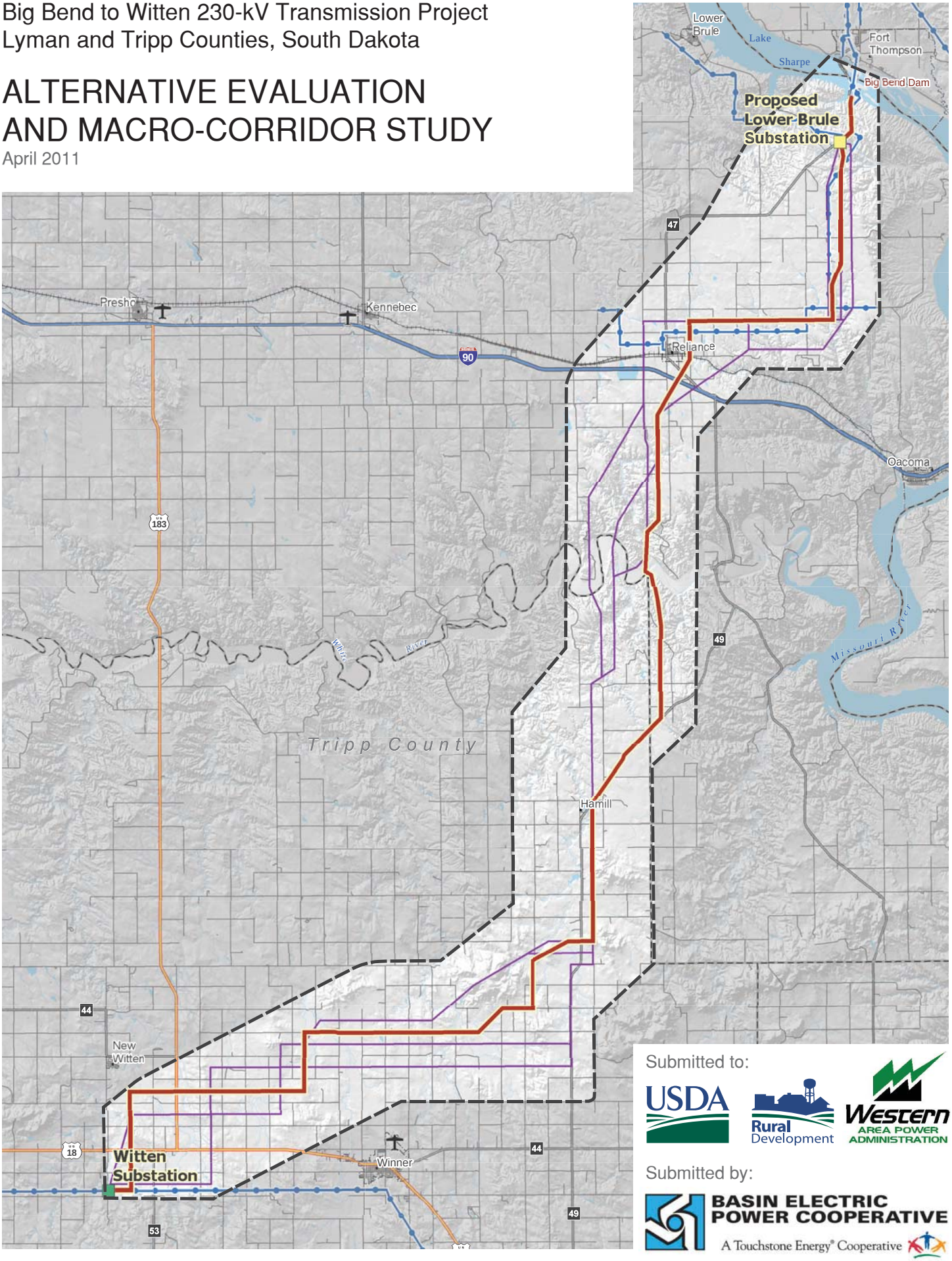
Big Bend to Witten 230-kV Transmission Project
Lyman and Tripp Counties, South Dakota

ALTERNATIVE EVALUATION AND MACRO-CORRIDOR STUDY

April 2011



Submitted to:

USDA Rural Development

Western Area Power Administration

Submitted by:

Basin Electric Power Cooperative

A Touchstone Energy® Cooperative

Table of Contents

Tables

Figures

Appendix A
Resource Maps

1.0 Introduction

1.1 Background

Basin Electric Power Cooperative (Basin Electric) is proposing to construct a 230-kilovolt (kV) transmission line that would connect a proposed Lower Brule Substation located on the Lower Brule Indian Reservation in Lyman County, South Dakota with the existing Witten Substation located in Tripp County, South Dakota. As part of this project, Western Area Power Administration (Western) is also proposing to convert an existing single-circuit 230-kV transmission line turning structure, located on the south side of the Big Bend Dam, to a double-circuit structure and construct a 2.1-mile double-circuit 230-kV transmission line from this point to the proposed Lower Brule Substation. Collectively, this project is referred to as the Big Bend to Witten 230-kV Transmission Project (Project).

1.2 Project Description

The Project involves constructing a 70-mile single-circuit 230-kV transmission line that would connect the proposed Lower Brule Substation with the existing Witten Substation. As part of this Project, Western would also construct a 2.1-mile double-circuit 230-kV transmission line from a new double-circuit transmission structure located on the Big Bend to Fort Thompson No. 2 transmission line to the proposed Lower Brule Substation. The total length of these transmission lines, depending on the final route selected, is expected to be approximately 72 miles. The macro-corridor developed for this Project is shown on Figure 1-1.

1.2.1 Right-of-Way Considerations

The new transmission line is proposed to be constructed within a 125-foot-wide right-of-way (ROW). Basin Electric representatives would work with the landowners along the selected route to obtain the necessary land rights to allow for access, construction, operation, and maintenance of the transmission line.

1.2.2 Proposed Transmission Line Characteristics

Table 1-1 provides the typical physical design characteristics for the proposed single-circuit 230-kV transmission line. The design specifications for Western's proposed 2-mile double-circuit transmission line were not available at the time this Macro-Corridor Study was published; however, they are anticipated to be similar to the single-circuit 230-kV transmission line characteristics presented in Table 1-1. Figure 1-2 illustrates the proposed single-circuit 230-kV transmission structures to be used for the Project.

Table 1-1:
Transmission Line Characteristics

Description of Design Component	Values
Voltage (kV)	230
Conductor Size (inches)	1.345
Right-of-Way Width (feet)	125
Typical Minimum and Maximum Span Distances Between Structures (feet)	650 - 950
Average Span (feet)	800
Minimum and Maximum Structure Height (feet)	70 - 115
Average Height of Structures (feet)	95
Average Number of Structures (per mile)	6.6
Temporary Disturbance per Structure (square feet) (approximately 125-foot x 100-foot area)	12,500
Permanent Disturbance per Structure (acre) (approximately 3-foot diameter per structure leg)	<0.0002
Minimum Conductor-to-Ground Clearance to Agricultural Land at 100 degrees Celsius (°C) (feet)	26
Minimum Conductor-to-Ground Clearance to Rural Roads at 100°C (feet)	28
Minimum Conductor-to-Ground Clearance to Paved Highways at 100°C (feet)	31
Circuit Configuration	Vertical

The steel single-pole transmission line structures would range in height from approximately 70 feet to 115 feet and average 95 feet, depending on the required span distances between structures and area topography. The span between structures would typically range from 650 feet to 950 feet and average approximately 800 feet, depending on topography; taller structures could be used for crossing existing distribution and transmission lines or where unusual terrain exists. The single-pole structures would be designed to support three conductors and an overhead optical ground wire (OPGW). The OPGW would provide lightning suppression and fiber optic communications between the Lower Brule and Witten substations for systems control. Tangent structures would be freestanding and directly embedded into the soil. Angle structures (used where the transmission line changes direction) and dead-end structures (used to provide longitudinal stability along the length of the line) would be constructed with concrete foundations. Guy wires would not be used.

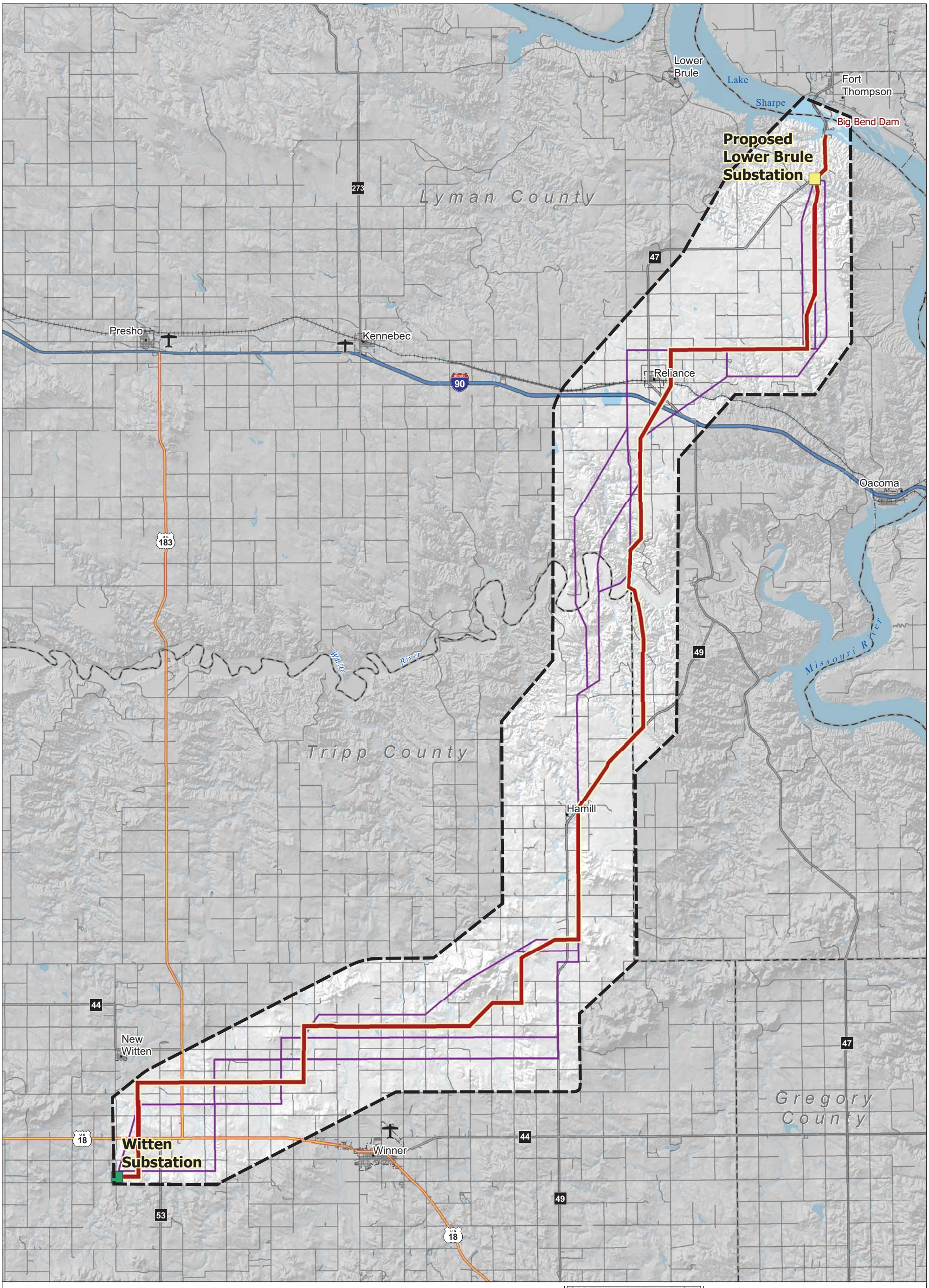
Project construction and design would meet the requirements of the National Electrical Safety Code (NESC) for the Heavy Loading District, Basin Electric and USDA-RUS design criteria, and other applicable local or national building codes. The Heavy Loading District refers to those areas (including South Dakota) that are subject to severe ice and wind loading. Minimum conductor clearance is measured at the point of greatest conductor sag and closest proximity to the ground. The proposed transmission line would be constructed with clearances that exceed standards set by NESC. Minimum conductor height would be 26 feet over agricultural land, 28 feet over rural roads, and 31 feet over paved highways.

1.3 Purpose of the Alternative Evaluation and Macro-Corridor Study

The U.S. Department of Agriculture's Rural Utilities Service (RUS) electric program provides capital loans to electric cooperatives for the upgrade, expansion, maintenance, and replacement of the electric infrastructure in rural areas. Basin Electric is pursuing financing from RUS for the new 230-kV transmission line in Lyman and Tripp counties. As part of this Project, Western is also proposing to convert an existing 230-kV transmission line turning structure, located on the south side of the Big Bend Dam, to a double-circuit structure and construct a 2.1-mile double-circuit 230-kV transmission line from this point to the proposed Lower Brule Substation.

