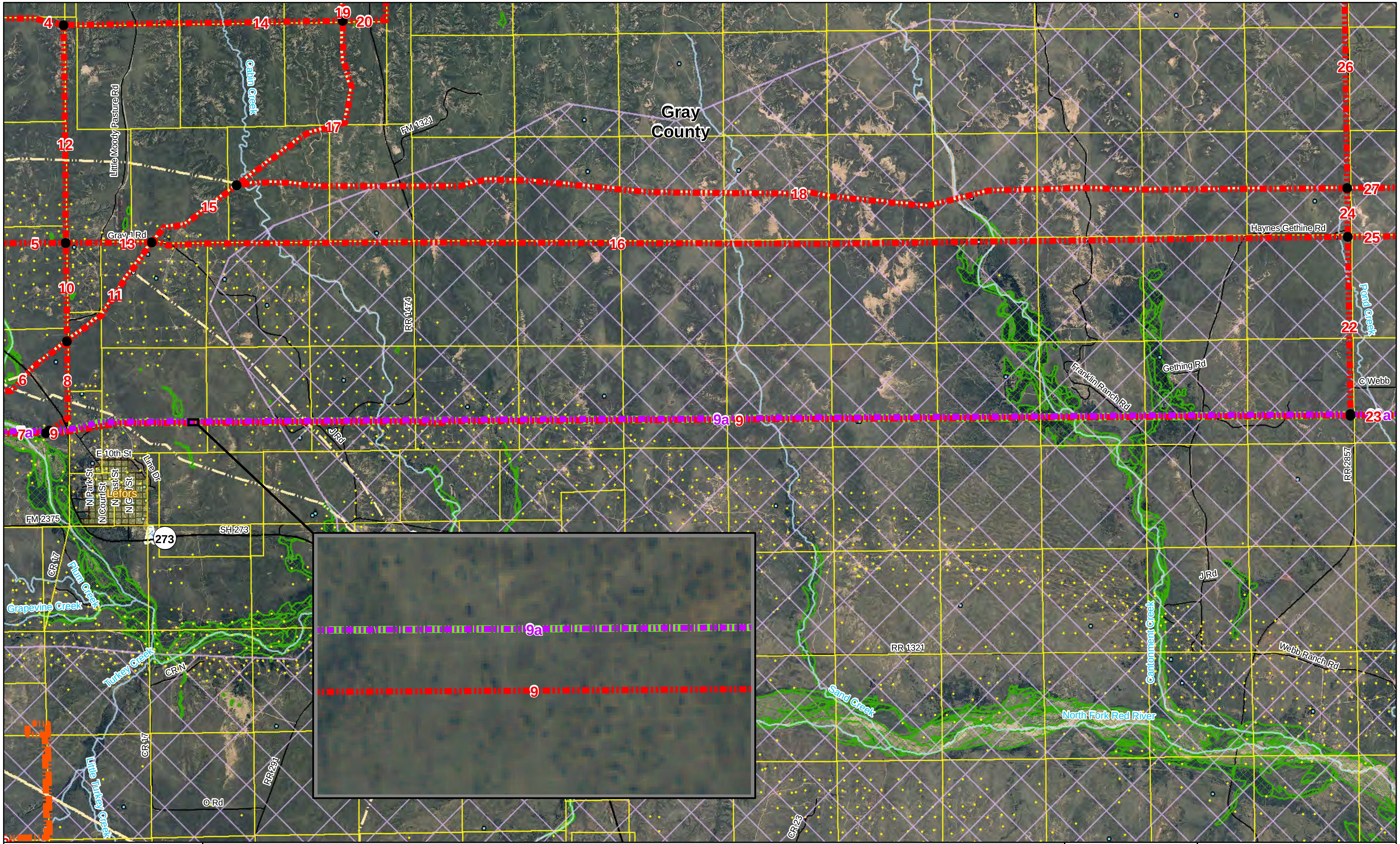

N

0 2,250 4,500

Feet

- Preliminary Route
- Rebuild Alternative
- Cross Texas Transmission Proposed Transmission Line
- Existing SPS Transmission Line
- Existing Substation
- Segment End Point
- Oil Well
- Water Wells
- FCC Tower
- Existing Pipelines
- City Boundary
- Section
- Lesser Prairie Chicken Range
- Stream
- Wetlands (Where Data is Available)

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SINCE 1898

Figure 6-4
Segment 9 Rebuild (9a)
Bowers to Howard

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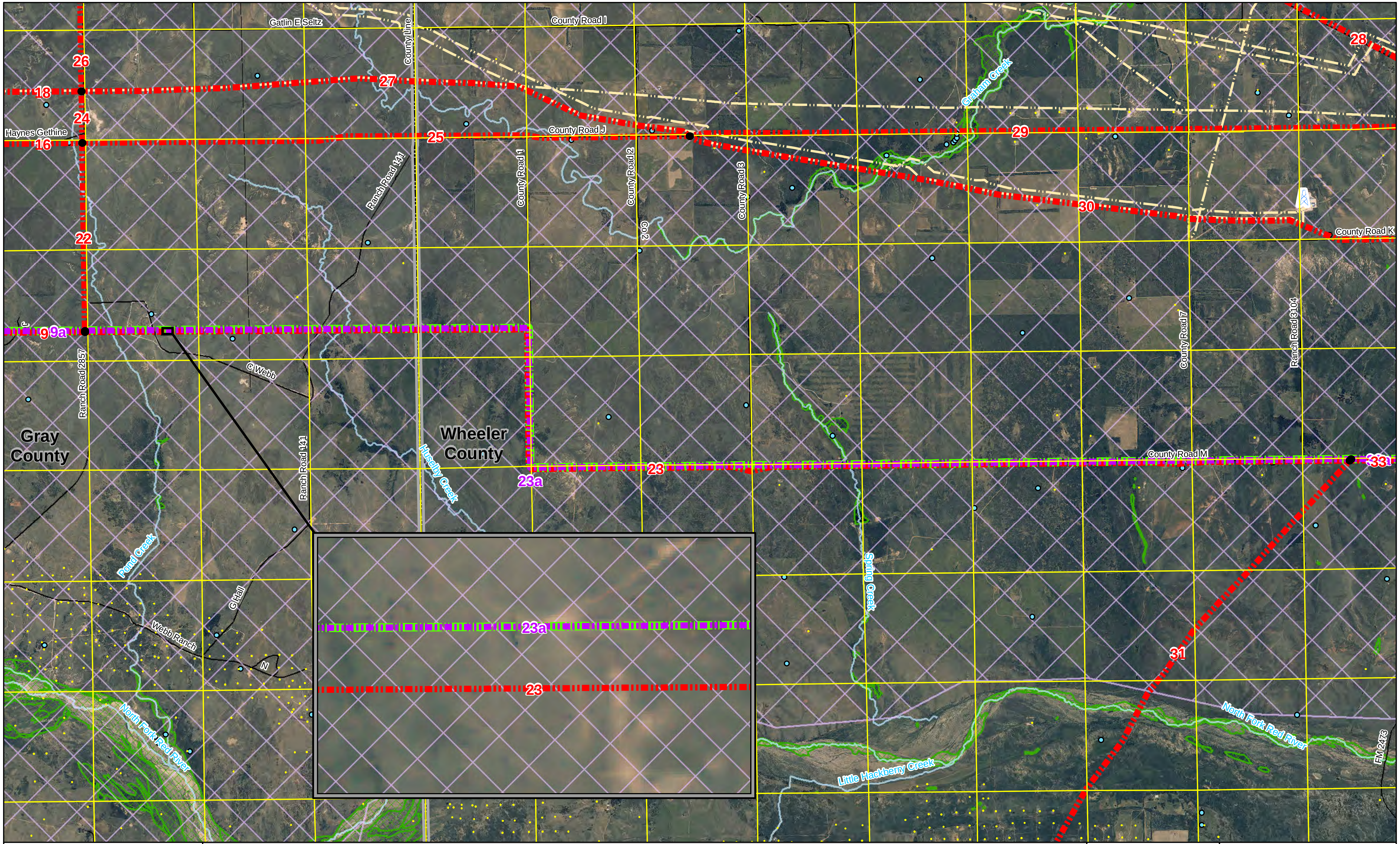

N

0 2,125 4,250

Feet

Legend	
Preliminary Route	Segment End Point
Rebuild Alternative	Water Wells
Existing SPS Transmission Line	Oil Well
FCC Tower	Stream
Existing Pipelines	Wetlands (Where Data is Available)
Section	Lesser Prairie Chicken Range
	County Boundary