RUS is required to evaluate environmental impacts of their actions under the National Environmental Policy Act (NEPA) and Council on Environmental Quality NEPA implementing regulations (40 Code of Federal Regulations 1500–1508). RUS will prepare an Environmental Assessment with Western as a cooperating agency. RUS guidance regarding NEPA implementation (RUS Bulletin 1794A-603) requires that a Macro-Corridor Study (MCS) and an Alternative Evaluation Study (AES) be prepared and accepted by RUS prior to the start of the official NEPA process. Basin Electric has prepared this document to evaluate the system alternatives that best meet the purpose and need of the Project, as well as to identify potential alternative routes for the transmission line.

This page intentionally left blank.



BIG BEND TO WITTEN TRANSMISSION PROJECT

Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route

Utility System
- Existing Substation
- Proposed Substation

Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Railroad
- Airport

Boundaries
- County Boundary
- Municipal Boundary

PROJECT MACRO-CORRIDOR

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

0 2 4
Miles

AECOM
717 17th Street Suite 2600
Denver, CO 80202

File: P:\2011\11180015.01Basin_LB2W\06GIS\6.3Layout\Resource_Maps\110222_MacroCorridor.mxd
Date Modified: March 10, 2011

Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS, NSBP

Figure 1-1

This page intentionally left blank.

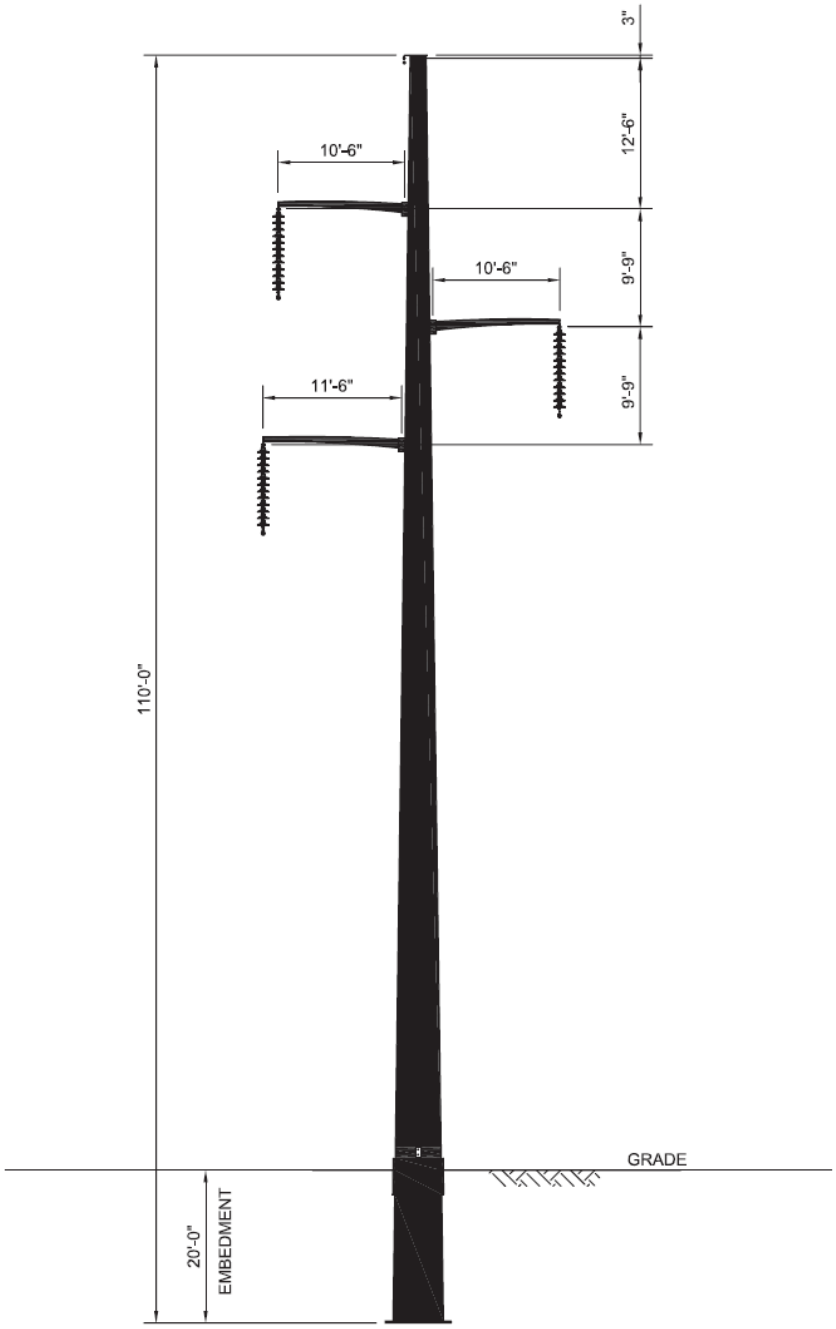


Figure 1-2: Typical Single-Circuit Single-pole Structure

This page intentionally left blank.

2.0 Purpose and Need

2.1 Overview of Basin Electric's Transmission System

Basin Electric, established in 1961 and headquartered in Bismarck, North Dakota, is one of the largest electric generation and transmission cooperatives in the United States. Basin Electric's core business is generating and transmitting wholesale bulk electric power to customers, which primarily consist of 135 member cooperatives located in nine states. Basin Electric's service territory spans 540,000 square miles in the central United States from the Canadian border to Mexico, including parts of Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, and Wyoming. Basin Electric's member cooperatives distribute electricity to about 2.8 million consumers.

Basin Electric owns 2,093 miles and maintains 2,178 miles of high-voltage transmission lines and owns and maintains equipment in 66 switchyards and 116 telecommunications sites.

No transmission lines (115-kV or greater) are present within the macro-corridor, except in the extreme northern and southern portions of the macro-corridor. Western's 230-kV Big Bend to Fort Thompson transmission line is located in the northern portion of the macro-corridor near Big Bend Dam. The Witten substation is on Western's 115-kV Fort Randall to Mission transmission line, located in the southern portion of the macro-corridor.

2.2 Existing Big Bend Switchyard

The existing Big Bend Switchyard contains eight generation interconnections (59 megawatts [MWs] each) and four step-up transformers. The 230-kV bus is split at disconnect switch 7089, providing two separate 230-kV buses. A 230-kV line connects each 230-kV bus radially to Fort Thompson Substation, which is 7 miles away. There are no 230-kV circuit breakers at Big Bend Switchyard. Replacement of switch 7089 with a 230-kV breaker was considered to allow the 230-kV buses to be connected through a breaker and add some operational flexibility. However, field investigation by Western indicated there is insufficient space to accommodate a 230-kV circuit breaker at that position.

2.3 Regional Transmission System Studies and Analyses

2.3.1 Basin Electric Transmission Studies

The Big Bend to Witten 230-kV transmission line is required to serve proposed load growth on the 115-kV system between Mission and Fort Randall substations. Much of the short-term load growth in this area is associated with provision of electrical service to pump stations for the proposed TransCanada Keystone XL pipeline. In addition to short-term load growth, the need for an additional source at the Witten Substation has been identified to improve regional system reliability and voltage stability.

2.3.2 Western Transmission System Studies

After receipt of information on the power requirements for the proposed pump stations in South Dakota associated with the TransCanada Keystone XL pipeline, Western conducted a

joint system engineering study to determine system reliability under the proposed loads at maximum electrical energy consumption. The joint system engineering studies determined that a 230-kV transmission line originating at the Fort Thompson/Big Bend area and extending south to the existing Witten Substation would be required to support voltage requirements for pump stations 20 and 21 in the Witten area when the pipeline is operating at maximum capacity.

To address this requirement, Western proposes to convert the existing Big Bend to Fort Thompson No. 2, 230-kV transmission line turning structure, located on the south side of the dam, to a double-circuit structure. Western would then construct approximately 2.1 miles of new double-circuit transmission line south to a new substation, (i.e., Lower Brule Substation), which would also be constructed by Western. The new switchyard/substation would be a 3-breaker ring bus configuration, expandable to a breaker and a half configuration. The new 2.1-mile-long double-circuit 230-kV transmission line would be owned, constructed, and operated by Western. After construction, ownership of the Lower Brule Substation would be transferred to Basin Electric, which would then own and operate it. Western would complete design of the new substation and double-circuit transmission line in 2012 and would begin construction in the spring of 2013.

2.3.3 West Central Electric Cooperative Request

West Central Electric Cooperative (West Central) has requested a 230-kV/69-kV interconnection to the proposed transmission line approximately 10 miles southwest of Big Bend Switchyard. The requested delivery point is near the town of Reliance; however, the specific location of the delivery point had not been determined as of March 2011.

2.4 Conclusion of Purpose and Need

As a result of the regional transmission studies and the need to provide additional electric power to the Witten Substation to meet anticipated increased demand, Basin Electric and Western determined that the best way to meet that need and ensure continued system reliability would be to convert the existing Big Bend to Fort Thompson No. 2, 230-kV transmission line turning structure to a double-circuit structure and to construct a new double-circuit 230-kV transmission line from this point to the new Lower Brule Substation. In addition, a new single-circuit 230-kV transmission line would be constructed from the Lower Brule Substation to the Witten Substation. Basin Electric has identified a preferred route and several alternative routes to the Witten Substation and this MCS provides an evaluation of the feasibility of the preferred and alternative routes. The potential environmental impacts of the routes will be evaluated in a separate Environmental Assessment to be prepared following public scoping.

3.0 System Alternatives Evaluated

Two major system alternatives were evaluated to meet the purpose and need of the Project. A 230-kV transmission line alternative from Lake Platte Substation to Witten Substation was considered as an electrically viable alternative to the Project. The Lake Platte alternative was eliminated from further consideration because of the technical and environmental issues associated with crossing the Missouri River.

Western determined that the Big Bend Substation, located at the Big Bend Dam, would not accommodate an expansion of two 230-kV circuit breakers that would be required for the Project. Therefore, four alternative configurations were identified and reviewed for the northern terminal. The alternatives were identified with consideration of a request from West Central Electric Cooperative to provide delivery into their 69-kV system approximately 10 miles southwest of Big Bend. The Witten Substation would serve as the southern terminal to the Project. The alternative configurations for the northern terminal are briefly described in the following sections.

3.1 Alternative Configuration 1

Alternative Configuration 1 would tap into the existing Big Bend to Fort Thompson 230-kV transmission line adjacent to the Big Bend Substation. Two options to this Alternative Configuration were identified. Option 1A would add an interconnection for the West Central Delivery at the Reliance tap; however, this option would increase the potential for a loss of the proposed transmission line. Option 1B would add a breaker at the interconnection point; this option would reduce exposure of tripping generation and potential line outage.

3.2 Alternative Configuration 2

Alternative Configuration 2 would tap into the existing Big Bend to Fort Thompson 230-kV transmission line, and a new substation would be constructed approximately 2 miles south of the Big Bend Substation. The newly constructed substation, the Lower Brule Substation with the West Central Delivery, would increase the Big Bend to Fort Thompson 230-kV transmission line reliability over Alternative Configuration 1.

3.3 Alternative Configuration 3

Alternative Configuration 3 would radially feed one double-circuit from the Big Bend to Fort Thompson 230-kV transmission line to the newly-constructed Lower Brule Substation. Should an outage occur on the Lower Brule to Fort Thompson 230-kV transmission line, then power generated from Big Bend could be transmitted on the remaining 230-kV double-circuit transmission line. Option 3A adds breakers at the Lower Brule Substation for the West Central Delivery. Option 3B would add a tap interconnection for the West Central Delivery at the Reliance Substation. Alternative 3 (Option 3B) is the proposed Alternative Configuration for this Project.

3.4 Alternative Configuration 4

Alternative Configuration 4 would loop both 230-kV double-circuits from the Big Bend to Fort Thompson 230-kV transmission line to the Lower Brule Substation with additional circuit breakers. This would provide additional reliability for the proposed transmission line, but would be the most expensive of the proposed alternatives.

4.0 Macro-Corridor Study

The purpose of the MCS was to evaluate potential alternative transmission line routes within an approximately 6-mile-wide macro-corridor between the Big Bend Dam located on the Lower Brule Indian Reservation in Lyman County and the existing Witten Substation located in Tripp County, South Dakota. This wide macro-corridor will provide flexibility to identify a preferred and at least one alternative route for the transmission line while minimizing impacts to important resources identified within the macro-corridor.

For this Project, three distinct phases for identifying and evaluating routes were undertaken as follows:

- Phase 1—Definition of the Macro-Corridor/Project Study Area
- Phase 2—Resource Data Collection and Evaluation
- Phase 3—Opportunities and Constraints Analysis

Each of these phases is described in more detail in the following sections. The final section of the document describes additional inputs to routing, which include public scoping, field reconnaissance, route refinement, and permitting.

4.1 Definition of the Macro-Corridor/Project Study Area

4.1.1 Early Project Planning

Two alternative corridors for the proposed transmission line were identified during early stages of Project planning and are discussed in detail in the Keystone XL project Draft Environmental Impact Statement (DEIS). Initially, a 6-mile-wide corridor was identified by Western and Basin Electric between an existing substation on the transmission grid (Witten Substation) and Big Bend Dam. Several route alternatives were identified within this initial corridor. Later, a second corridor, which is also six miles in width, was developed by Western and Basin Electric with input from the Lower Brule Reservation. This corridor followed a similar path from the existing Witten Substation to Big Bend Dam but with deviations in the southeast near Winner and the northeast near Reliance. The second corridor allowed for more direct north-south route options on the Lower Brule Reservation and is the basis for the macro-corridor identified in this study.

4.1.2 Macro-Corridor Study Planning

The first phase of the MCS process involved identifying the study area within which the Project would be located. The extent of a study area for a transmission line project is primarily determined by the project endpoints, the purpose and need, and the electric system requirements and components that best meet the purpose and need. As described in the Alternative Evaluation (Section 3.0), studies by Basin Electric's System Planning Group and Western determined that a new double-circuit 230-kV transmission line from the Big Bend Dam to the proposed Lower Brule Substation, and a single-circuit 230-kV transmission line

from the Lower Brule Substation to the Witten Substation offered the best way to meet the purpose and need for the Project.

Given the project endpoints (new double-circuit structure located on the south side of the Big Bend Dam in the north and Witten Substation in the south), West Central's request for interconnection in the Reliance area, and the limited number of reasonable crossing locations of the White River, the Project study area was defined as an approximately 6-mile-wide macro-corridor generally running north-south through Lyman County and into Tripp County south of the unincorporated town of Hamill. At a point approximately 6 miles south of Hamill, the macro-corridor turns southwest to the Witten Substation. The defined macro-corridor within which preliminary routes have been identified is shown in Figure 4-1. The macro-corridor encompasses approximately 250,350 acres or 391.2 square miles.

4.2 Resource Data Collection and Evaluation

The second phase of the MCS involved collecting resource data within the study area from resource management agencies, state and local governments, utility companies, and other publicly available sources. Resource data obtained from municipalities, counties, state and federal agencies, and utilities were used to prepare Geographic Information System (GIS) resource maps and included the following resource categories:

- Existing Linear Transportation and Utility Corridors;
- Land Use and Jurisdiction;
- Cultural Resources;
- Wetlands and Water Resources;
- Geologic Hazards; and
- Biological Resources.

All data collected reflect existing data readily available from the resource and local, state, and federal agencies. No new field data were collected within the macro-corridor to support the opportunities and constraints analysis.

The resource data were mapped in GIS format and combined with aerial photography to validate the identified preferred and alternative routes for the proposed transmission line within the macro-corridor. As described below, each environmental resource was categorized as an opportunity (suitable area), an avoidance area, or an exclusion area in the GIS opportunity and constraint model. The following sections describe in more detail each set of resource data that was collected as part of this analysis. Resource maps referenced in this section have been included in Appendix A.

4.3 Opportunities and Constraints Analysis

The final phase of the MCS involved conducting an opportunity and constraints analysis. Project opportunity and constraint criteria were developed based on resources and characteristics of the macro-corridor that provided favorable or unfavorable attributes for

locating the proposed transmission line. The criteria classifications include opportunity, avoidance, and exclusion areas associated with each selected resource. Table 4-1 lists the opportunity and constraint criteria that were developed for the Project.

To assist in the evaluation of the preliminary routes, the GIS data for each resource were categorized as an opportunity or a constraint and a GIS-based model was developed to map the areas of opportunity and constraint. The degree of opportunity and constraint is based on the character of the resource (i.e., linear or site specific, natural or human, native or disturbed, and the proximity of the transmission line to the resource). In some cases, the opportunity and constraint mapping may show routes crossing areas of avoidance or exclusion; however, sensitive features or land uses will be taken into account during the route refinement process. In some instances, a route may be moved to avoid a sensitive area, or a sensitive feature (e.g., wetland) may be spanned. In either case, potential impacts to a sensitive resource can be avoided.

This page intentionally left blank.

BIG BEND TO WITTEN TRANSMISSION PROJECT

Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route

Boundaries
- County Boundary
- Municipal Boundary

Opportunities & Constraints
- Opportunities
  - Less Opportunity
  - More Opportunity
- Avoidance
- Exclusion

Utility System
- Existing Substation
- Proposed Substation
- 230 kV & Above Transmission Line
- 115 kV Transmission Line
- 69 kV Distribution Line

Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Railroad
- Airport

MAP AREA SHOWN IN RED.

NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
MN
0 100 200 Miles

OPPORTUNITIES AND CONSTRAINTS COMPOSITE MAP

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

0 2 4 Miles

AECOM
717 17th Street Suite 2600
Denver, CO 80202

Path: P:\2011\11180015.01Basin_LB2W\06GIS\6.3Layout\OppsCons
File: 110216_OppsCons.mxd
Date Modified: March 30, 2011

Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS

Figure 4-1

This page intentionally left blank.

Table 4-1:
Project Opportunity and Constraint Criteria

Resource	Opportunity Area (Optimize Use for Routing)	Avoidance Area (Minimize Use for Routing)	Exclusion Area (Exclude for Routing When Possible)
Existing Linear Transportation and Utility Corridors			
Roads (interstate, state, county)	Within 0.5 mile of existing road	Within 0.25 mile of scenic byway (except when parallel to an existing transmission line)	—
Railroads	Within 0.25 mile of railroad	—	—
Power Lines	Within 0.50 mile of existing power lines (69-kV or greater)	—	—
Land Use and Jurisdiction			
Land Use/Land Cover	Cropland and Pasture Herbaceous Rangeland Mixed Rangeland Shrub & Brush Rangeland	Beaches Commercial and Services Deciduous Forest Land Mixed Urban or Built-Up Non-forested Wetland Other Agricultural Land Other Urban or Built-Up Residential Transportation, Communication, Utility	Reservoirs Strip Mines
Center-pivot Irrigation	—	—	Center-pivot irrigated fields
Jurisdiction - Municipal or Town Boundaries	—	Within municipal or town boundaries	—
Jurisdiction – State- or Corps of Engineers-owned Lands	—	Within boundary of state- or USACE-lands	—
Jurisdiction – Indian Trust Lands	—	Within boundary of Indian Trust Lands	—
Residential Areas	—	Within 500 feet of an occupied residence	Within 150 feet of an occupied residence
Schools, Parks, Recreation Areas, and other Census Landmarks	—	Within 500 feet of schools; educational facilities; cemeteries; parks; designated recreational areas; and apartments.	Within 150 feet of schools; educational facilities; cemeteries; parks; designated recreational areas; and apartments.
Communication and Radio Towers (FCC Structures)	—	Within 150 feet of FCC structure	Within 50 feet of FCC structure
Cultural Resources			
Class I Survey Data	—	Within 0.125 mile of Class I site	Within 100 feet of Class I site

Resource	Opportunity Area (Optimize Use for Routing)	Avoidance Area (Minimize Use for Routing)	Exclusion Area (Exclude for Routing When Possible)
Wetlands and Water Resources			
Wetlands	—	Within wetland boundary	—
Surface Water	—	Within 100 feet of lakes and perennial streams	—
Geologic Hazards			
Geologic Hazards	—	Within areas classified as moderate or high hazard	—
Biological Resources			
Designated Wildlife Areas	—	Federal (USFWS Jurisdiction) and State Wildlife Refuges, State Wildlife Areas, Walk-in Hunting Areas; Game and Waterfowl Production Areas	—
Sharp-tailed grouse leks	—	Within 1.0 mile of active lek	Within 0.25 mile of active lek

Avoidance areas included sensitive areas that were likely to incur environmental impacts or result in land use conflicts if directly affected by the Project. It is preferable to avoid these areas if opportunity areas are available elsewhere for locating the proposed transmission line. If a sensitive area cannot be completely avoided, impacts can be minimized through route refinement, careful placement of the transmission structures and access roads, spanning of the sensitive resource, seasonal restrictions on construction activities, and other mitigation measures.

Exclusion areas include locations with the highest level of sensitivity, including those areas with regulatory or legislative designations or extreme physical constraints not compatible with transmission line construction and/or operation. In general, locating a transmission line in these areas is not recommended and could result in increased environmental impacts, significantly higher costs, and/or additional regulatory approvals.

Figure 4-1 illustrates those areas identified as opportunities, avoidance areas, and exclusion areas based on the opportunities and constraints criteria and resource data gathered. Based on this analysis, all of the identified routes appear to provide reasonable alternatives for the proposed transmission line which avoid the majority of avoidance and exclusion areas within the macro-corridor. Although some of the routes cross areas that have been identified as avoidance and exclusion areas, routing in these areas appears feasible from an engineering perspective. Avoidance areas crossed by one or more route segments include buffers associated with potentially sensitive land uses including some residential parcels, wetland areas, areas along the White River associated with moderate landslide potential, and one sharp-tailed grouse lek. Exclusion areas crossed include buffers associated with a reservoir, a census landmark (Fletcher Landing Field), and one sharp-tailed grouse lek. During the

route refinement process, sensitive areas will be avoided or spanned to the extent feasible. The following sections describe each of the opportunity and constraint criteria in greater detail.

4.3.1 Existing Linear Transportation and Utility Corridors

Existing linear facilities and ROWs can provide suitable opportunities for routing transmission lines. For this Project, roads, railroads, and transmission lines were identified and mapped as possible opportunities (see Figure A-1). Data on the locations of roads and railroads within the macro-corridor were obtained from the South Dakota Department of Transportation (SDDOT) and U.S. Census Bureau TIGER database (2010).

Locating a transmission line along these linear features may result in fewer environmental impacts because of the existing disturbance and relatively easy access to the ROW. A general description of these transportation features is presented in the following sections.

4.3.1.1 Major Roads and Scenic Byways

There are a number of opportunities for routing the proposed transmission line along existing roadways within the macro-corridor. As shown in Figure A-1, most of the macro-corridor has a fairly extensive roadway network that includes local roads, state highways, U.S. highways, and one interstate highway. The main highways in the Lyman County portion of the macro-corridor include BIA Highway 5, South Dakota (SD) Highway 47 (SD 47), and Interstate 90 (I-90). The main highways in the Tripp County portion of the macro-corridor include SD 44, SD 49, SD 53, U.S. Highway 18 (US 18), and US 183. In order to maximize the areas of opportunity within the macro-corridor, particularly through areas in agricultural production, areas within 0.5 mile of a roadway were designated as opportunity areas.

The Native American Scenic Byway was designated as a national scenic byway on September 22, 2005. The byway traverses the Lower Brule Indian Reservation from west to east and enters the macro-corridor on BIA Highway 5. At the intersection of BIA Highway 5 and SD 47, the byway turns north and follows SD 47 north across the Big Bend Dam.

The Lewis and Clark National Historic Trail (NHT) Auto Tour Route enters the macro-corridor on SD 47 north of Reliance and continues south through Reliance on SD 47. The auto tour route leaves the macro-corridor southeast of Reliance and south of I-90. Areas within 0.25 mile of these scenic byways will be avoided to the extent feasible, unless an existing transmission line parallels the roadway. The preferred route will cross the Lewis and Clark NHT Auto Tour Route southeast of Reliance.

4.3.1.2 Railroad Rights-of-Way

The South Dakota State Railroad (formerly Dakota Southern Railroad) runs east-west across the macro-corridor through the town of Reliance immediately north of I-90. The SDDOT Office of Railroads manages the railroad ROW and utility leases. Due to the east-west orientation of the railroad, this linear feature does not provide a significant opportunity for

routing the proposed transmission line. Coordination with the Office of Railroads will be necessary since a utility lease or crossing permit would be required where the proposed transmission line crosses the railroad ROW near Reliance.

4.3.1.3 Power Lines

Existing power lines may provide opportunities for routing the proposed transmission line within or adjacent to an existing ROW. Using or paralleling the ROWs of existing power lines could potentially reduce impacts associated with construction, operation, and maintenance of the proposed transmission line. However, it may not be possible to parallel certain existing transmission lines (115-kV or greater) for reasons of system reliability. Specific assessment should be conducted to determine whether the reliability of the electric system would be jeopardized by placing the proposed transmission line in close proximity to an existing transmission line. The potential risk is that both transmission lines could be taken out of service by an accident or severe weather.

Existing transmission and distribution lines within the macro-corridor are shown in Figure A-2. In the northern part of the macro-corridor in Lyman County, the preferred route and several of the alternative routes parallel existing power lines. There are very few existing transmission lines in the central and southern portions of the macro-corridor. The only known existing transmission line in the Tripp County portion of the macro-corridor is a Western transmission line that serves the Witten Substation. One of the alternative routes parallels this transmission line along the southern boundary of the macro-corridor. Existing distribution lines that serve rural residences could provide additional opportunities for routing.

4.3.2 Land Use and Jurisdiction

4.3.2.1 Land Use and Land Cover

Land use and land cover data were obtained from the U.S. Geological Survey (USGS) National Land Cover Dataset (NLCD) (2001). Land cover describes the general categories of land uses within the macro-corridor. Figure A-3 shows the distribution of land cover types in the macro-corridor. As can be seen from the figure, the categories cropland and pasture, herbaceous rangeland, and shrub and brush rangeland constitute the majority of the land cover within the macro-corridor. These general categories of land cover types typically provide good opportunities for routing transmission lines.