Burns & McDonnell

SINCE 1898

Figure 6-5
Segment 23 Rebuild (23a)
Bowers to Howard

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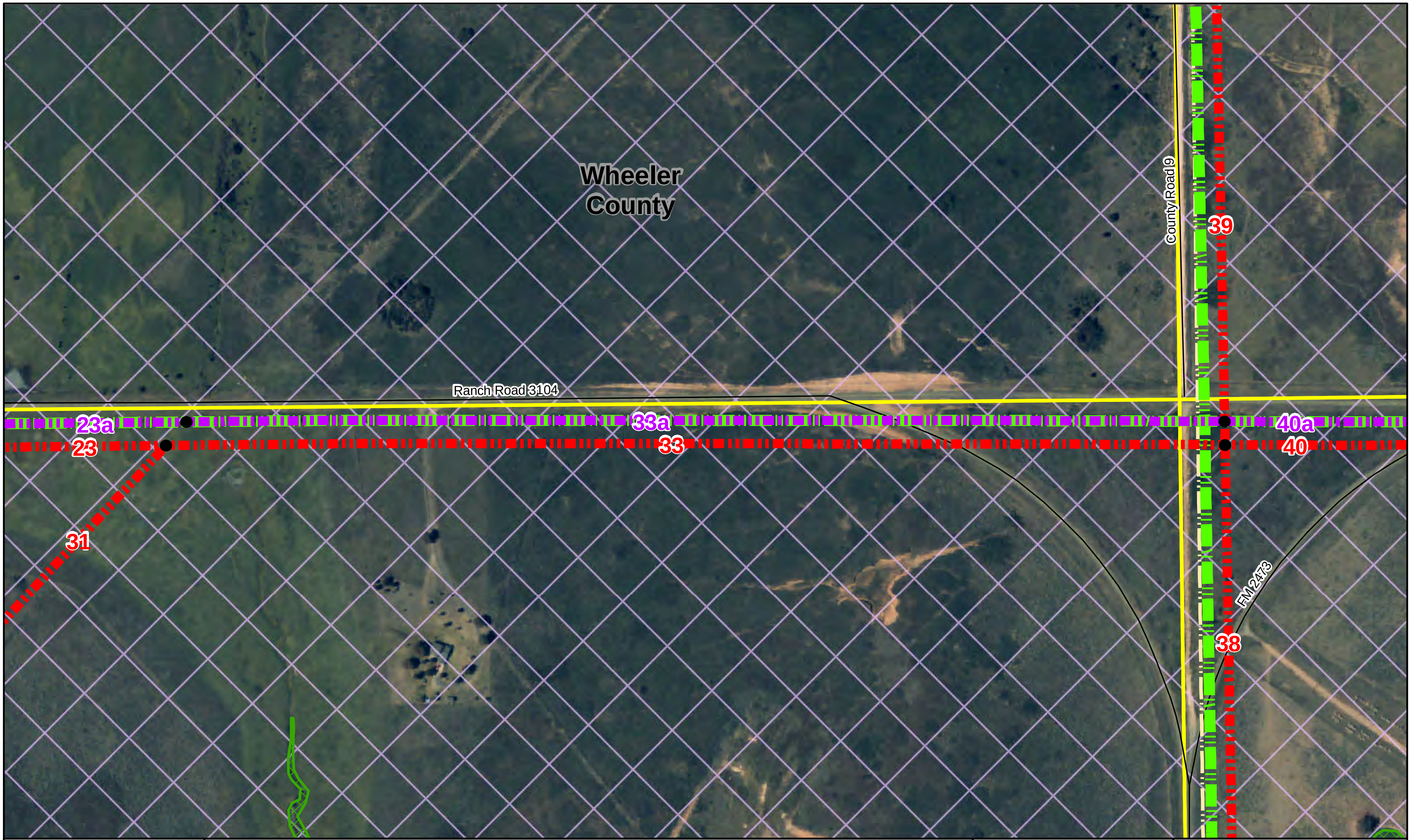

N
0 200 400
Feet

Preliminary Route
Rebuild Alternative
Existing SPS Transmission Line
Segment End Point
Existing Pipelines
Section
Lesser Prairie Chicken Range
Wetlands (Where Data is Available)

Burns & McDonnell
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Figure 6-6
Segment 33 Rebuild (33a)
Bowers to Howard

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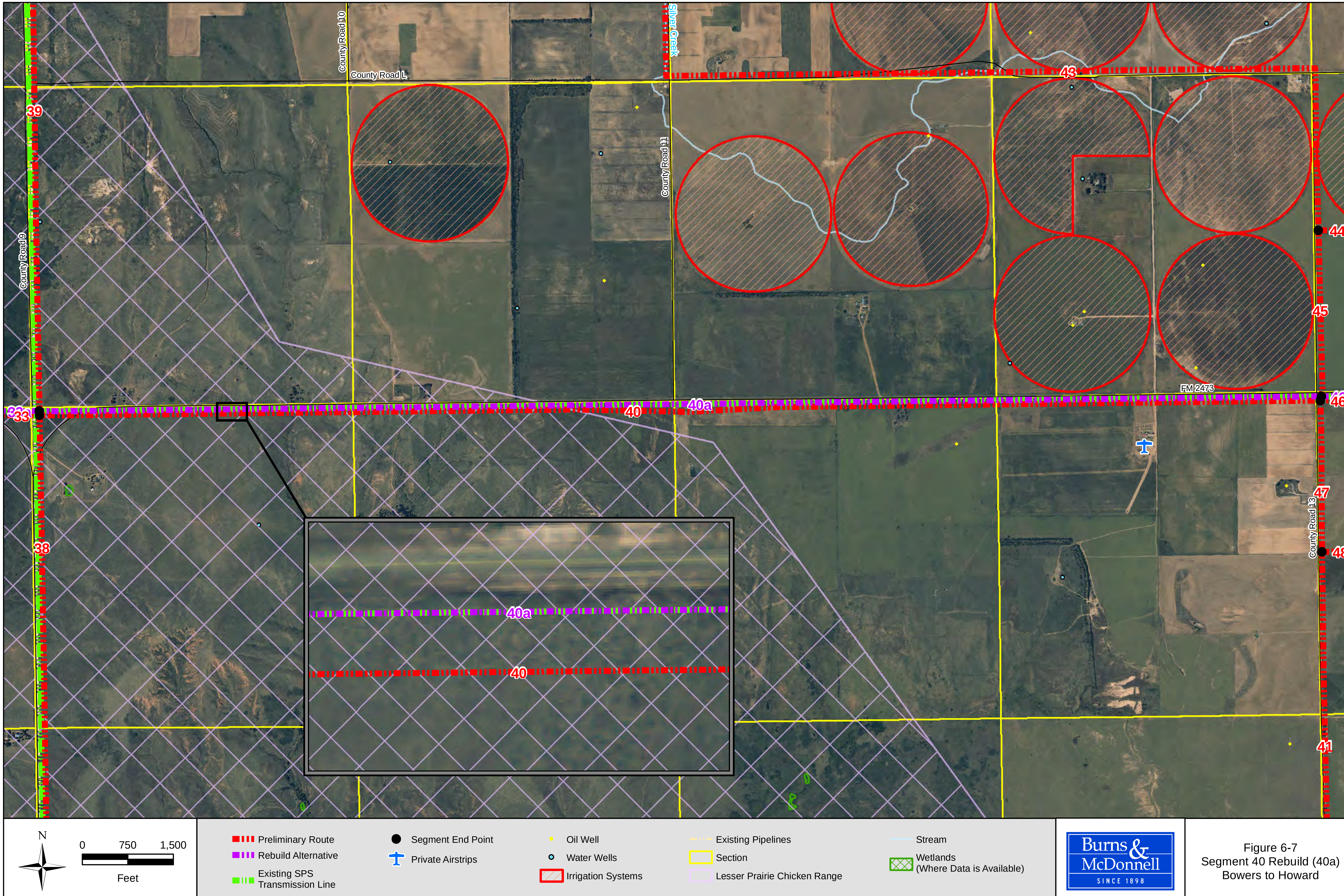

Figure 6-7
Segment 40 Rebuild (40a)
Bowers to Howard

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N

0 200 400

Feet

Preliminary Route
Rebuild Alternative
Existing SPS Transmission Line
Segment End Point
Water Wells
Existing Pipelines
Section
Irrigation Systems
Wetlands (Where Data is Available)

Burns & McDonnell SINCE 1898

Figure 6-8
Segment 46 Rebuild (46a)
Bowers to Howard

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7.0 ENVIRONMENTAL IMPACTS OF THE PROPOSED ROUTES

Following is a description of the evaluation of the potential impacts to the natural, human, and cultural resources in the study area from the construction and operation of the proposed project. Alternative routes indicated below were discussed in Chapters 2.0, 4.0, and 6.0. Table 7-1 summarizes the environmental and land use data evaluated by Burns & McDonnell professionals.

7.1 ROUTE SCREENING AND SELECTION

Burns & McDonnell completed a screening methodology using the 37 quantified route criteria shown in Table 2-1 for each of the identified 137 preliminary routes. The routing criteria included such units as length, acres, and counts of particular resources and are therefore not directly comparable. In addition, no single route had the lowest impact value for all of the measured criteria. For example, while a particular route may have been the shortest, it may have ranked higher in other criteria. With this level of complexity resulting from the number of routes and variations on the individual criteria measurements, it is difficult to conduct a route-by-route comparison to identify a particular route or routes that would minimize overall potential impacts. Therefore, as part of an overall evaluation to compare all of the routes and variable criteria together, Burns & McDonnell used a statistical z-score analysis to transform the variable measurements into comparable units, to screen the route alternatives, and to identify a set of proposed routes warranting further investigation and comparison.

Once the criteria totals for each route were determined, a z-score was calculated for each criterion for each route. The z-score analysis uses the mean (or average) value within a set of data to compare with each individual route value, and to determine the degree of difference (standard deviation) each route value is from the mean. For example, the total length of all the routes would be quantified and the mean value for the entire set of route lengths would be determined. Next, the total length for each route would be compared to that mean value. If the individual route length was equal to the mean value, the z-score would be zero, as there would be no difference. If the total length was greater than the mean, the z-score would be a positive number; if the total length was less than the mean, the z-score would be a negative number. In addition, the further below or above the mean a route value is for a particular criterion, the more negative/positive the corresponding z-score. Z-scores were determined for each criterion of each route.

Following calculation of the z-scores, which have now transformed the data into like, or comparable, units, Burns & McDonnell developed a total route score by adding all of the z-scores for the 37 criteria together. Both positive and negative z-scores were included in the total z-score. In the resulting route z-scores, positive total z-scores would indicate that the overall route would have a greater environmental impact than the average for all routes, while negative total z-scores would have a smaller than average overall environmental and social impact. The resulting total z-scores for the 137 routes ranged from a low of -25.0 to a high of 26.6.