4.3.2.2 Center-pivot Irrigation

Center-pivot irrigation is limited within the macro-corridor and only one parcel using this type of irrigation system has been identified near the White River. The westernmost alternative route avoids this parcel. Parcels with center-pivot irrigation systems were designated as exclusion areas, although transmission lines may be routed along the edges of these fields.

4.3.2.3 Jurisdiction

Jurisdiction and land ownership within the macro-corridor is shown in Figure A-4. Reliance is the only incorporated town within the macro-corridor; Hamill is unincorporated. Preliminary

routes are located outside of the incorporated boundary of Reliance and avoid residences near Hamill.

Data on land ownership were obtained from the South Dakota Geographic Information System (GIS). Land ownership and jurisdiction within the macro-corridor include the Bureau of Indian Affairs (BIA), Indian Trust Land, State of South Dakota, U.S. Army Corps of Engineers (USACE), and private land. An estimated 80 percent of the land in the macro-corridor is privately owned. There is one walk-in hunting area located northeast of Reliance on the Lower Brule Indian Reservation (shown as state land on Figure A-4); however, none of the routes are located near this parcel. Areas within town boundaries, state-owned, USACE-owned, and Indian Trust Lands were designated as avoidance areas.

4.3.2.4 Residences and Residential Areas

Individual residences and other structures within the macro-corridor have been digitized to aid in the routing of the transmission line. As can be seen in Figure A-5, residences are located throughout the macro-corridor. Preliminary routes for the transmission line were selected to avoid residences. For the opportunity and constraints analysis, areas within 150 feet of an occupied residence were designated as exclusion areas and areas within 500 feet of an occupied residence will be avoided during routing whenever possible.

4.3.2.5 Schools, Parks, Recreation Areas, and Census Landmarks

Data on the locations of schools, parks, recreation areas, cemeteries, and other census-identified landmarks were obtained from the U.S. Census Bureau (2010). As can be seen from Figure A-6, there are only a few census landmarks within the macro-corridor. For the opportunity and constraints analysis, areas within 150 feet of census landmarks were designated as exclusion areas and areas within 500 feet of these features were designated as avoidance areas.

There are two known recreation areas within the macro-corridor, which are located on the Lower Brule Indian Reservation. The Good Soldier Creek Recreation Area is located on the right bank of Lake Sharpe adjacent to Big Bend Dam in Lyman County. Access is from State Highway 47 to a gravel circulation road. The recreation area is primarily a day use area that covers approximately 17 acres of land, 9 acres of which are developed. Facilities include picnic sites, campsites, group picnic shelters, grills, a vault toilet, a playground, horseshoe pits, a handicap-accessible fishing dock, large parking areas, a non-operating water treatment plant, and a two-lane boat ramp with a dock.

The Right Tailrace Recreation Area is located immediately downstream and adjacent to Big Bend Dam in Lyman County. The recreation area is accessible from State Highway 47. The area consists of approximately 148 acres with roughly one-third of the area developed. Facilities include picnic sites, a group picnic area, a primitive campground, handicap accessible fishing pier, a playground, a comfort station with shower, potable water, a fish-cleaning table, a fixed dock for pedestrian visitors, and a one-lane boat ramp with a courtesy dock. The Right Tailrace Recreation Area affords year-round use. The main uses of the area

include both water-oriented and land-based recreation activities including boating, fishing, camping, picnicking, hiking, and wildlife viewing.

There are three known cemeteries within the macro-corridor. The Saint Mary's Cemetery is located north of Reliance and the Trinity Cemetery is located southwest of Reliance on the south side of I-90. A third cemetery is located near Hamill. None of these cemeteries are located within 500 feet of the preferred or an alternative route.

4.3.2.6 Communication and Radio Towers

The locations of communication facilities within the macro-corridor were obtained from the Federal Communications Commission (FCC). Communication facilities include television transmission towers, microwave towers, and cellular telephone towers (FCC 2009). There are approximately 22 communications facilities within the macro-corridor. These facilities are generally scattered throughout the macro-corridor as shown in Figure A-7.

The Project will follow all FCC regulations for siting transmission lines and structures near communication facilities. For the opportunity and constraints analysis, areas within 50 feet of a communications facility were designated as exclusion areas and areas within 150 feet of a communications facility were designated as avoidance areas.

4.3.2.7 Airports

Data on airports within and near the macro-corridor were obtained from the Bureau of Transportation Statistics (BTS) airport data (2006) and the U.S. Census Bureau (2010). The Fletcher Landing Field is the only known airstrip within the macro-corridor. The alternative transmission route southeast of Reliance crosses a portion of the parcel that contains the identified landing strip. Based on a telephone conversation between Basin Electric and a representative from the town of Reliance regarding this parcel, the landing strip has had no known use in several years, and does not appear to be active. Therefore, this landing strip would not be considered an avoidance area during the route refinement process.

There are no known public airports within the macro-corridor. The nearest public airport (Winner Regional Airport or Bob Wiley Field) is approximately 3 miles from the nearest alternative segment, and the proposed transmission structures should not pose a hazard to aircraft arriving at or departing from the airport. Airports near the macro-corridor are shown in Figure A-1.

4.3.3 Cultural and Historic Resources

There are no known National Register of Historic Places (NRHP) listed sites within the macro-corridor. Previously collected Class I cultural resources survey data were included in the opportunity and constraints analysis. Areas within 100 feet of Class I sites were designated as exclusion areas and areas within 0.125 mile of Class I sites were designated as avoidance areas.

The main Class I cultural resources that could potentially be affected by the Project are several bridges more than 50 years old, which are located throughout the macro-corridor. These bridges were previously determined to be ineligible for inclusion on the NRHP; however, they have been retained in the MCS since they may have local significance. Bridges identified in the Class I inventory near the preferred route include bridges over Red Butte, Black Dog, Thunder, and Dog Ear creeks, and a branch of Thunder Creek. A second bridge over Dog Ear Creek is located in close proximity to one of the alternative routes.

Five previously identified potentially historic structures over 50 years old are located within the macro-corridor. None of these structures is located within 0.125 mile of either the preferred route or an alternative route. The general locations of structures and bridges identified in the Class I inventory are shown in Figure A-8. Due to the sensitive nature of cultural resource data, other Class I cultural resource sites are not shown on the figure; however, the locations of these sites will be taken into account during the route refinement phase of the Project.

4.3.4 Wetlands and Water Resources

4.3.4.1 Wetlands

Wetlands and surface water features within the macro-corridor are shown in Figure A-9. Data on the locations of wetlands in the macro-corridor were obtained from the National Wetlands Inventory (NWI). Areas of wetlands are scattered throughout the macro-corridor, with a large concentration of wetlands north of I-90. The preliminary routes generally avoid areas with large numbers of wetlands. Impacts to wetlands can typically be avoided through careful placement of transmission structures and by spanning the transmission line across wetland areas. The maximum distance that can be spanned is approximately 950 feet.

As part of the opportunity and constraints analysis, areas within mapped wetland boundaries were designated as avoidance areas. Wetlands surveys will be conducted prior to final design and construction so that the transmission line can be routed to minimize impacts to these resources.

4.3.4.2 Surface Water

River and stream data were obtained from the USGS National Hydrological Dataset (NHD). The Project would cross the White River as well as a number of named creeks and their tributaries within the macro-corridor. In Lyman County, Short, North Fork American Crow, and Red Butte creeks and tributaries would be crossed by the proposed transmission line. In Tripp County, the Project would cross Black Dog, No Moccasin, Thunder, Dog Ear, Hollow, and East Cottonwood creeks and a number of smaller tributaries. West Cottonwood Creek also enters the far western portion of the macro-corridor north of the Witten Substation; however, it does not appear that West Cottonwood Creek would be crossed by any of the proposed alignments. Areas within 100 feet of surface waters were designated as avoidance areas. All of the surface waters within the macro-corridor, including the White River, can be

spanned by the proposed transmission line and it is unlikely that the Project would result in impacts to these surface waters.

4.3.5 Geologic Hazards

The principal geologic hazards identified within the macro-corridor are landslide hazards. Steeper slopes along the White River have been classified as moderate hazard areas, while slopes along the Missouri River have been classified as high hazard areas. For the opportunity and constraints analysis, areas of both moderate and high landslide hazards have been classified as avoidance areas since transmission line routing in these areas appears feasible from an engineering perspective. Landslide hazards are shown in Figure A-10.

4.3.6 Biological Resources

4.3.6.1 Vegetation and Wildlife

Vegetation

The land cover types present within the macro-corridor are shown in Figure A-3. The dominant land cover types include agricultural cropland and mixed grass prairie communities (i.e., rangeland), with some areas of shrub and brush rangeland present near the White River. Several nonforested wetlands are also located within the macro-corridor. Preliminary routes for the proposed transmission line were selected to avoid these larger wetland complexes. Smaller wetlands can be spanned to minimize potential impacts.

Wildlife

The macro-corridor contains mixed grass prairie, which provides habitat for resident and migrant songbirds such as the Brewer's sparrow, horned lark, lark bunting, and several species of sparrows. Wetlands and prairie potholes support species of waterfowl and shorebirds, and provide forage and stopover habitat for migrating species in the spring and fall. Mammals in the area would likely include fox, coyote, prairie dog, gopher, badger, and rodent species. Common wildlife species observed during site visits will be documented; however, habitat areas for these species were not included in the opportunity and constraints analysis.

4.3.6.2 Threatened, Endangered and Special Status Species

Federal Species of Concern

Federally threatened species are those species, subspecies, or varieties likely to become endangered within the foreseeable future throughout all or a significant portion of their range. Federally endangered species are those species, subspecies, or varieties already in danger of extinction throughout all or a significant portion of their range. Federal candidate species are those species being considered for listing as endangered or threatened, but for which a proposed regulation has not yet been published in the *Federal Register*. Species listed as threatened and endangered that may occur within Lyman and Tripp counties are shown in Table 4-2.

Table 4-2:
Federally Threatened and Endangered Species in Lyman and Tripp Counties

Common Name	Scientific Name	County	Group	Status	Avoidance
Whooping crane	*Grus americana*	Lyman, Tripp	Bird	FE	Avoidance of wetlands/surface waters
Least tern	*Sterna antillarum athalassos*	Lyman	Bird	FE	Avoidance of waters/shorelines
Piping plover	*Charadrius melodus*	Lyman	Bird	FT	Avoidance of waters/shorelines
Black-footed ferret	*Mustela nigripes*	Lyman, Tripp	Mammal	FE	Avoidance of prairie dog colonies
Pallid Sturgeon	*Scaphirhynchus albus*	Lyman	Fish	FE	Avoidance of Missouri River
American burying beetle	*Nicrophorus americanus*	Tripp	Insect	FE	No avoidance measures proposed at this time due to the variety of habitats including, forests, grasslands, wetlands.

Electronic resource data for the other threatened and endangered species were not available at the time this MCS was completed. Habitat and occurrences of these additional species will be assessed in greater detail during the route refinement process based on additional data received from the agencies. Basin Electric and the agencies will work with South Dakota Game, Fish and Parks (SDGFP) and U.S. Fish and Wildlife Service (USFWS) throughout the routing process to minimize impacts on threatened and endangered species and their habitats.

Other Species of Concern

Bald Eagle

The bald eagle was de-listed from the Endangered Species Act on June 28, 2007, but is still protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The bald eagle commonly inhabits suitable nesting and foraging habitats near reservoirs and rivers. Bald eagle habitat within the macro-corridor has been identified by the South Dakota Natural Heritage Program (SDNHP) and will also be documented during biological site visits. This information will be used during the route refinement process to avoid bald eagle habitat to the extent feasible, and any known nest locations would be avoided.

Migratory Birds

Migratory birds are protected under the Migratory Bird Treaty Act. During the route refinement phase of the Project, data from SDNHP and biological site visits will be used to avoid important migratory bird habitats such as wetlands. SDGFP and USFWS will be consulted to determine appropriate measures to avoid impacts to migratory birds.

Initial agency consultation letters were sent to USFWS and SDGFP on February 23, 2011. In addition, a request for species occurrence data was submitted to SDNHP. Species information obtained during initial consultation with the agencies will be incorporated into the route refinement process.

4.3.7 Data Considered, But Not Used in Macro-Corridor Analysis

4.3.7.1 Soils

Soil data for the macro-corridor were obtained from the Natural Resource Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO) database. For the preliminary analysis of routing opportunities, data on the erosion potential of soils by water and wind were mapped, but were not included in the opportunities and constraints model because highly erodible soils are present throughout the macro-corridor and these data were not useful in discriminating among the various routes.

4.3.7.2 Slope

Slope was identified and mapped using the USGS National Elevation Dataset 30-meter Digital Elevation Model and the Spatial Analyst extension in ArcGIS 9.1. As shown in Figure A-11, the majority of the macro-corridor consists of slopes of less than 30 percent. Areas of steeper slope are generally concentrated near the Missouri River, north and south of the White River, and are associated with various landforms that occur throughout the macro-corridor.

Slope may be classified as either an opportunity or a constraint depending on its degree and orientation. Opportunities associated with slope exist where landforms provide visual screening of the transmission line. In contrast, steep terrain is typically avoided or excluded during routing because constructing a transmission line and access roads on steep slopes could require complex engineering and may result in potential environmental impacts. Given the generally low slope within the macro-corridor and the ability to avoid steeper terrain during final routing, slope should not be a significant factor for routing the Project. Consequently, slope data were mapped, but were not included in the opportunities and constraints model.

4.3.7.3 Agriculture

Agricultural land uses, including cultivated cropland, pasture, and herbaceous rangeland, are present throughout the macro-corridor and collectively represent more than 90 percent of land use within the macro-corridor.

Data regarding regions of important farmland were obtained from the SSURGO database. The three main categories of important farmland within the macro-corridor are “prime farmland,” “farmland of statewide importance,” and “prime farmland if irrigated.” As shown in Figure A-12, areas categorized as important farmland are present throughout the macro-corridor. The acreage and percentage of important farmland in the macro-corridor is presented in Table 4-3.

Table 4-3:
Important Farmland in the Macro-Corridor

SSURGO Farmland Category	Acres	Square Miles	Percent of Total Land Area
All Areas are Prime Farmland	3,121	4.9	1%
Farmland of Statewide Importance	60,505	94.5	24%
Prime Farmland, If Irrigated	74,146	115.9	30%
TOTALS	137,772	215.3	55%

Approximately 55 percent of the area of the macro-corridor is classified as important farmland. Due to its widespread distribution throughout the macro-corridor, areas of important farmland were not specifically categorized as avoidance areas at this stage. Given the nature of the Project, it is unlikely there would be actual conversion of important farmland, but coordination with the USDA NRCS will assist in this determination. The proposed transmission line will be routed along the edges of cultivated fields whenever possible, and Basin Electric will work with landowners to avoid impacts to farming operations.

4.3.7.4 Oil and Gas Wells

Based on data available from the South Dakota Geological Survey, there is no current oil or gas production in Lyman or Tripp counties, and the four oil and gas wells within the macro-corridor were dry holes that have been plugged and abandoned. Consequently, the presence of these former wells should not be a factor in the routing of the transmission line.

This page intentionally left blank.

5.0 Additional Inputs to Routing and Alternatives

As discussed in Section 4.0, the opportunities and constraints analysis was used to validate the preliminary route options that have been identified within the macro-corridor. The route validation and refinement process continues through public scoping and field reconnaissance. Issues raised by the public and landowners, and additional constraints identified in the field can play a significant role in route refinement. By including these additional inputs, a preferred route and one or more alternative routes will be identified for analysis in the Environmental Assessment (EA) and presented to the South Dakota Public Utilities Commission (PUC) and local agencies for permitting. These additional inputs are discussed in the following sections.

5.1 Public Scoping and Stakeholder Involvement

Public and stakeholder involvement and Project communications will be integral to the evaluation of the preliminary routes within the macro-corridor and the selection of a preferred and an alternative route for detailed environmental analysis.

The public involvement process will include public scoping meetings that will occur at the beginning of the formal NEPA process. At these meetings, hosted by the agencies, Basin Electric will present the macro-corridor and preliminary routes to the public and solicit input regarding issues of concern. This input will assist in refining the alternative routes as well as determining the level of analysis necessary to address the relevant issues. Public input will continue to be a part of the Project through the NEPA process and the development of the EA for the Project.

Stakeholders are those people and organizations that may be affected or have some interest in the Project. Potential stakeholders for this Project identified to date include the following entities:

- Businesses, residents, and property owners along the identified routes;
- Towns of Reliance, Hamill, Winner, and New Witten;
- State and local elected officials;
- SDGFP;
- SDDOT;
- Native American tribes;
- Bureau of Indian Affairs;
- USACE;
- USFWS; and
- National Park Service.

Public scoping meetings for this project are scheduled in the towns of Reliance and Winner for the week of April 25, 2011. Notification of public meetings will be sent to stakeholders and will be posted in local news media prior to the meetings.

5.2 Field Reconnaissance and Identification of Route-Specific Constraints

Field reconnaissance within the macro-corridor is planned for the week of April 25, 2011. The field reconnaissance will be used to ground-truth data that have already been collected and identify additional route-specific constraints. Field observations may include determining the extent of floodplains and wetlands and identifying other visible constraints that could influence routing decisions. These items are discussed in the following sections.

5.2.1 Floodplains

The 100-year floodplain delineation is typically used to define floodplain hazard areas. Local and state governments, as well as the Federal Emergency Management Agency (FEMA), strongly discourage development within floodplains. Floodplains can generally be spanned or avoided through careful pole placement. The floodplain of the White River at the proposed crossing locations will be observed during the field reconnaissance to determine if the floodplain will pose a challenge for routing. Once an alignment and alternatives are chosen, hardcopy FEMA floodplain maps, if available, would be included in the analysis.

5.3 Route Refinement and Comparative Analysis

Through a process that includes resource impact assessment and landowner, public, and agency involvement, specific alternative routes will be identified (Phase 5 of the siting process). This allows for the quantification of Project-related impacts associated with each route alternative. Potential routes that are identified would need to meet the Project objectives, which require that the routes:

- Connect both substations;
- Maximize opportunities and minimize constraints and avoidance areas through more detailed analysis; and
- Are cost-effective.

The route refinement process will involve assessing the environmental consequences that are expected as a result of implementation of the Project. Potential routes will be analyzed on a segment-by-segment basis using routing criteria developed through the public/agency consultation process. These criteria will expand upon the opportunity and constraints criteria used in the MCS. For each of the routing criteria, segment impacts will be quantified to allow for easy comparison. Impact values associated with each of the route alternatives will then be summed and a rank will be assigned to each route alternative, with 1 representing the least impact and a higher number (depending on the number of alternatives considered) representing the most impact. An alternative's ranking will reflect the relative impact that a given route alternative has on resources compared to the impacts of the other alternatives.

6.0 References Cited

BTS (U.S. Department of Transportation, Bureau of Transportation Statistics), 2006. Data on the locations of airports. Available online at: http://www.bts.gov/programs/geographic_information_services/

FCC (Federal Communications Commission), 2009. Data on the locations of communications facilities. Available online at: http://wireless.fcc.gov/geographic/index.htm?job=licensing_database_extracts

NPS (National Park Service), 2008. Data on the location of properties listed on the National Register of Historic Places. Available online at: http://www.nps.gov/nr/research/

NRCS (U.S. Department of Agriculture, Natural Resources Conservation Service), 2011. Data on soils and soil type. Available online at: http://soildatamart.nrcs.usda.gov/

SDGIS (South Dakota Geographic Information System), 2011. Data on land ownership and jurisdiction. Available online at: http://arcgis.sd.gov/server/sdGIS/Data.aspx

TransCanada, 2009. Final Report, Keystone XL Pipeline, Integrated System Eastern Interconnection Transmission Impacts, Integrated System Network Load Study, May 15.

USACE (U.S. Army Corps of Engineers), 2003. Big Bend Dam/Lake Sharpe Master Plan, Missouri River, South Dakota, Update of Design Memorandum MB-90. October.

U.S. Census Bureau, 2010. Data on roads, railroads, and census landmarks from TIGER database. Available online at: http://www.census.gov/geo/www/tiger/tgrshp2010/tgrshp2010.html

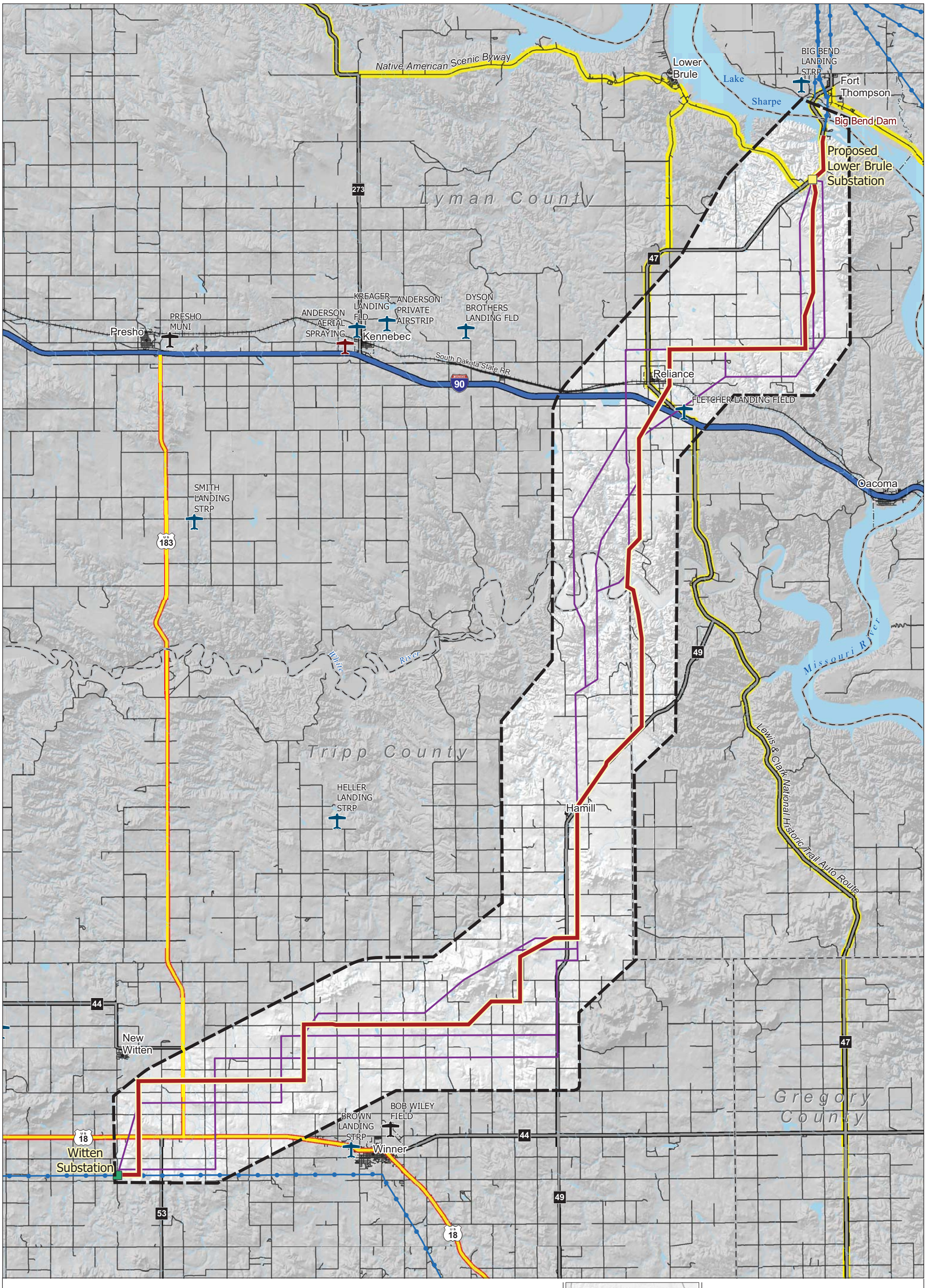
USFWS (U.S. Fish and Wildlife Service), 2010. Data on the location of wetlands in the National Wetlands Inventory. Available online at: http://www.fws.gov/wetlands/Data/DataDownload.html

USGS (U.S. Geological Survey), 1999. National Hydrography Dataset. Data on the locations of streams, rivers, lakes and other water features. Available online at: http://nhd.usgs.gov/

USGS (U.S. Geological Survey), 2001. National Land Cover Dataset. Available online at: http://seamless.usgs.gov/index.php

This page intentionally left blank.