Using the total route z-scores, Burns & McDonnell was able to rank all 137 routes and then select the top-ranking Northern, Central, South-Central, and Southern routes (the North-Central routes were removed from consideration after the open houses). Burns & McDonnell also selected the rebuild of the existing Y62 line, which was added following the public open house meetings. This resulted in a total of 5 routes comprised of only 31 segments (out of 49 remaining segments). Burns & McDonnell selected an additional 8 routes, generally those that ranked the highest and that included the remaining 18 segments, to carry forward for additional analysis as the proposed routes. These selected 13 routes (proposed routes) are listed in Table 7-1 with their corresponding route data for all 37 analyzed criteria. Table 7-1 also lists the z-scores for these 13 proposed routes. Figure 7-1 shows these proposed routes overlaid on the constraint map and includes parcels either crossed by the proposed routes or with habitable structures within 300 ft. of the routes. Throughout the remainder of Chapter 7, the proposed routes are further analyzed qualitatively based on their impacts to natural resources, human resources, and cultural resources, described below. Detailed descriptions of each of the segments that are used in the proposed routes are included in Appendix D.

7.2 IMPACTS ON NATURAL RESOURCES

This section contains a discussion of the potential impacts of the project on the natural resources found along the proposed routes, including physiography and land cover, soils, hydrology, vegetation, wetlands, wildlife, and threatened and endangered species.

7.2.1 Physiography and Land Cover

Upland land cover impacts along the proposed routes have been broken down into four categories: rangeland, cultivated land, mobile irrigation land, and wooded areas. Wetlands and open water were taken into consideration as well, but are discussed in the wetlands section that follows. Mobile irrigation land and cultivated land are also discussed in Section 7.4.1.2 – Agriculture. Land cover impacts were determined based primarily on a review of aerial photography and field reconnaissance.

Rangeland is the most desirable land cover for transmission line routing based on the low potential for impacts. Cultivated and mobile irrigation lands are the next desirable land cover. Wooded areas are the

Table 7-1
Environmental and Land Use Data and Z-Scores for Proposed Routes

		Route A	Route B	Route C	Route D	Route E	Route F	Route G	Route H	Route I	Route J	Route K	Route L	Route M
1	Total Length (ft.)	183,410	182,160	202,140	186,880	190,250	199,320	202,340	200,350	197,530	233,880	216,270	226,790	220,310
	Total Length (Miles)	34.7	34.5	38.3	35.4	36.0	37.8	38.3	37.9	37.4	44.3	41.0	43.0	41.7
2	Length Parallel to Transmission Lines (ft.)	178,140	172,540	104,830	164,070	165,840	15,060	107,030	49,020	9,770	116,130	126,320	99,150	11,970
3	Length Parallel to Roads (ft.)	49,930	2,360	19,710	4,100	4,860	31,700	27,180	25,690	34,430	28,680	71,980	92,540	95,750
4	Length Parallel to Pipelines (ft.)	0	0	0	2,810	0	1,540	0	9,630	1,540	0	16,040	4,790	1,540
5	Length Parallel to Apparent Property Lines (ft.)	96,240	92,140	128,170	97,980	96,240	129,920	152,530	129,420	128,130	175,070	155,180	161,810	204,270
6	Length Parallel to Railroads (ft.)	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Total Length Parallel to Existing Facilities (ft.)	183,340	176,020	165,000	180,670	178,930	145,500	179,590	146,190	143,710	212,060	207,220	217,730	204,270
8	Habitable Structures[1] located within 300 feet (count)	5	7	10	7	7	12	13	11	12	5	7	9	19
9	Length Across Parks and Recreation Areas[2] (ft.)	0	0	0	0	0	0	0	0	0	0	0	0	0
10	Park and Recreation Areas[2] located within 1,000 feet (count)	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Rangeland within Right-of-Way (acres)	264.7	260.3	296.4	270.5	264.7	244.4	295.9	271.3	246.8	343.7	307.4	322.2	275.1
12	Cultivated Land within Right-of-Way (acres)	19.6	21.8	22.8	17.7	31.2	62.3	22.8	38.3	53.9	27.6	31.0	30.4	68.2
13	Length Across Mobile Irrigation Systems (ft.)	0	930	0	200	370	1,350	0	930	1,350	0	0	0	2,540
14	Wooded Areas within Right-of-Way (acres)	0.7	9.0	3.9	10.2	8.4	10.9	4.8	9.7	10.9	2.9	6.5	9.6	9.1
15	Forested/Scrub-Shrub Wetlands within Right-of-Way (acres)	3.9	4.3	0.2	5.4	4.1	1.8	0.2	0.7	1.8	0.2	1.4	1.8	2.8
16	Emergent and Riverine Wetlands within Right-of-Way (acres)	2.3	2.4	1.6	2.4	2.4	2.7	1.9	2.7	2.7	1.3	1.1	2.1	2.6
17	Number of Streams Crossed (count)	57	59	75	60	60	64	76	60	66	80	61	62	73
18	Number of Ecologically Significant Stream Segments Crossed (count)	0	0	0	0	0	2	0	2	2	0	1	1	3
19	Length Parallel to Streams (within 100 ft.) (ft.)	3,450	4,610	7,290	4,610	5,750	8,750	7,950	6,280	8,750	9,200	8,190	9,720	12,350
20	Known Rare/Unique Plant Species in Right-of-Way (count)	0	0	0	0	0	0	0	0	0	0	0	0	0
21	Length Through Potential T&E Species Habitat (ft.)	1,200	1,010	710	1,010	1,010	710	1,010	710	710	710	3,700	4,830	1,010
22	LPC Habitat Score (score)	379.6	644.2	712.1	652.3	654.7	631.8	712.7	693.6	639.8	787.2	696.5	717.9	655.6
23	Number of Recorded Cultural Sites Crossed (count)	0	0	0	0	0	0	0	0	0	0	0	0	1
24	Number of Recorded Cultural Sites within 1,000 ft. (count)	0	0	0	0	0	0	0	0	0	0	0	0	0
25	Length Through HPA (ft.)	12,020	13,170	14,190	12,400	14,180	13,800	11,520	11,480	14,010	18,620	17,400	17,250	22,880
26	Number of FAA Registered Airstrips within 20,000 feet with runway lengths greater than 3,200 feet in length (count)	0	0	0	0	0	0	0	0	0	0	0	0	0
27	Number of FAA Registered Airstrips within 10,000 feet with runway lengths less than 3,200 feet in length (count)	0	0	0	0	0	0	0	0	0	0	0	0	0
28	Number of Private Airstrips within 10,000 feet (count)	1	1	1	1	1	1	1	1	1	1	2	2	1
29	Number of Heliports within 5,000 feet (count)	0	0	0	0	0	0	0	0	0	0	0	0	1
30	Length Across Open Water (ft.)	830	880	1,080	880	880	1,080	1,050	1,080	1,080	720	1,000	1,000	800
31	Number of AM Towers within 10,000 feet (count)	0	0	0	0	0	0	0	0	0	0	0	0	0
32	Number of FM Towers within 2,000 feet (count)	3	3	2	3	4	2	2	2	2	2	3	2	3
33	State/Federal Highway Crossings (count)	7	5	6	7	5	4	6	4	6	6	11	9	7
34	Other Public Road Crossings (count)	15	15	14	16	15	21	14	19	21	15	7	6	19
35	Length of Line within Foreground Visual Zone of State/Federal Highways (ft.)	54,250	52,230	61,040	53,270	57,900	27,160	61,140	49,930	40,500	84,780	149,520	112,540	117,540
36	Length of Line within Foreground Visual Zone of Parks and Recreation Areas (ft.)	0	0	0	0	0	0	0	0	0	0	0	0	0
37	Length Through Off-Road Erosional Hazard Areas (ft.)	8,180	9,080	10,570	9,080	9,080	1,770	10,170	3,030	1,770	22,880	8,740	3,370	16,670
	Z-Scores	-25.18	-18.17	-15.99	-14.85	-14.91	-13.23	-12.78	-13.57	-11.74	-5.84	6.81	7.27	16.91

Notes: All length measurements are in feet or miles. All linear measurements were obtained from aerial photography flown in 2011 and ortho-rectified to National Map Accuracy Standards of +/- 20 feet.

[1] 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.

[2] Defined as park or recreational areas owned by a government body or an organized group, club, or church.

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least desirable, as transmission ROWs require a low clearance and these areas would have to be cleared within the ROW.

Construction and operation of the transmission line would not result in any significant impacts to the existing physiography. Land clearing would consist only of tree and shrub removal. Any potential impact to topography, which would be minimal and temporary in nature, would be from the use of heavy construction equipment and excavation required for the construction of new foundations and support structures. Alternative routes were designed to parallel existing ROW and disturbed areas (where possible) to minimize potential impacts to land cover.

The amount of rangeland within the ROW of the proposed routes varies from 244.4 acres (Route F) to 343.7 acres (Route J). In general, the South-Central and Central routes (Routes A, B, E, F, and I) cross the lowest amounts of rangeland (less than 265 acres), largely because these routes are generally the shortest as well.

Cultivated land within the ROW ranges from 17.7 acres (Route D) to 68.2 acres (Route M). Generally, most routes cross fewer than 31 acres of cultivated land, except for Routes F, I, and M, which cross about twice as many acres due largely in part to their use of Segment 43, which alone has nearly 30 acres of cultivated land crossed. The two routes with the least impact to cultivated land are Routes D and A, with 17.7 acres and 19.6 acres of cultivated land occupied, respectively.

The proposed routes cross between 0 and 2,540 ft. of mobile irrigation systems. Routes having no impact to such systems are: Routes A, C, G, J, K, and L.

Because little of the project area is wooded, the proposed routes occupy between only 0.7 (Route A) and 10.9 acres (Routes F and I) of wooded land within the ROW. Route A would require the least amount of clearing of all the routes at 0.7 acres, largely because it would involve rebuilding the existing line to add the new line along the existing transmission line centerline, using the existing ROW that has already been cleared. Segments 3, 9, 28, 29, and 41 have the greatest amount of woodland clearing (from 4.0 to 7.0 acres), causing the routes that use these segments (Routes B, D, E, F, H, I, L, and M) to have greater impacts overall.

Based on the types of land cover crossed, Route A would be preferred due to the routes crossing the fewest wooded areas, low amounts of cultivated lands, and no mobile irrigation systems, as well as low amounts of rangeland due in part to its shorter length.