Appendix A—Resource Maps



BIG BEND TO WITTEN TRANSMISSION PROJECT

Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route

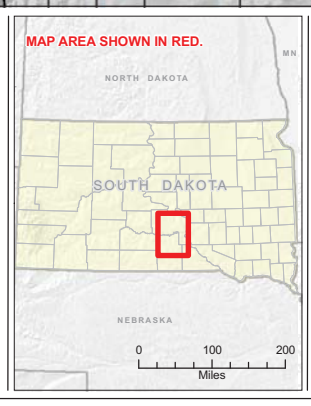
Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Scenic Byway
- Railroad

Airport (BTS)
- Private
- Public

Census Landmarks
- Airport or Airfield

Boundaries
- County Boundary
- Municipal Boundary

Utility System
- Existing Substation
- Proposed Substation
- Transmission Line



TRANSPORTATION

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

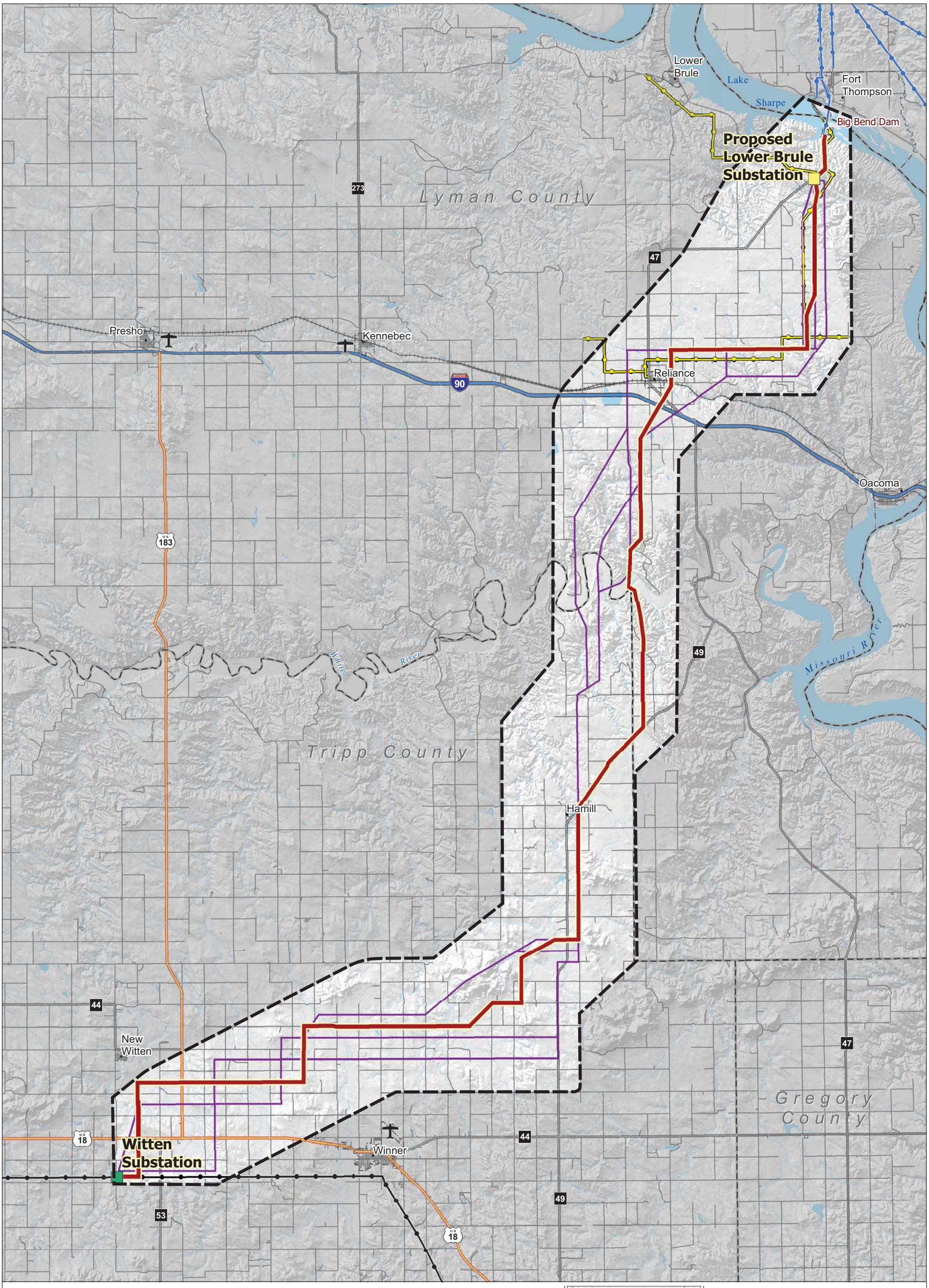
0 2 4
Miles

AECOM
717 17th Street Suite 2600
Denver, CO 80202

File: P:\2011\11180015.01Basin_LB2W\06GIS\6.3Layout\Resource_Maps\110221_Transportation.mxd
Date Modified: February 21, 2011

Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS, NSBP

Figure A-1



BIG BEND TO WITTEN TRANSMISSION PROJECT

Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route

Utility System
- Existing Substation
- Proposed Substation
- 230 kV & Above Transmission Line
- 115 kV Transmission Line
- 69 kV Distribution Line

Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Railroad
- Airport

Boundaries
- County Boundary
- Municipal Boundary

UTILITIES

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

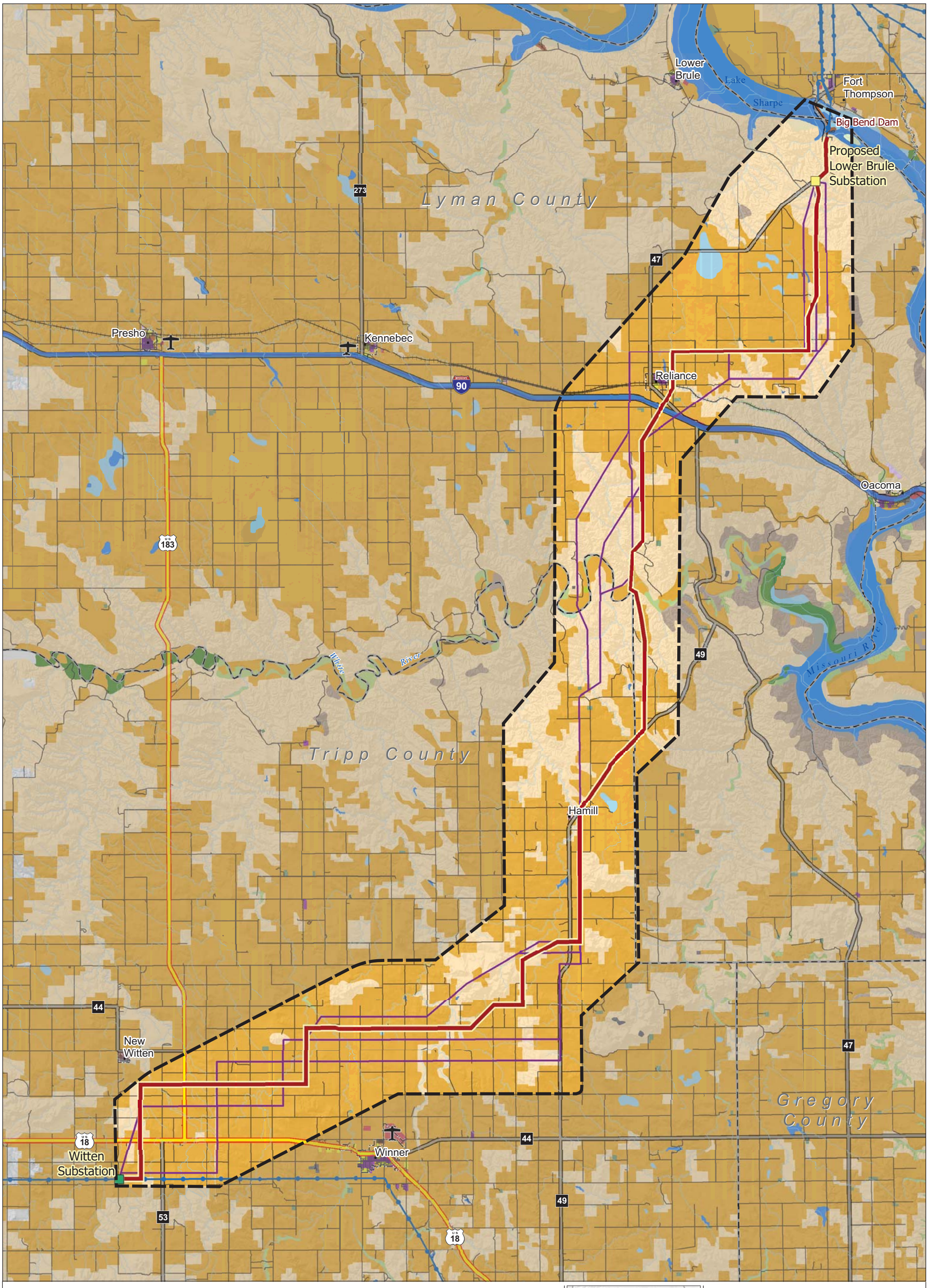
0 2 4
Miles

AECOM
717 17th Street Suite 2600
Denver, CO 80202

Path: P:\2011\111180015.01Basin_LB2W\06GIS\6.3Layout\Resource_Maps\
File: 110222_Utilities.mxd
Date Modified: March 30, 2011

Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS, NSBP

Figure A-2



BIG BEND TO WITTEN TRANSMISSION PROJECT

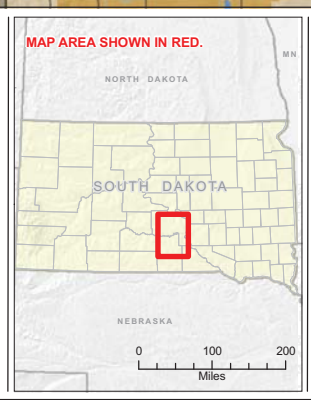
Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route

Land Cover
- Beaches
- Commercial And Services
- Cropland And Pasture
- Deciduous Forest Land
- Herbaceous Rangeland
- Mixed Rangeland
- Mixed Urban Or Built-up
- Nonforested Wetland
- Other Agricultural Land
- Other Urban Or Built-up
- Lake/Reservoir
- Residential
- Shrub & Brush Rangeland
- Strip Mines
- Transportation/ Communication/ Utility
- Center Pivot Irrigation
- Confined Feeding Ops
- Forested Wetland
- Industrial

Boundaries
- County Boundary
- Municipal Boundary

Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Railroad
- Airport

Utility System
- Existing Substation
- Proposed Substation
- Transmission Line



LAND COVER

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

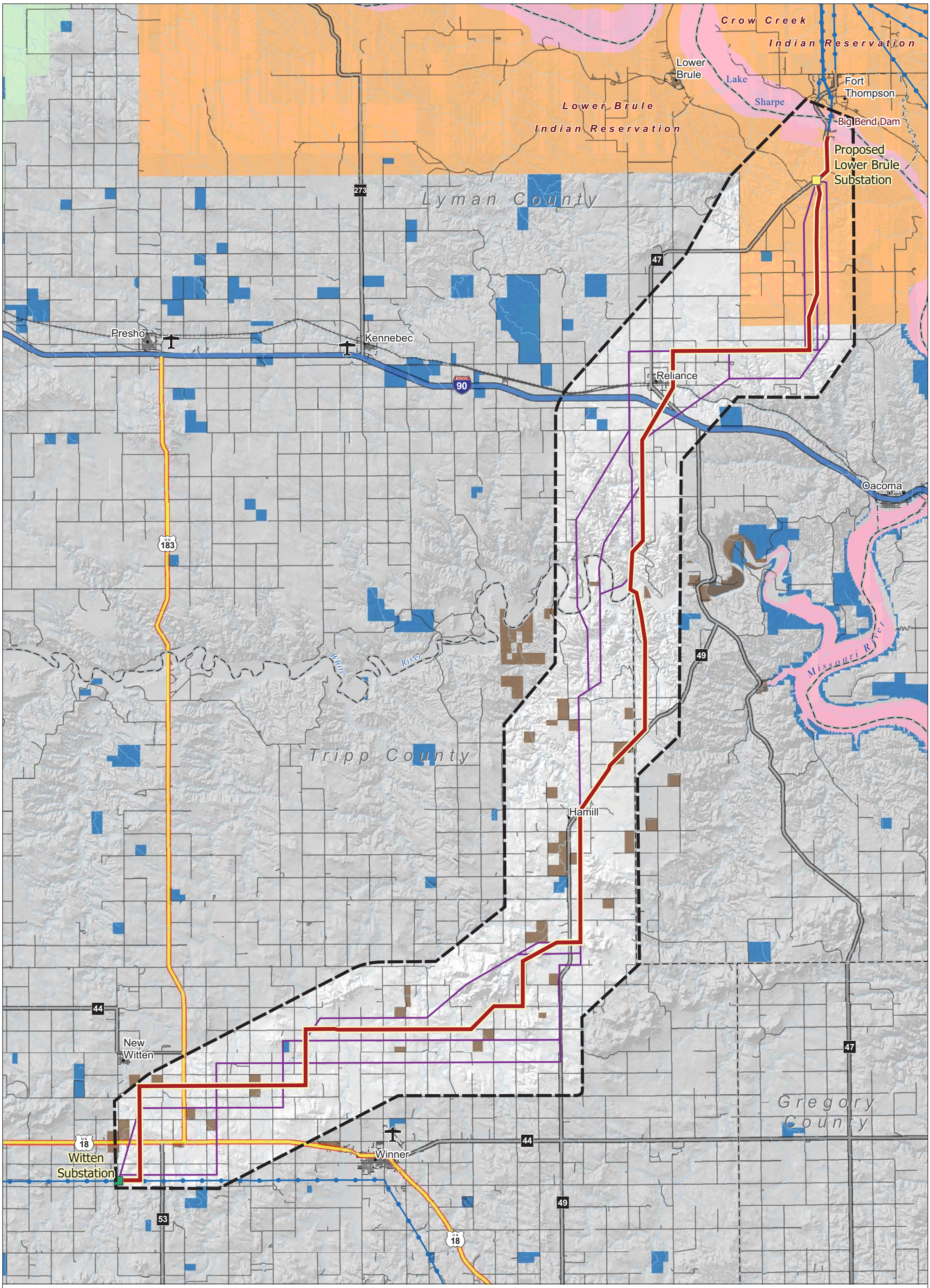
0 2 4
Miles

AECOM
717 17th Street Suite 2600
Denver, CO 80202

File: P:\2011\11180015.01Basin_LB2W\06GIS\6.3Layout\Resource_Maps\110221_Land_Use.mxd
Date Modified: February 22, 2011

Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS, NSBP

Figure A-3



BIG BEND TO WITTEN TRANSMISSION PROJECT

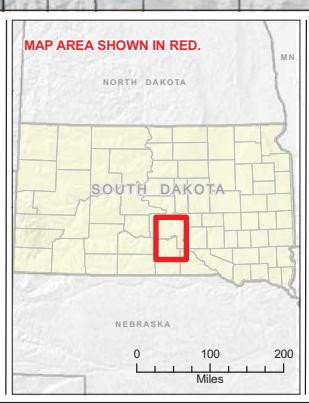
Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route

Jurisdiction
- Municipal
- DOD - Army Corps of Engineers
- BIA - Indian Reservation
- USFS - National Grassland
- State of South Dakota
- Indian Trust Land

Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Railroad
- Airport

Boundaries
- County Boundary

Utility System
- Existing Substation
- Proposed Substation
- Transmission Line



JURISDICTION

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

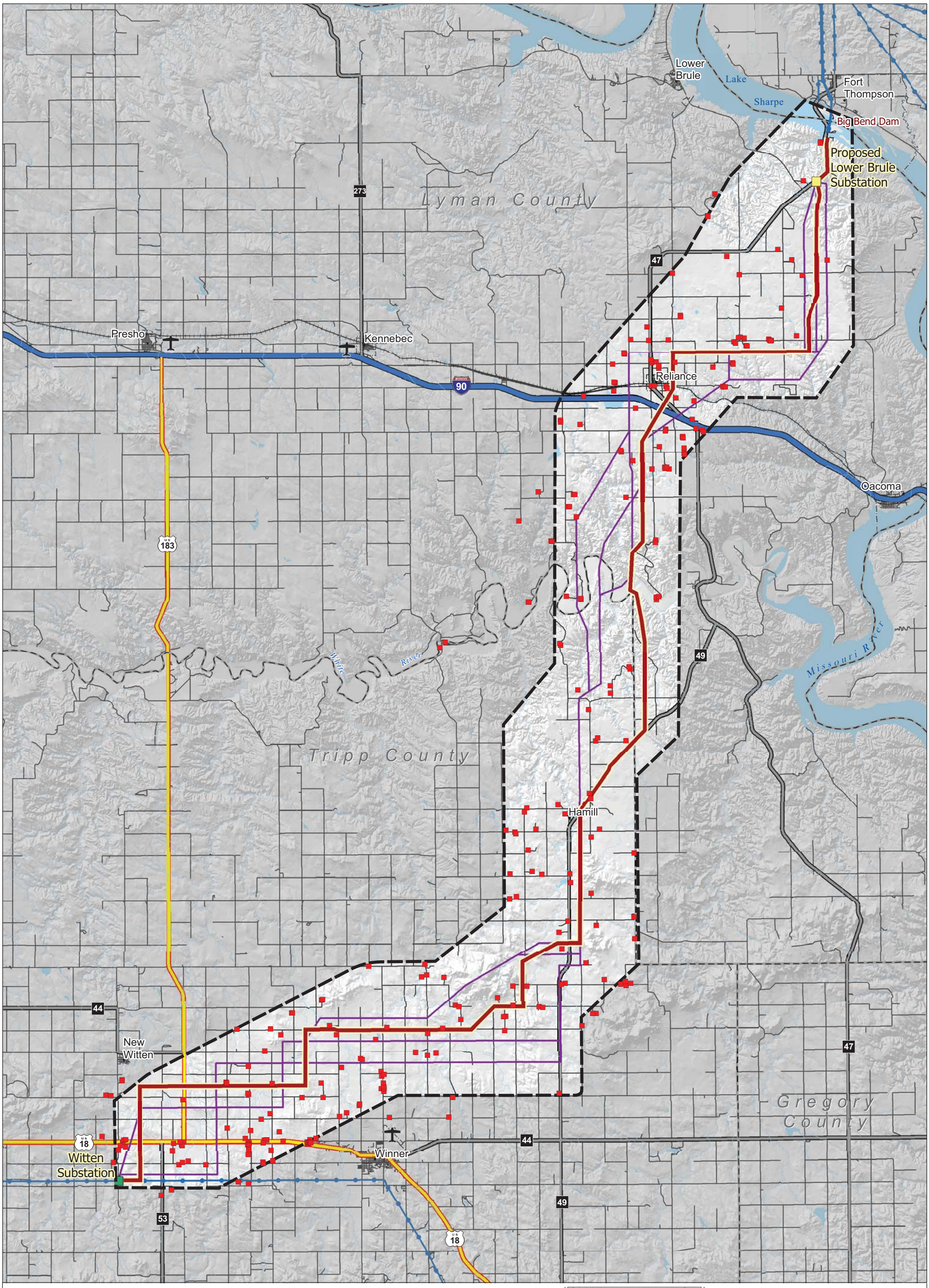
0 2.5 5 Miles

AECOM
717 17th Street Suite 2600
Denver, CO 80202

File: P:\2011\11180015.01Basin_LB2W\06GIS\6.3Layout\Resource_Maps\110222_Jurisdiction.mxd
Date Modified: March 10, 2011

Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS, SDGIS

Figure A-4



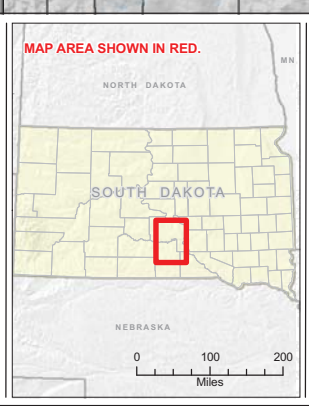
BIG BEND TO WITTEN TRANSMISSION PROJECT

Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route
- Digitized Residence

Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Railroad
- Airport

Boundaries
- County Boundary
- Municipal Boundary

Utility System
- Existing Substation
- Proposed Substation
- Transmission Line



RESIDENCES

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

0 2 4
Miles

AECOM
717 17th Street Suite 2600
Denver, CO 80202

File: P:\2011\11180015.01Basin_LB2W\06GIS\6.3Layout\Resource_Maps\110222_Residences.mxd
Date Modified: February 22, 2011

Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS, NSBP

Figure A-5

Lower Brule
Lake Sharpe
Saint Joseph Cmtry
Fort Thompson
Big Bend Dam
Proposed Lower Brule Substation
Holy Angels Cmtry
Presho
Hillsdale Cmtry
Kennebec Cmtry
Saint Michaels Cmtry
Kennebec
Saint Marys Cmtry
Reliance
Trinity Cmtry
Oacoma
Prairie View Cmtry
Red Hill Cmtry
Missouri River
Hamill
Iona Cmtry
New Witten
Dixon Cmtry
Witten Substation
Winner

BIG BEND TO WITTEN TRANSMISSION PROJECT

Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route

Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Railroad

Boundaries
- County Boundary
- Municipal Boundary

Utility System
- Existing Substation
- Proposed Substation
- Transmission Line

Census Landmarks
- Cemetery
- Hospital/Hospice
- Local Jail
- Place of Worship
- School or Academy
- Landmark Area

MAP AREA SHOWN IN RED.

NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
MN
0 100 200 Miles

CENSUS LANDMARKS

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

0 2.5 5 Miles

AECOM
717 17th Street Suite 2600
Denver, CO 80202

File: P:\2011\11180015.01Basin_LB2W\06GIS\6.3Layout\Resource_Maps\110302_Census.mxd
Date Modified: March 3, 2011
Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS

Figure A-6

BIG BEND TO WITTEN TRANSMISSION PROJECT

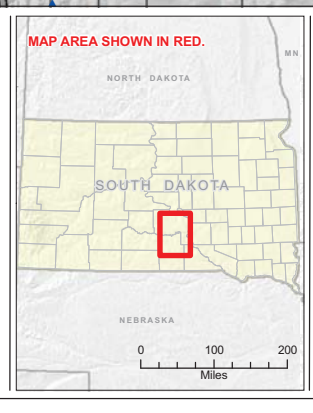
Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route

Boundaries
- County Boundary
- Municipal Boundary

Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Railroad

Utility System
- Existing Substation
- Proposed Substation
- Transmission Line

Communication Structures
- AM
- FM
- ASR
- BRS EBS
- Cellular
- LM BCAST
- LM COMM
- TV NTSC
- LM Private
- MDS ITFS
- Microwave
- Paging
- TV Digital



COMMUNICATION FACILITIES

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

0 2.5 5 Miles

AECOM
717 17th Street Suite 2600
Denver, CO 80202

File: P:\2011\11180015.01Basin_LB2W\06GIS\6.3Layout\Resource_Maps\110224_FCCmxd
Date Modified: February 24, 2011

Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS, FCC

Figure A-7

BIG BEND TO WITTEN TRANSMISSION PROJECT

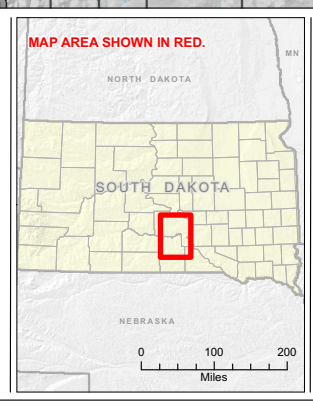
Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route

Class I Cultural Resources
- Bridge
- Structure

Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Railroad
- Airport

Boundaries
- County Boundary
- Municipal Boundary

Utility System
- Existing Substation
- Proposed Substation
- Transmission Line



CULTURAL RESOURCES

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

0 2 4
Miles

717 17th Street Suite 2600
Denver, CO 80202

File: P:\2011\11180015.01Basin_LB2W\06GIS\6.3Layout\Resource_Maps\110301.mxd
Date Modified: March 1, 2011
Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS

Figure A-8

BIG BEND TO WITTEN TRANSMISSION PROJECT

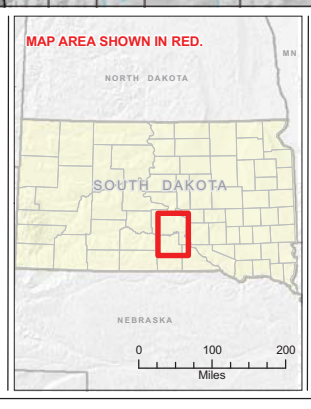
Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route

Hydrology & Wetlands
- Water Body
- Stream/River/Canal
- NWI Wetland

Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Railroad
- Airport

Boundaries
- County Boundary
- Municipal Boundary

Utility System
- Existing Substation
- Proposed Substation
- Transmission Line



HYDROLOGY & WETLANDS

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

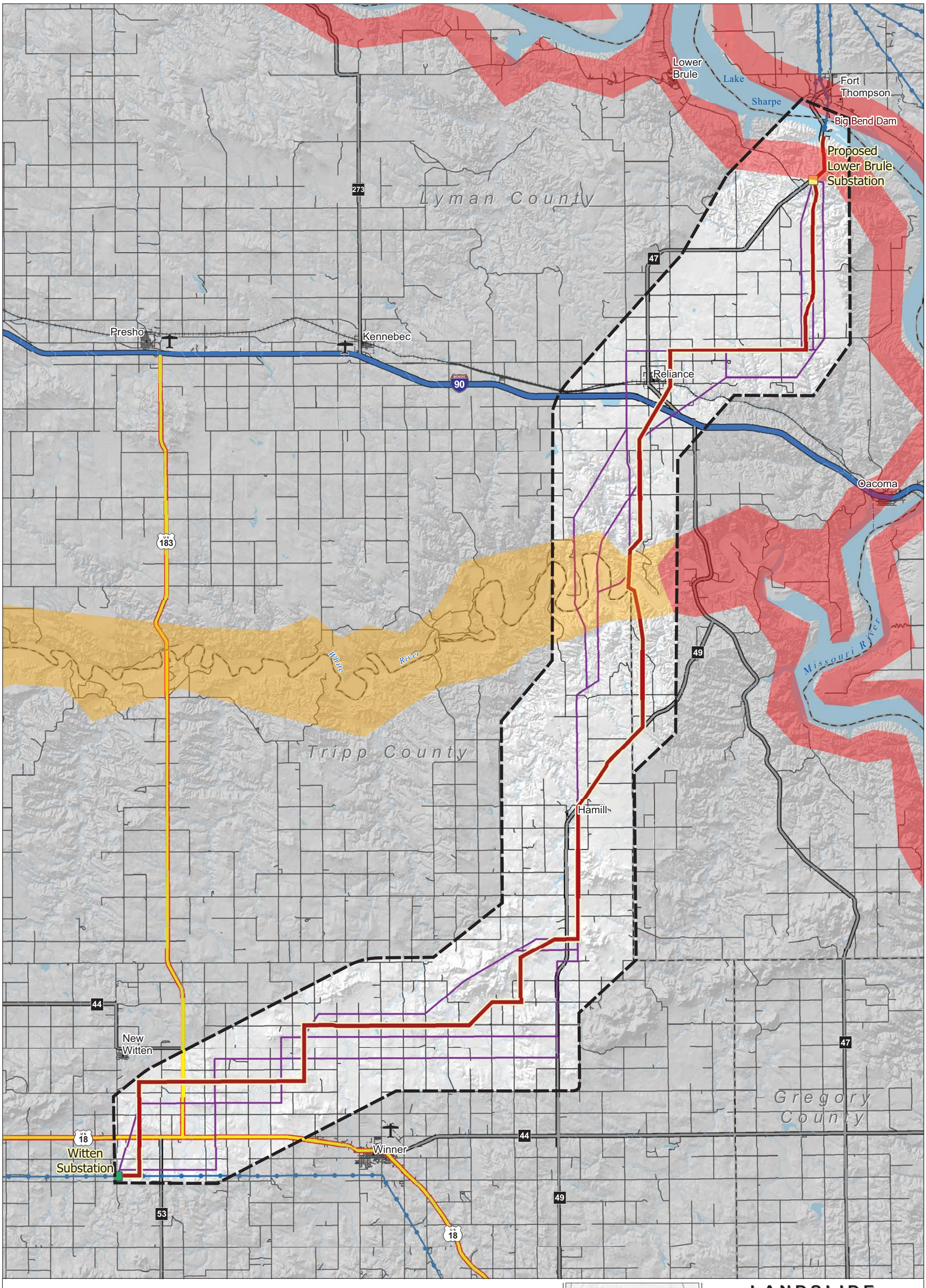
0 2 4
Miles

AECOM
717 17th Street Suite 2600
Denver, CO 80202

File: P:\2011\11180015.01Basin_LB2W\06GIS\6.3Layout\Resource_Maps\110301_NWI_Hydro.mxd
Date Modified: March 1, 2011

Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS, USFWS

Figure A-9



BIG BEND TO WITTEN TRANSMISSION PROJECT

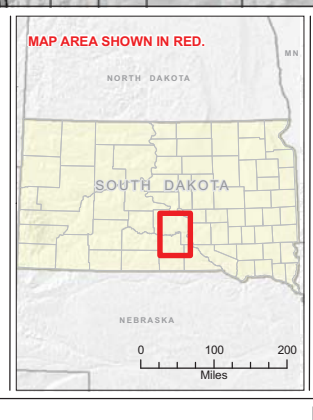
Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route

Landslide Hazard
- High
- Moderate

Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Railroad
- Airport

Boundaries
- County Boundary
- Municipal Boundary

Utility System
- Existing Substation
- Proposed Substation
- Transmission Line



LANDSLIDE HAZARD

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

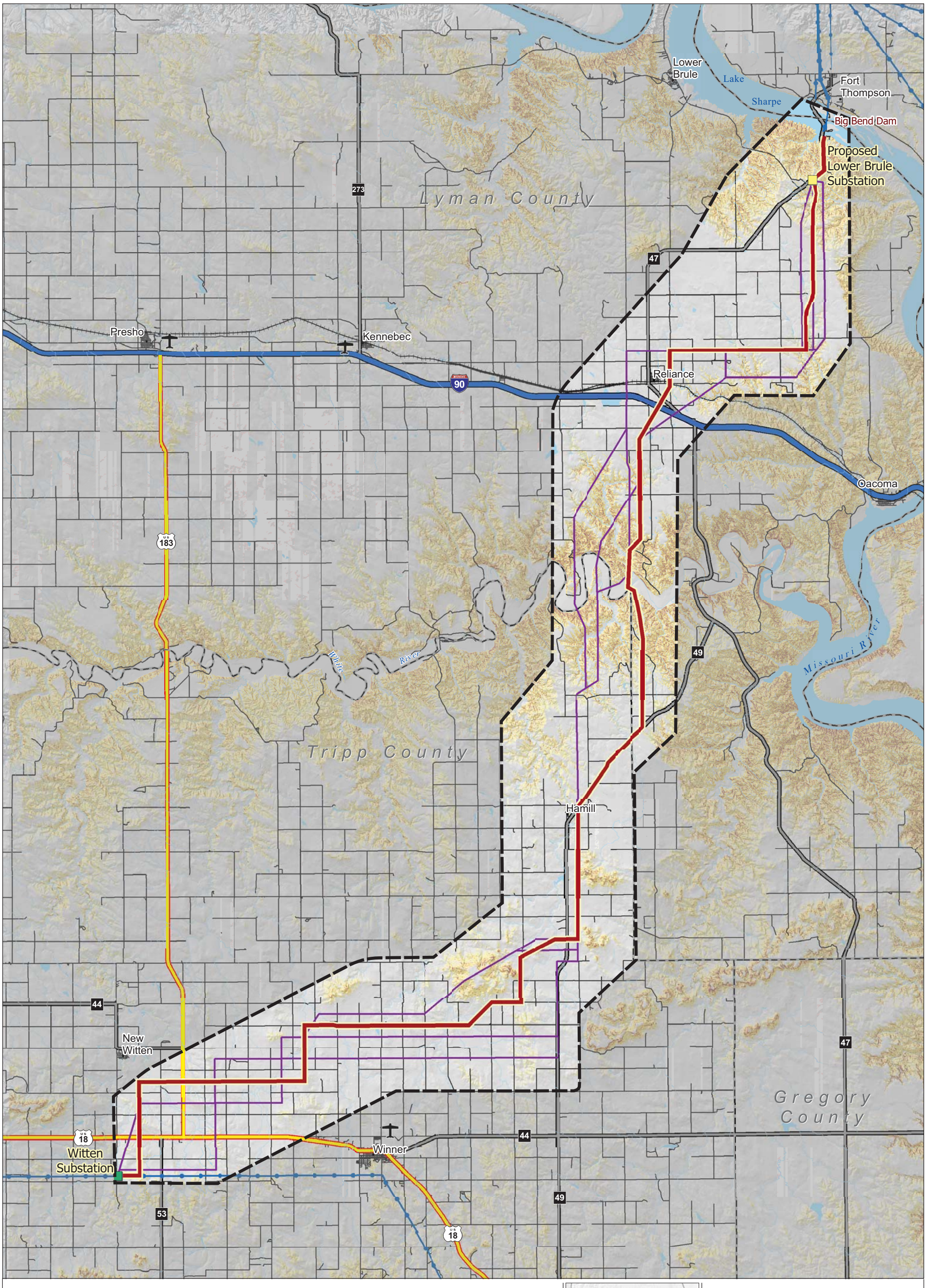
0 2 4
Miles

AECOM
717 17th Street Suite 2600
Denver, CO 80202

File: P:\2011\11180015.01Basin_LB2W\06GIS\6.3Layout\Resource_Maps\Geo_Hazards_110301.mxd
Date Modified: March 1, 2011

Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS, National Atlas

Figure A-10



BIG BEND TO WITTEN TRANSMISSION PROJECT

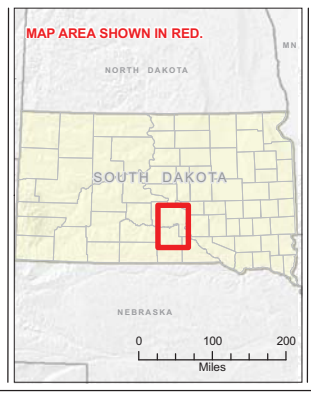
Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route

Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Railroad
- Airport

Boundaries
- County Boundary
- Municipal Boundary

Utility System
- Existing Substation
- Proposed Substation
- Transmission Line

Percent Slope
- 0 - 10%
- 10 - 20%
- 20 - 30%
- >30%



SLOPE

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

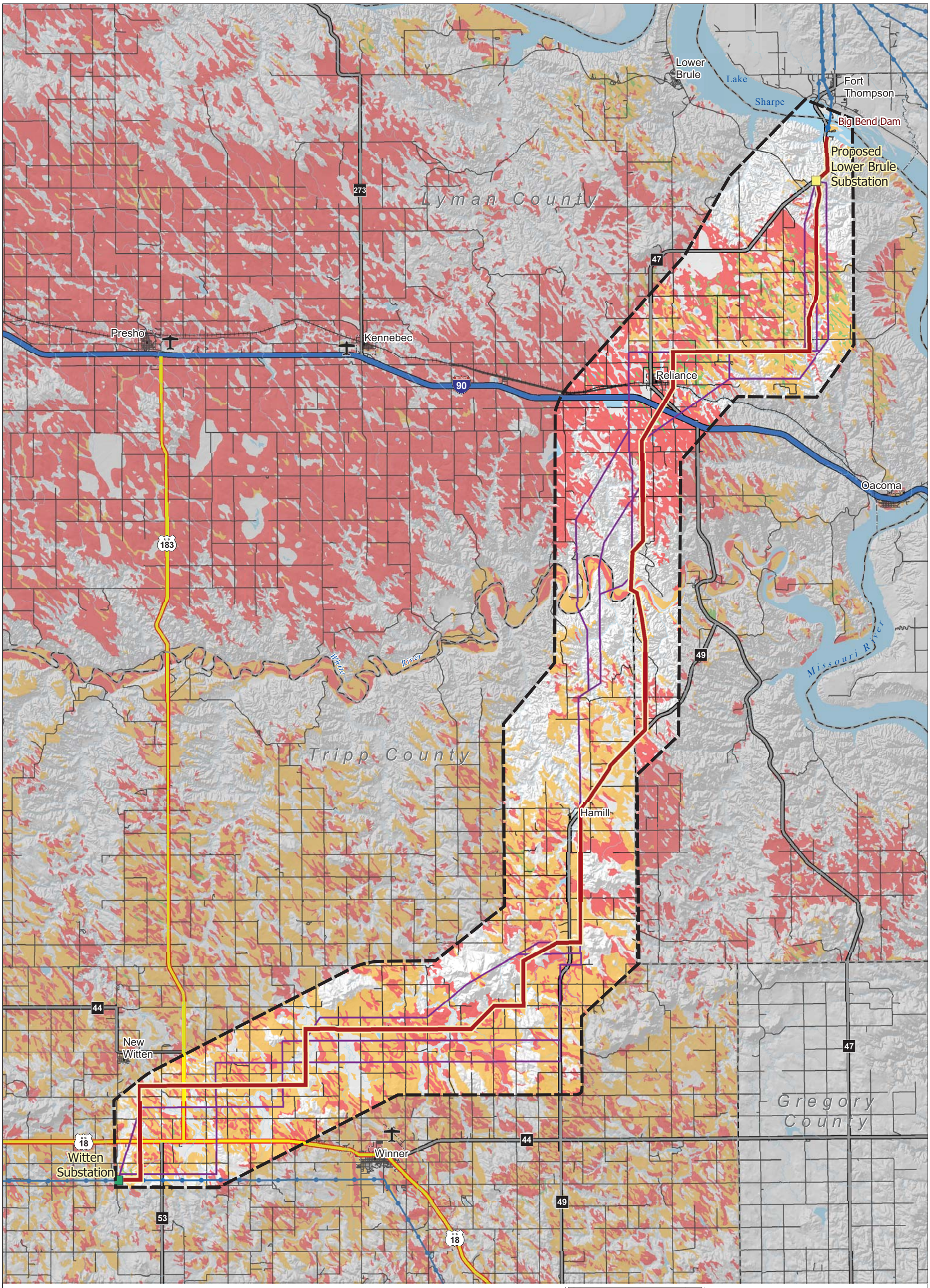
0 2.5 5 Miles

AECOM
717 17th Street Suite 2600
Denver, CO 80202

File: P:\2011\11180015.01Basin_LB2W\06GIS\6.3Layout\Resource_Maps\110224_Slope.mxd
Date Modified: March 9, 2011

Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS

Figure A-11



BIG BEND TO WITTEN TRANSMISSION PROJECT

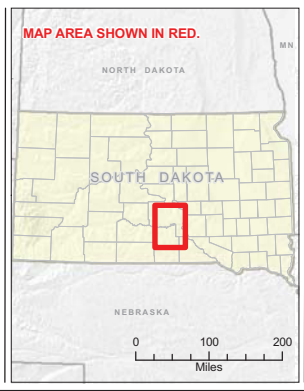
Project Features
- Project Study Area
- Preferred Transmission Route
- Alternative Route

Important Farmland
- Prime farmland
- Farmland of Statewide Importance
- Prime Farmland if Irrigated

Transportation
- Interstate
- US Highway
- State Highway
- Other Road
- Railroad
- Airport

Boundaries
- County Boundary
- Municipal Boundary

Utility System
- Existing Substation
- Proposed Substation
- Transmission Line



IMPORTANT FARMLAND

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

0 2 4
Miles

AECOM
717 17th Street Suite 2600
Denver, CO 80202

File: P:\2011\11180015.01Basin_LB2W\06GIS\6.3Layout\Resource_Maps\110301_Prime_Farmland.mxd
Date Modified: March 1, 2011

Projection: NAD 1983 State Plane, South Dakota South, Feet
Data Sources: ESRI, BTS, US Census, Basin, USGS, NRCS

Figure A-12