7.2.2 Soils

The project would result in temporary, minor adverse impacts to the soils within the ROW during construction activities; thus, no significant impacts to soils are anticipated along any of the proposed routes. The primary impacts to soils would result from the use of heavy construction equipment and excavation required for construction of new foundations and support structures. These activities, only temporary in nature, could cause soil compaction, ruts or tracks from vehicle movement, and mixing of the soil profile.

During construction of the proposed transmission line, some erosion could occur within the cleared ROW, resulting in localized increases in soil loss and perhaps sedimentation of area streams. To minimize erosion and sedimentation, a SWPPP and any applicable permits will be prepared and obtained prior to any soil disturbance.

Erosion control measures employed during construction would include seeding, placement of staked straw bales or silt fences on sloped areas, and other appropriate Best Management Practices to control erosion and runoff. To the extent possible, construction crews would avoid soil-disturbing activities during excessively wet weather.

To identify the potential for impacts to erodible soils, the length of each route through areas designated by the NRCS as off-road erosional hazards was calculated. The proposed routes cross from 0.3 miles (Routes F and I) to 4.3 miles (Route J) of soils having a moderate to high erosional hazard. Routes crossing the least amount of soils having a moderate to high erosional hazard (between 0.3 miles and 0.6 miles) include Routes F, H, I, and L. All other proposed routes cross more than a mile of moderate to highly erodible soils. While Routes F, H, I, and L would be preferred from a soils perspective due to the reduced length of these routes that cross soils that are considered to have a high erosional hazard, Routes A and B would also be preferable even though they cross between 1.5 and 1.7 miles of highly erodible soils. These routes are also preferable because they would be built in place of or parallel to existing transmission line ROWs for much of their length, where existing access roads could likely be used instead of requiring construction of new access roads on the erodible soils.

All of the proposed routes traverse soils that are considered by the USDA as prime farmland. Aside from potential construction-related erosion, impacts to prime farmland soils are anticipated to be minor and occur only at the base of transmission line structures. The NRCS indicated in its August 3, 2011, letter (Appendix A, page A-119) that the proposed line would have no impacts. Transmission lines are typically not considered to cause a conversion of farmland because the land can still be used after construction.

7.2.3 Hydrology

Potential hydrology impacts along the proposed routes were considered and evaluated by the number of streams and rivers crossed by each route, the number of ESSS crossed, and the length of streams parallel to the routes (within 100 ft.). These potential impacts were determined using digital hydrology data from the USGS National Hydrology Dataset (NHD 2012).

All South-Central routes (Routes A, B, D, and E), as well as Routes C, G, and J, do not cross any ESSS identified by TPWD. Graham, Sweetwater, and McClellan creeks are the ESSS identified by TPWD in the study area. Routes K and L cross McClellan Creek, Routes F, H, and I cross Graham Creek twice, and Route M crosses Graham Creek once and Sweetwater Creek twice. Potential impacts to these ESSSs are not anticipated as the streams are small and would be spanned by the transmission line. SPS will also implement a SWPPP and obtain any associated permits prior to any soil disturbance to reduce the potential for impacting the water quality of streams during construction.

In general, the South-Central routes (Routes A, B, D, and E), as well as Route H, a Central route, cross the fewest streams, from 57 (Route A) to 60 (Routes D, E, and H). Routes K, L, and F also cross relatively few streams, between 61 and 64. The other routes cross more than 70 creeks and streams. Similarly, the South-Central routes parallel the least amount of streams and rivers, from 3,450 ft. (Route A) to 5,750 ft. (Route E). In general, the Northern and Southern routes (Routes J, K, L, and M) parallel some of the greatest amounts of creeks and streams, from 8,190 ft. to 12,350 ft., in some part due to their increased lengths.

Based on this information, Routes A, B, D, and E are preferred from a hydrology perspective based on the number of streams and rivers crossed, as well as lower lengths of streams parallel to the route centerlines. Even among these routes, Route A, which is the rebuild of the existing Y62 line, is preferred overall as it would not create any new stream crossings or add any additional length parallel to streams from what was crossed or already parallel to the existing line, and it also crosses no ESSS stream segments.

Construction and operation of the project would not significantly impact surface water features along the proposed transmission line. Short-term, minor water quality impacts may occur during the construction of the proposed project. Such impacts would be associated with soils from disturbed areas being transported into adjacent surface waters during storm events. Appropriate measures will be taken to reduce these impacts. To the extent required, SPS would obtain the appropriate permits from the USACE for any work crossing streams and rivers.

Impacts to groundwater and aquifers are not expected to occur from construction of the proposed project. Precautions will be taken during construction to ensure the proper control and handling of any petroleum products or other chemicals that may be needed during construction.

If structures of the approved route would be located in a FEMA-designated 100-year floodplain, planning, structure siting, engineering design, and any necessary permitting will help mitigate construction activities impacting flood channels and therefore, the project should not significantly affect flooding.

USFWS requested in its August 17, 2011, letter (Appendix A, page A-93) that SPS avoid the cutting of riparian and wetland vegetation by machines and locate additional work areas and temporary easements outside of wetlands and riparian areas. Additionally, they requested that these riparian areas and wetlands that are to be avoided should be marked with orange guard fence or flagging. Any anticipated impacts should be communicated to the USACE to determine if permitting will be required. TPWD indicated in its September 16, 2011, letter (Appendix A, page A-7) that routes should avoid multiple crossings of creeks, streams, and rivers and paralleling waterways to minimize impacts to riparian areas and that measures should be taken to ensure that construction activities either do not impact or minimally impact ecologically significant streams.

7.2.4 Vegetation

Construction and operation of the project would result in the loss of some vegetation within the transmission line ROW due to clearing. The majority of the vegetation that would be impacted by the proposed project consists of mesquite shrub/grassland and cottonwood – hackberry – saltcedar brush/woods. Generally, clearing in these areas would be to provide access for construction and maintenance equipment, unless the vegetation could grow tall enough to interfere with the lines. Minimal impacts from the placement of structures would occur in cultivated areas. Where possible, proposed routes were designed to parallel existing ROW and disturbed areas to minimize potential impacts to vegetation.

TPWD indicated in its September 16, 2011, letter (Appendix A, page A-7) that impacts to native vegetation should be minimized to the extent feasible during construction. If native vegetation must be impacted, TPWD recommended mitigating for the loss by re-vegetating areas disturbed by project activities with site-specific native species. Additionally, TWPD strongly recommended that areas of existing native grasses should be preserved to the extent feasible.

7.2.5 Threatened and Endangered Plant Species

Potential impact to threatened and endangered plant species were determined by reviewing data from the TXNDD, maintained by the TPWD, written correspondence with the USFWS and TPWD personnel, and a review of potential habitat within the study area. No impacts to threatened or endangered plant species are expected. One rare natural plant community, cottonwood-tallgrass (*Populus deltoids-andropogon gerardii*), is known to be within 10 miles of the study area, but is not known to exist within the proposed ROW of any of the proposed routes. The USFWS did not indicate a concern for any plant species within the project area. Upon approval of a final route by the PUCT, detailed environmental surveys will be conducted along the proposed transmission line to identify potential habitat and/or endangered plant species. If encountered, SPS will coordinate with both the USFWS and TPWD accordingly.

7.2.6 Wetlands

Potential wetland impacts along the proposed routes have been broken down into three categories: forested/scrub-shrub; emergent; and open water (lakes, ponds, and playas). For this analysis, both riverine and emergent wetlands were counted in the emergent category due to the similarity of these two types of wetlands in this area. These potential impacts were determined based on a review of aerial photography, USFWS maps, USDA NAIP infrared imagery, and topography maps.

The amount of forested/scrub-shrub wetlands within the ROW of the proposed routes ranges from 0.2 acres (Routes C, G, and J) to 5.4 acres (Route D). In general, the North, Central, and Southern routes (Routes C, F, G, H, I, J, K, and L) cross the lowest amounts of forested wetlands (less than two acres). The amount of riverine and emergent wetlands within the ROW of the proposed routes ranges from 1.1 acres (Route K) to 2.7 acres (Routes F, H, and I). In general, the Northern and Southern routes (Routes J and K) cross the lowest amounts of riverine and emergent wetlands (less than 1.5 acres). The amount of open water crossed by the proposed routes ranges from 720 ft. (Route J) to 1,080 ft. (Routes C, F, H, and I). In general, the North and South-Central routes (Routes A, B, D, E, J, and M) cross the lowest amounts of open water (less than 1,000 ft.). Route J is preferred from a wetlands perspective since it crosses the least forested/scrub-shrub wetlands, the least total wetlands, and the least length of open water. In addition to Route J, Route A is also preferred because the forested wetlands have already been converted to emergent wetlands along most of the route (due to clearing for the existing ROW).

To minimize impacts to wetland areas, the transmission line routes were identified and the approved route will be designed to avoid or span wetland areas to the extent possible. Additionally, the proposed routes were aligned parallel to existing ROW and through disturbed areas (where possible) to minimize potential impacts to wetlands. Very few of the wetlands along the routes exceed the typical span of the transmission structures. Upon approval of a final route by the PUCT, detailed environmental surveys will be conducted along the proposed transmission line to identify jurisdictional waters of the U.S. SPS would obtain the appropriate permits from the USACE for any work within wetlands.

TPWD indicated in its September 16, 2011, letter (Appendix A, page A-7) that transmission lines should be located as far from wetlands and open water as possible to avoid potential collisions by waterfowl and other bird species. Transmission lines adjacent to these areas should be buried when feasible, and bird flight diverter markings should be installed when overhead lines are used. USFWS indicated in its August 17, 2011 letter (Appendix A, page A-93) that route alignment should be adjusted where necessary to avoid wetland impacts and to avoid losses of moderate-aged to mature-aged trees. Additionally, unavoidable wetland impacts should be mitigated through in-kind creation and restoration of wetland areas that establish similar functions and values of the affected wetlands. Wetland areas that are to be avoided should be marked with orange guard fence or flagging. Any anticipated impacts should be communicated to the USACE to determine if permitting will be required.

7.2.7 Wildlife

Construction and operation of the transmission line could result in some temporary adverse impacts to wildlife, primarily from the removal of large trees within or near the proposed project that could provide feeding, shelter, or nesting habitat for some species. Impacts to most species would be temporary and short-term during construction and would consist primarily of displacement and disturbance. Some less mobile species occurring along the transmission line could be directly impacted and movements between segmented habitats could be temporarily impeded due to noise and human presence. Additional temporary disturbance could occur during future maintenance of the transmission line. To the extent possible, waterways will be spanned or avoided to minimize impacts to aquatic species. Proposed routes were designed to parallel existing ROW and disturbed areas (where possible) to minimize potential impacts to wildlife.

7.2.8 Threatened and Endangered Animal Species

Potential impacts to threatened and endangered animal species were determined by reviewing data from the TXNDD, maintained by TPWD, discussions with both USFWS and TPWD personnel, and a review of potential habitat for threatened and endangered species likely to occur within the study area. Correspondence letters from USFWS and TPWD can be found in Appendix A of this document.

TPWD made several recommendations in its September 16, 2011, letter (Appendix A, page A-7) pertaining to threatened and endangered animal species. TPWD recommended the avoidance of impacts to all threatened and endangered wildlife, habitat, and food supply.

Because the proposed transmission line project is not likely to be built directly along high cliffs or adjacent to bluffs known to provide roosting, nesting or foraging habitat for the peregrine falcon, no impacts are expected. The proposed project is not likely to lead to a loss of viability or federal listing of this species.

Bald eagles, which are not federally listed but are still protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act, may forage in the project area; however, direct impacts would be limited to accidental collisions with the transmission lines. Nesting habitat is not expected to be impacted. The proposed project is not expected to lead to a loss of viability or federal protection of the species.

Whooping cranes nest in Canada and winter in coastal marshes in Texas. The migration route of this population passes through north-central Texas (to the east of the study area) and migrating whooping cranes often are sighted at and along reservoirs, large ponds, rivers, and wetlands at stop-over habitats. Despite not being within the primary migratory corridor, the proposed project has the potential to adversely affect whooping cranes by means of inadvertent collisions, and possible human disturbance during construction and maintenance activities. Collisions with transmission lines are a substantial cause of whooping crane mortality in migration (Brown et al. 1987, Lewis 1992). The proposed transmission line will not cause direct impacts to any area designated as critical habitat for the whooping crane.

Piping plovers are listed by TPWD as potentially occurring within Gray County. Piping plovers require similar habitat to the Interior least tern and these species are often found breeding in close proximity to each other. TPWD does not list the Interior least tern as potentially occurring within either Gray or Wheeler counties but the species is listed as potentially occurring in Gray County by the USFWS. A review of the habitat requirements of both of these species indicate that suitable habitat may be found within both Gray and Wheeler counties within the study area. If areas are found to contain this species, precautions should be taken to avoid potential impacts including limiting activities within the inhabited area to outside of the nesting period, typically May to August.

Both the black-footed ferret and the gray wolf are extirpated from the region; thus, no impact to these two endangered species is expected.

For the Texas horned lizard, TPWD recommended that potential impacts to both this species and its primary food source, the harvester ant, should be avoided during construction. Potential impacts to vegetation communities known to inhabit or considered to be suitable for this species should be minimized to the extent possible. Where impacts to vegetation are unavoidable, TPWD recommended the area be surveyed for evidence of rare species prior to clearing or construction. If areas are found to contain this species, precautions should be taken to avoid potential impacts.

For routes within or near colonial waterbird rookeries, TPWD recommended construction activities should be scheduled when the birds are not present, particularly after nesting activities have ceased, when impacts are unavoidable. TPWD recommended that surveys should be conducted prior to construction to determine if any colonial waterbird rookeries exist within or near the approved route ROW. TPWD also stated that with proper construction timing, construction impacts to colonial waterbirds are expected to be minimal and the use of bird flight diverters would reduce the chance of bird strikes on the line following construction.

USFWS outlined the following recommendations in its August 17, 2011, letter (Appendix A, page A-93) pertaining to threatened and endangered animal species:

- All construction activities should be conducted in accordance with the Service's National Bald Eagle Management Guidelines.
- Transmission line construction should be avoided within the whooping crane migration corridor if possible, and new construction should follow existing ROW whenever possible.
- Transmission lines should be marked with bird flight diverters in areas near wetlands and riparian corridors, following guidelines provided in "*Mitigating Bird Collisions with Power Lines: the State of the Art in 1994, Avian Power Line Interaction Committee 1994, Edison Electric Institute, Washington, D.C.*"
- USFWS should be contacted if any active mitigation measures for whooping cranes are incorporated into the project to track efforts to mitigate collision hazards.
- Transmission lines should be routed outside of occupied LPC habitat whenever possible.
- Temporary workspaces at stream crossings should be placed outside of the riparian zones of the respective stream and immediately re-vegetated with native species following construction to avoid impacts to various species.
- Temporary ROWs within or adjacent to riparian areas should be hand-cleared and immediately re-vegetated with native species following construction to avoid impacts to various species.

The habitat assessment performed by Burns & McDonnell and summarized below includes an assessment of potential habitat for both the Interior least tern and the piping plover, but does not include the state-listed Texas horned lizard habitat. The Texas horned lizard was not included because its habitat covers the majority of the study area; thus, including this habitat would not differentiate the routes, as all routes are expected to cross it. The amount of threatened and endangered species habitat crossed by the proposed routes range from 710 ft. (Routes C, F, H, I, and J) to 4,830 ft. (Route L). One of the Northern routes (Route J) and most of the Central routes (Routes C, F, H, and I) cross the least amount of potential threatened and endangered species habitat (710 ft.), partly because where they cross the North Fork of the Red River, which was identified as potential habitat for the Interior least tern, is narrower than other crossings. The South-Central routes have a slightly higher length through potential threatened and endangered species habitat (1,010 – 1,200 ft.), but would be parallel to an existing transmission line, or in the case of the rebuild alternative, would replace the existing transmission line and thus, would mitigate the additional potential for impacts. As a result, any route except Routes K and L would be acceptable from the perspective of potential impacts to threatened and endangered animal species.

7.2.8.1 Lesser Prairie Chicken

All of the routes will cross potential LPC habitat as mapped by TPWD. To minimize potential impacts, routes have been identified that parallel existing compatible corridors, including existing transmission lines, roads, and pipelines, where possible.

To better evaluate and compare the routes' potential impact to the LPC, Burns & McDonnell developed a modified habitat model based on the Oklahoma Lesser Prairie-Chicken Spatial Planning Tool (OLEPCSPT). Both models incorporate known historical and current range information, habitat data, and avoidance buffers for certain structures to develop a habitat score for all areas within a study area. The Oklahoma Spatial Planning Tool also includes information on leks (mating locations) and lands managed for the species. However, despite requests submitted to both TPWD and USFWS for known leks and CCAA lands reserved for the species, this information was not provided and thus could not be included in the Burns & McDonnell model. More detailed information on the habitat model is provided in Appendix C.

When analyzed using the Burns & McDonnell habitat model, the routes score between 380 (Route A) and 787 (Route J). In general, the South-Central routes (Routes A, B, D, and E) and the Central routes (Routes F and I) score the best and thus are preferred when considering potential impacts to the LPC. Route A, which would involve the rebuilding of the existing Y62 line, would be the least impacting as it has the smallest habitat score of all identified routes and would not introduce an additional set of vertical structures into the habitat. Rebuilding the existing Y62 line as a double circuit line is as close to the recommendations made by TPWD in their September 16, 2011, letter as is electrically feasible. The new structures will likely be taller than the current Y62 structures to comply with electrical safety codes, but the amount of additional ROW needed is minimized by using the existing ROW. Avoidance of the estimated occupied range of the LPC was determined to not be feasible as it would increase the length of the longest proposed route by at least 23 miles (increasing the overall project length by more than 50 percent).

TPWD strongly recommended in its September 16, 2011, letter (Appendix A, Page A-7) that surveys for the LPC and associated habitat take place during the 2012 breeding season (March 10 – May 15). TPWD requested that those findings be submitted to TPWD for further recommendations. In the event that LPC disturbance is unavoidable, TPWD strongly recommended compensation for direct and cumulative impacts to the LPC.

7.3 SUMMARY OF NATURAL RESOURCE IMPACTS

Several natural resources have been evaluated to determine the possibility of both ecological and natural resource impacts from the proposed transmission line project. Considering natural resources as a whole, the South-Central routes (Routes A, B, D, and E) are preferred, as they cross a significantly less amount of open water, do not cross any ESSS, cross the least amount of streams, and are parallel to steams for the shortest distance. Additionally, the South-Central routes are also the least impacting to potential LPC habitat and comply with the TPWD recommendations for avoiding impacts to the LPC to the extent that is feasible. Of these routes, Route A is anticipated to have the least impact to natural resources because it involves building the new line along the existing transmission line centerline that currently runs between the Bowers and Howard substations, using the previously-disturbed existing line ROW.

Although Route A has the least potential to impact natural resources, it is not anticipated that any of the proposed routes will significantly impact or alter the natural resources within the study area.

7.4 IMPACTS ON HUMAN RESOURCES

This section contains a discussion of the potential impacts of the project on the human resources found along the proposed routes, including land use, infrastructure, and socioeconomics. The primary criteria considered to measure potential land use impacts from this project included overall route length, potential impacts to agriculture, proximity to habitable structures, length parallel to existing corridors (including apparent property boundaries), number of airstrips and airports, as well as communication facilities near the routes, potential impacts to park/recreational areas, road crossings, and visibility.

7.4.1 Community Values and Community Resources

Community resources can be impacted directly, where construction of a transmission line, support structures, or ROW would result in restricted access to, or removal of said resource, or indirectly, where the intrinsic value of the resource, usually aesthetic, would be diminished. Impacts to community values and community resources are discussed in detail in the sections below.

7.4.1.1 Land Use and Development Patterns

Land use impacts from transmission line construction are determined by the amount of land (of whatever use) displaced by the actual ROW and by the compatibility of electric transmission line ROW with adjacent land uses. During construction, temporary impacts to land uses within the ROW could occur due to the movement of workers and materials through the area. Construction noise and dust, as well as temporary disruption of traffic flow, may also temporarily affect the area immediately adjacent to the ROW. Coordination between SPS, their contractors, and landowners regarding access to the ROW and construction scheduling should minimize these disruptions. Most existing land uses may continue during construction.

P.U.C. SUBST. R. 25.101 requires that the PUCT consider whether new transmission line routes parallel existing compatible ROWs, property lines, or other natural or cultural features. In general, all of the proposed routes parallel existing corridors (including apparent property boundaries) for a significant amount of their length.

The proposed routes range from 34.5 miles to 44.3 miles in total length, with a range of approximately 72.8 to nearly 100 percent of their total length parallel to existing corridors (i.e. existing transmission lines, pipelines, roads, and apparent property boundaries). While not the longest alternatives, the Central routes (Routes C, F, G, H, and I) parallel the least corridors (72.8 to 88.8 percent). For these routes, the majority of the existing corridor paralleled is apparent property lines, rather than an existing utility or road. The Northern routes (Routes J and M) are some of the longest routes (41.7 to 44.3 miles), but they parallel a highway and other corridors more than the Central routes (90.7 to 92.7 percent). The Southern routes (Routes K and L) are also longer than most of the other routes (41.0 to 43.0 miles), but they parallel existing corridors for 95.8 to 96.0 percent of their lengths. The South-Central routes (Routes A, B, D, and E) are generally the shortest, most direct routes (34.5 to 36.0 miles in length) and parallel the greatest amounts of existing corridors (94.0 to nearly 100 percent of their lengths): primarily the existing transmission line running between the two substations. Route B is the shortest overall route and parallels existing corridors for nearly 96.6 percent of its length. However, Route A is only about 0.3 miles longer than Route B, but parallels existing corridors for nearly 100 percent of its length, 97 percent of which would be located along the existing transmission line, where the existing line would be rebuilt to accommodate the new circuit.

By paralleling existing corridors, potential impacts to property, community values and community resources, and viewsheds are typically minimized due to the already disturbed nature of the area crossed by the existing facility/corridor. Paralleling existing corridors is therefore normally considered preferable to creating a completely new corridor. Route A is nearly the shortest route and has the highest percentage of its total length parallel to existing corridors and is preferred in this respect.

7.4.1.2 Agriculture

The evaluation of potential impacts to agricultural resources was determined by examining aerial photography, reviewing the results of field reconnaissance surveys, and reviewing input from the public, and then separating those assessments into the categories of rangeland, cultivated land, and mobile irrigation systems.

The amount of rangeland within the ROW of all 13 routes range from 244.4 to 343.7 acres. In general, the Northern (Routes J and M) and Southern routes (Routes K and L) have greater rangeland impacts (275.1 to 343.7 acres) than the other routes, largely due to their increased length. Route F crosses the lowest amount of rangeland (244.4 acres), but then crosses one of the highest amounts of cultivated land (62.3 acres). Cultivated land crossed for all the routes range from 17.7 to 68.2 acres. In general, the South-Central routes (Routes A, B, D, and E) cross the lowest amounts of cultivated land (17.7 to 31.2 acres), along with Routes C and G of the Central routes (both 22.8 acres).

All traveling irrigation systems that were identified as being crossed by a route were center-pivot irrigation systems. The routes cross from 0 to 2,540 ft. of mobile irrigation systems. Routes A, C, G, J, K, and L would not impact any of these systems, while Routes F, I, and M would impact the most (1,350 ft. to 2,540 ft. crossed). Table 7-2 below lists the number of crossings and the total length of land irrigated by traveling irrigation systems crossed by the proposed routes. The center-pivot irrigation systems are visible on Figure 7-1.

The potential impact on the agricultural use of rangeland will be negligible because the constructed transmission line will not interfere with grazing and SPS will not fence the ROW or otherwise separate the ROW from adjacent lands. Coordination of the construction phase of the project around the sowing and harvesting of crops will be essential in reducing impacts to the livelihoods of local growers. To the extent possible, the impact on cropland and land with mobile irrigation systems will also be minimized with the placing of structures in close proximity to fence and property lines where applicable. To the extent possible, land irrigated by mobile irrigation systems will be spanned such that no transmission structures impede the operation of the mobile irrigation system. It is anticipated that the only land that will be permanently impacted for the production of crops or animals would be that land physically occupied by the transmission line structures.

Table 7-2
Land with Traveling Irrigation Systems Crossed by the Proposed Routes

Route	Number Crossed	Total Length Crossed (ft.)	Segment
A	0	0	--
B	1	930	51
C	0	0	--
D	1	200	44
E	1	370	48
F	5	1,350	43, 44
G	0	0	--
H	1	930	51
I	5	1,350	43, 44
J	0	0	--
K	0	0	--
L	0	0	--
M	7	2,540	28, 43, 44

When evaluating the potential for the highest impacts from an agricultural perspective, land designated as rangeland was considered as having the least potential impacts and land irrigated by mobile irrigation systems was considered as having the potential for the highest impacts from an agricultural perspective. Given the acreages and lengths of each route across the different types of agricultural land use, Routes A, C, and G appear to have the least amount of potential impacts to agriculture, and are therefore preferred from an agricultural perspective. Route A (the rebuild of the existing Y62 line) would have the least impact on agricultural properties as less new ROW would be required. Thus, there would be less of an impact than for those lines that do not involve rebuilding an existing transmission line.

7.4.1.3 Urban and Residential Areas

Generally, when developing routes for a new transmission line, cities and towns are avoided when possible due to the concentration of development located within their boundaries. There are a couple of municipal areas located within the project area. Though the most densely-populated portions of these cities were avoided, some routes tend to be closer to municipal boundaries than others, and a few cross the city limits in locations where the concentration of development appeared to be less dense. Because the Howard Substation is located within the city of Wheeler, all routes cross its city boundaries. Route M also crosses the city of Mobeetie, along SH 152.

One of the more important measures of potential land use impacts is the number of habitable structures located in the vicinity of each route. Burns & McDonnell determined the number, distance, and direction of habitable structures located within 300 ft. of the centerline of each route through interpretation of aerial photography and verification during reconnaissance surveys, where possible. Burns & McDonnell, to the greatest extent reasonable and in accordance with the policy of prudent avoidance, attempted to avoid habitable structures in the routing of the proposed routes.

The number of habitable structures located within 300 ft. of the proposed route centerlines ranges between 5 and 19. Routes A and J have the fewest habitable structures within 300 ft. of the centerline (5), while Routes F, G, H, I, and M have the most (between 11 and 19). Routes B, D, E, and K only have two additional habitable structures (7) within 300 ft. than Routes A and J. Table 7-3 lists the type of habitable structure, the direction and distance from the closest segment component of each route, and the unique identification number assigned to each habitable structure depicted in Figure 7-1.

Most of the habitable structures within 300 ft. of Routes A, B, D, E, and J are also in close proximity to the existing transmission line. Because Route A would be rebuilt in place of the existing line, new impacts to these habitable structures would be minimized to the maximum extent possible. Therefore, Route A is preferred from an urban/residential perspective.

7.4.1.4 Park and Recreational Areas

The evaluation of potential impacts to park and recreational areas considered the disruption or preemption of recreational activities. Based on a review of the TPWD, TNRIS, and Environmental Systems Research Institute, Inc. (ESRI) digital data and field reconnaissance, none of the proposed routes cross any park and recreational area, nor do they have any park and recreational areas within 1,000 ft. of their centerline. Therefore, no impacts are anticipated to park and recreational areas from any of the proposed routes.

7.4.1.5 Transportation and Aviation

No long-term impacts are anticipated to the transportation system of the project area due to the construction of the proposed project. Short term impacts may occur during construction which would result in a temporary disruption of traffic service.

Table 7-3
Habitable Structures within 300 Feet of the Proposed Routes

Route	ID	Structure Type	Distance	Direction	Segment
A	4	House	115	North	9a
A	25	House	290	South	23a
A	32	Barn	260	North	40a
A	33	House	160	North	40a
A	46	House	110	North	49
B	5	House	290	South	9
B	23	Barn	280	South	23
B	24	Garage	215	South	23
B	25	House	170	South	23
B	33	House	230	North	40
B	44	House	180	North	51
B	45	House	200	North	51
C	6	Barn	280	North	16
C	7	House	280	North	16
C	8	House	290	North	16
C	9	House	255	North	16
C	10	House	145	North	16
C	23	Barn	280	South	23
C	24	Garage	215	South	23
C	25	House	170	South	23
C	33	House	230	North	40
C	46	House	110	North	49
D	5	House	290	South	9
D	23	Barn	280	South	23
D	24	Garage	215	South	23
D	25	House	170	South	23
D	33	House	230	North	40
D	41	House	280	North	44
D	46	House	110	North	49
E	5	House	290	South	9
E	23	Barn	280	South	23
E	24	Garage	215	South	23
E	25	House	170	South	23
E	33	House	230	North	40
E	42	Barn	115	South	48
E	43	House	220	South	48
F	6	Barn	280	North	16
F	7	House	280	North	16
F	8	House	290	North	16
F	9	House	255	North	16
F	10	House	145	North	16
F	17	House	220	North	25
F	34	Garage	150	South	43
F	35	House	230	South	43
F	36	Barn	185	South	43
F	37	House	130	West	43
F	41	House	280	North	44
F	46	House	110	North	49
G	1	House	140	East	8
G	2	Garden Shed	270	East	8
G	3	House	235	East	8
G	6	Barn	280	North	16
G	7	House	280	North	16
G	8	House	290	North	16
G	9	House	255	North	16
G	10	House	145	North	16
G	23	Barn	280	South	23
G	24	Garage	215	South	23
G	25	House	170	South	23
G	33	House	230	North	40
G	46	House	110	North	49
H	6	Barn	280	North	16
H	7	House	280	North	16
H	8	House	290	North	16
H	9	House	255	North	16
H	10	House	145	North	16
H	17	House	220	North	25
H	28	House	260	East	39
H	29	Quonset Shed	150	East	39
H	33	House	230	North	40
H	44	House	180	North	51
H	45	House	200	North	51
I	6	Barn	280	North	16
I	7	House	280	North	16
I	8	House	290	North	16
I	9	House	255	North	16
I	10	House	145	North	16
I	17	House	220	North	25
I	34	Garage	150	South	43
I	35	House	230	South	43
I	36	Barn	185	South	43
I	37	House	130	West	43
I	41	House	280	North	44
I	46	House	110	North	49
J	23	Barn	280	South	23
J	24	Garage	215	South	23
J	25	House	170	South	23
J	33	House	230	North	40
J	46	House	110	North	49
K	11	Compressor Station	155	North	3
K	12	RV/Bus	105	North	3
K	18	House	155	North	3
K	30	Barn	160	South	32
K	31	House	230	South	32
K	33	House	230	North	40
K	46	House	110	North	49
L	11	Compressor Station	155	North	3
L	12	RV/Bus	105	North	3
L	18	House	155	North	3
L	30	Barn	160	South	32
L	31	House	230	South	32
L	38	House	160	West	41
L	39	House	170	West	41
L	40	House	230	West	41
L	46	House	110	North	49

(Continued on next page)

Table 7-3
Habitable Structures within 300 Feet of the Proposed Routes (continued)

Route	ID	Structure Type	Distance	Direction	Segment
M	1	House	140	East	8
	2	Garden Shed	270	East	8
	3	House	235	East	8
	13	Workshop/Shed	180	North	28
	14	House	250	North	28
	15	House	265	North	28
	16	House	280	South	28
	19	Utility Well Building	170	South	28
	20	House	240	South	28
	21	Barn/Garage	155	South	28
	22	Business/Industry	210	South	28
	26	Mobile Home	250	Northeast	28
	27	House	230	Northeast	28
	34	Garage	150	South	43
	35	House	230	South	43
	36	Barn	185	South	43
	37	House	130	West	43
	41	House	280	North	44
	46	House	110	North	49

The routes cross between 4 and 11 state or federal highways and between 6 and 21 other public roads. The Southern routes (Routes K and L) cross the most state and federal highways (9 to 11), but the least amount of other public roads (6 to 7). Routes B, E, F, and H cross the fewest state and federal highways (between 4 and 5), and Routes A, B, C, E, G, and J cross the fewest other public roads (14 to15) aside from the Southern routes. While Routes K and L cross fewer roads in total, they cross the most federal and state highways where traffic would be greatest, so these routes are not as preferable for minimizing potential impacts to transportation. Routes B, C, E, and G minimize crossings of both state/federal highways and other public roads with 20 total crossings. While Route A does not cross the fewest roads, it crosses only two more roads than Routes B, C, E, and G, and it would involve rebuilding an existing transmission line in place, so the impact at these crossings would be minimal due to the presence of the existing line in the same location. As a result, Route A would minimize impacts to transportation to the greatest extent practicable.

Average structure heights for the transmission line will be between 80 and 140 ft. The PUCT requires that all known private airstrips and all airports registered with the FAA having no runway more than 3,200 ft. in length within 10,000 ft. of the route centerline are identified. For private airstrips, no FAA notification is required. For all public-use airports registered with the FAA having no runway more than 3,200 ft. in length, the FAA would be notified if the proposed transmission line structures exceed a 50:1 horizontal slope from the closest point of the closest runway. The PUCT also requires that all public-use airports registered with the FAA having at least one runway more than 3,200 ft. in length within 20,000 ft. of the route centerline be identified. For all public-use airports registered with the FAA with at least one runway more than 3,200 ft. in length, the FAA would be notified if the proposed transmission line structures exceed a 100:1 horizontal slope from the closest point of the closest runway. The PUCT also requires that all heliports within 5,000 ft. of the route centerline be identified. For all public-use heliports, the PUCT requests whether or not any transmission line structures will exceed a 25:1 horizontal slope from the closest point of the closest landing and takeoff area of the heliport.

Burns & McDonnell identified airports and heliports along the proposed routes from field reconnaissance surveys, aerial interpretation, aeronautical charts, and GIS data obtained from the FAA NFDC (NFDC, 2011).

None of the routes are within 20,000 ft. of any FAA-registered airports or airstrips with a runway greater than 3,200 ft. in length or within 10,000 ft. of any FAA-registered airstrips or airports with runways less than 3,200 ft. in length. One heliport was identified within 5,000 ft. of the centerline of Route M (a Northern route).

All routes have at least one private airstrip within 10,000 ft. of the centerline. Routes K and L have an additional private airstrip within 10,000 ft. of their centerlines, for a total of two private airstrips within 10,000 ft. In addition to the private airstrip within 10,000 ft., Route M is also within 5,000 ft. of a heliport.

Table 7-4 illustrates the FAA registration status of the airstrips and heliport, the name of the airstrip (if known), and the direction and distance of the airstrip from the closest segment.

Based on Burns & McDonnell's preliminary calculations, FAA notification will not be required for any airstrips as a result of this project. Due to the fact that the proposed routes in the proximity of the private airstrips are parallel to existing lines that presumably do not impact the airstrips, no impacts are anticipated to these airstrips. The heliport identified in proximity to Route M may be impacted by the construction of this route, depending on the direction of the flight paths for this heliport. As a result of the non-standard markings of this heliport, it is not possible to determine the flight path and thus, the extent, of impacts from these routes. Communication with TXDOT revealed that the heliport was installed at the request of the Town of Mobeetie for use by air ambulance service but is not maintained by TXDOT and is not listed as a public use heliport. As a result of the heliport being private and not registered with the FAA, no permitting will be required as private airports and heliports are not protected by the FAA regulations.

Table 7-4
Airports\Airstrips\Heliports along the Proposed Routes

Route	Airport	Type	Distance from Centerline (ft.)	Direction	FAA Notification	Segment
A	Unnamed Private Airstrip 2	Private	1,030	South	No	40a
B	Unnamed Private Airstrip 2	Private	960	South	No	40
C	Unnamed Private Airstrip 2	Private	960	South	No	40
D	Unnamed Private Airstrip 2	Private	960	South	No	40
E	Unnamed Private Airstrip 2	Private	960	South	No	40
F	Unnamed Private Airstrip 2	Private	4,710	South	No	43
G	Unnamed Private Airstrip 2	Private	960	South	No	40
H	Unnamed Private Airstrip 2	Private	960	South	No	40
I	Unnamed Private Airstrip 2	Private	4,710	South	No	43
J	Unnamed Private Airstrip 2	Private	960	South	No	40
K	Unnamed Private Airstrip 1	Private	180	South	No	32
	Unnamed Private Airstrip 2	Private	960	South	No	40
L	Unnamed Private Airstrip 1	Private	180	South	No	32
	Unnamed Private Airstrip 2	Private	3,220	Northwest	No	41
M	Unnamed Heliport	Private	160	South	No	28
	Unnamed Private Airstrip 2	Private	4,710	South	No	43

Source: Field reconnaissance.

7.4.1.6 Visual Character

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

The assessment of aesthetic impacts to the visual character along the proposed routes was determined through field reconnaissance surveys and review of GIS mapping data. The evaluation focused on the potential view of the proposed project from park and recreational areas and from state and U.S. highways. The viewshed for both parks and roads were defined as a one-half-mile buffer around parks and recreation areas or highways.

The routes are within the viewshed of approximately 5.1 to 28.3 miles of state/U.S. highways. The routes that are in the least amount of state/U.S. highway viewsheds include Routes B, F, H, and I (5.1 to 9.9 miles), followed closely by Routes A, C, D, E, and G (10.1 to 11.6 miles). The Northern and Southern routes (Routes J, K, L, and M) are within the greatest amount of state/U.S. highway viewshed: between 16.1 and 28.3 miles. None of the routes is within the viewshed of any park/recreational areas.

Overall, Routes A, B, D, and E (the South-Central routes) that follow or would be constructed using the existing transmission ROW that already exists between the two project endpoints are preferred from a visual perspective due to the presence of the existing line and structures that have already altered the viewshed in the vicinity and at the state and U.S. highway crossings. While other routes may be within a half-mile of fewer state and U.S. highways, they would create a new visual intrusion into the landscape at these locations.

7.4.1.7 Utilities

A considerable amount of each of the proposed routes will parallel existing utilities, primarily existing transmission lines, pipelines, and highways. Many segments (Segments 1, 2, 3, 4, 7, 9, 23, 32, 33, 37, 38, 39, 40, 41, 46, 48, and 51, which are parts of all proposed routes except Route A) parallel an existing SPS-owned transmission line for all or a portion of their lengths. Most of the existing lines paralleled are 69 kV, but Segments 3, 32, and 41 (Routes K and L) parallel a 230 kV SPS transmission line. Route A uses Segments 2a, 7a, 9a, 23a, 33a, 40a, and 46a, which would involve rebuilding the existing SPS 69 kV transmission line that runs between the Bowers and Howard substations. A portion of Segment 48 (Route E) also parallels an existing Greenbelt Cooperative transmission line for approximately 1,360 ft. Segment

3 parallels approximately 1.8 miles of the north side of the CTT Gray to White Deer (Docket 38650) 345 kV transmission line (which is currently under construction) and crosses it once, and then crosses the CTT Gray to Tesla (Docket 37956) 345 kV transmission line, which is also currently under construction, and parallels the north side of an existing SPS-owned 230 kV transmission line for approximately 17 miles where the existing Xcel 230 kV line also parallels the north side of the CTT Gray to Tesla line. Segments 8, 22, 28, 33, 33a, 35, 37, 38, 39, 41, 45, 48, 50, and 51 each cross an existing 69 kV SPS-owned transmission line.

With the exception of Route A, which would be built along the existing transmission line centerline and use the existing transmission line ROW, the proposed transmission line along the other routes, when paralleling existing utility corridors, will not share any ROW with the existing utilities but instead will be located immediately adjacent to the existing ROWs. This separation will minimize potential impacts to existing utilities in the area. In addition, the proposed project will cross numerous existing utilities. In both cases, where the proposed project either crosses or parallels an existing utility, some mitigation measures may be required to protect the existing utilities. Once a final route is approved, detailed studies regarding the potential impact of the proposed project on existing utilities will be conducted and appropriate mitigation measures will be taken where necessary.

7.4.1.8 Communication Towers

Communication towers were identified using GIS data obtained from the FCC, aerial interpretation, and field reconnaissance surveys. The PUCT requires the identification of the following communication towers:

- Commercial AM radio transmitters within 10,000 ft. of the route centerline
- All FM radio transmitters, microwave relay stations, or other similar electronic installations within 2,000 ft. of the centerline. (For this report, those towers fitting this second definition will be referred to collectively as “communication” towers, due to the bulk of them being cellular towers).

There are no commercial AM communication towers within 10,000 ft. of any of the proposed routes. All routes have between two and four other communication towers within 2,000 ft. Routes C, F, G, H, I, J, and L have two communication towers within 2,000 ft.; Routes A, B, D, K, and M have three communication towers within 2,000 ft.; and Route E has four communication towers within 2,000 ft. Table 7-5 lists the towers within 2,000 ft. of each route, with the type, direction, and distance to the closest segment.

Table 7-5
Communication Towers

Route	Operator	Type	Distance from Centerline (ft.)	Direction	Segment
A	Unknown	Unknown	1,160	South	9a
	Global Tower LLC	Cellular	740	Northeast	49
	Texas RSA No 2 LP/ Universal Cable Holdings/ Wheeler TV Systems	Cellular/ Microwave	1,680	Northeast	49
B	Unknown	Unknown	1,090	South	9
	Global Tower LLC	Cellular	740	Northeast	51
	Texas RSA No 2 LP/ Universal Cable Holdings/ Wheeler TV Systems	Cellular/ Microwave	1,680	Northeast	51
C	Global Tower LLC	Cellular	740	Northeast	49
	Texas RSA No 2 LP/ Universal Cable Holdings/ Wheeler TV Systems	Cellular/ Microwave	1,680	Northeast	49
D	Unknown	Unknown	1,090	South	9
	Global Tower LLC	Cellular	740	Northeast	49
	Texas RSA No 2 LP/ Universal Cable Holdings/ Wheeler TV Systems	Cellular/ Microwave	1,680	Northeast	49
E	Unknown	Unknown	1,090	South	9
	WWC Texas RSA Limited Partnership	Cellular	440	South	48
	Global Tower LLC	Cellular	740	Northeast	48
	Texas RSA No 2 LP/ Universal Cable Holdings/ Wheeler TV Systems	Cellular/ Microwave	1,680	Northeast	48
F	Global Tower LLC	Cellular	740	Northeast	49
	Texas RSA No 2 LP/ Universal Cable Holdings/ Wheeler TV Systems	Cellular/ Microwave	1,680	Northeast	49
G	Global Tower LLC	Cellular	740	Northeast	49
	Texas RSA No 2 LP/ Universal Cable Holdings/ Wheeler TV Systems	Cellular/ Microwave	1,680	Northeast	49
H	Global Tower LLC	Cellular	740	Northeast	51
	Texas RSA No 2 LP/ Universal Cable Holdings/ Wheeler TV Systems	Cellular/ Microwave	1,680	Northeast	51
I	Global Tower LLC	Cellular	740	Northeast	49
	Texas RSA No 2 LP/ Universal Cable Holdings/ Wheeler TV Systems	Cellular/ Microwave	1,680	Northeast	49
J	Global Tower LLC	Cellular	740	Northeast	49
	Texas RSA No 2 LP/ Universal Cable Holdings/ Wheeler TV Systems	Cellular/ Microwave	1,680	Northeast	49
K	Unknown	Unknown	520	East	38
	Global Tower LLC	Cellular	740	Northeast	49
	Texas RSA No 2 LP/ Universal Cable Holdings/ Wheeler TV Systems	Cellular/ Microwave	1,680	Northeast	49
L	Global Tower LLC	Cellular	740	Northeast	49
	Texas RSA No 2 LP/ Universal Cable Holdings/ Wheeler TV Systems	Cellular/ Microwave	1,680	Northeast	49
M	Top O' Texas Educational Broadcasting Foundation	FM	400	North	28
	Global Tower LLC	Cellular	740	Northeast	49
	Texas RSA No 2 LP/ Universal Cable Holdings/ Wheeler TV Systems	Cellular/ Microwave	1,680	Northeast	49

Source: FCC 2011 & field reconnaissance

No significant impacts to the operation of communication installations are anticipated from any of the proposed routes.

7.4.2 Socioeconomic Patterns

This section addresses the potential impacts (both positive and negative) of the proposed project on the socioeconomic patterns along the proposed routes, including population, employment, and income.

7.4.2.1 Population

Construction and operation of the proposed transmission line along any of the proposed routes would not directly result in a change to the population in the study area. The project would, however, help to provide the electrical needs for a growing population in Texas. Reliable electric service is important to residents and a significant factor in the location of many industries.

7.4.2.2 Employment and Income

Construction and operation of the proposed transmission line along any of the proposed routes would not significantly affect long-term employment in the study area. Transmission construction activities will occur over a one- to two-year timeframe and maintenance requirements are low. The construction force needed to construct the proposed project would be small and temporary. The presence of additional workers and increased employment would increase retail sales in the project area due to the purchases of food, fuel, and other merchandise. The project would increase the tax base in counties crossed by the proposed project, regardless of which route is selected.

7.5 SUMMARY OF HUMAN RESOURCES IMPACTS

In summary, Route A is the recommended route from a land use and human resource perspective. Route A has fewer habitable structures, lower visibility and road crossing counts, the fewest airports in its immediate vicinity, no impacted irrigation systems, and lower amounts of cropland crossed than most of the other proposed routes. In addition, Route A is one of the shortest routes and would be constructed almost entirely within or along existing corridors, the majority of which is an existing transmission line.

7.6 IMPACTS ON CULTURAL RESOURCES

Construction activities associated with any proposed project have the potential to adversely impact cultural resources. The effects that could adversely affect a cultural resource eligible for the NRHP are discussed in the Code of Federal Regulations (36 CFR 800) and include:

- Destruction or alteration of all or part of a property (NRHP Eligible Property);
- Isolation from or alteration of the property's surrounding environment (setting); or

- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting.

Impacts may be direct or indirect. Direct impacts typically occur during construction. Indirect impacts include those caused by construction that occur later in time or are further removed, but are foreseeable. These impacts may include alterations in the pattern of land use, changes in population density, or accelerated growth rates, all of which may have an impact on properties with historical, architectural, archaeological, or other cultural significance.

Although an on-the-ground cultural resources survey has not been conducted, HPAs have been identified along the proposed routes using USGS topographic maps. HPAs are locations that are usually identified as having a high probability for the occurrence of prehistoric sites and include areas where the proposed project crosses water, stream confluences, drainages, alluvial terraces, wide floodplains, upland knolls, and areas where lithics (workable stone) could be found. Routes A, D, G, and H cross the least HPAs, ranging from 11,480 ft. to 12,400 ft.

Maps on file with the Texas Archaeological Laboratory and the THC Archeological Sites Atlas were reviewed in an effort to identify all known and recorded archaeological sites and historic resources within 1,000 ft. of the centerline of the proposed routes. Only Route M crosses a known recorded cultural resource site. Fort Elliot (Site Number 41WE14.2) is crossed by Segment 28 for a distance of approximately 3,000 ft. None of the proposed routes would be located within 1,000 ft. of any recorded cultural site, nor any NRHP sites.

7.6.1 Cultural Resources Impact Summary

In general, the study area is rural and has not experienced many professional cultural resources surveys. Since much of the environment is suitable for past human occupation, the record of known cultural resources may be sparser than is actually the case. Since few known cultural resource sites are located within 1,000 ft. of any proposed route, the proposed routes with the least HPA length would be preferred (Routes A, D, G, and H). Therefore, from a cultural resources perspective, Routes G and H (Central routes) are preferred, followed closely by Routes A and D (South-Central routes). Following PUCT approval for the proposed transmission line, a cultural resources survey along the final route may be required by the PUCT and/or the THC.

7.7 RECOMMENDED ROUTE

Based on the previously-described impacts and recommended routes for minimizing impacts to natural resources, human resources, and cultural resources, Burns & McDonnell recommends that Route A be selected as the proposed route for the Bowers to Howard 115 kV Transmission Line Project. Route A is one of the shortest routes and would be constructed almost entirely within or along existing corridors, the majority of which is an existing transmission line. Because Route A would involve placing the new line (along with the old line) along the centerline of the existing transmission line and using the previously-disturbed ROW of the existing line, many potential impacts for Route A would be minimized by the presence of the existing line. In addition, Route A has fewer habitable structures, lower visibility and road crossing counts, the fewest airports in its immediate vicinity, no impacted irrigation systems, lower amounts of cropland crossed, and less HPAs crossed than most of the other proposed routes. Route A also crosses a significantly lower amount of open water, does not cross any ESSS, crosses the least amount of streams, and is parallel to streams for the shortest distance of all proposed routes. Finally, Route A impacts the least amount of potential LPC habitat and complies to the maximum extent feasible with the TPWD recommendations for avoiding impacts to the LPC.

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Figure 7-1 Final Routes on Environmental and Land Use Constraints Map

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