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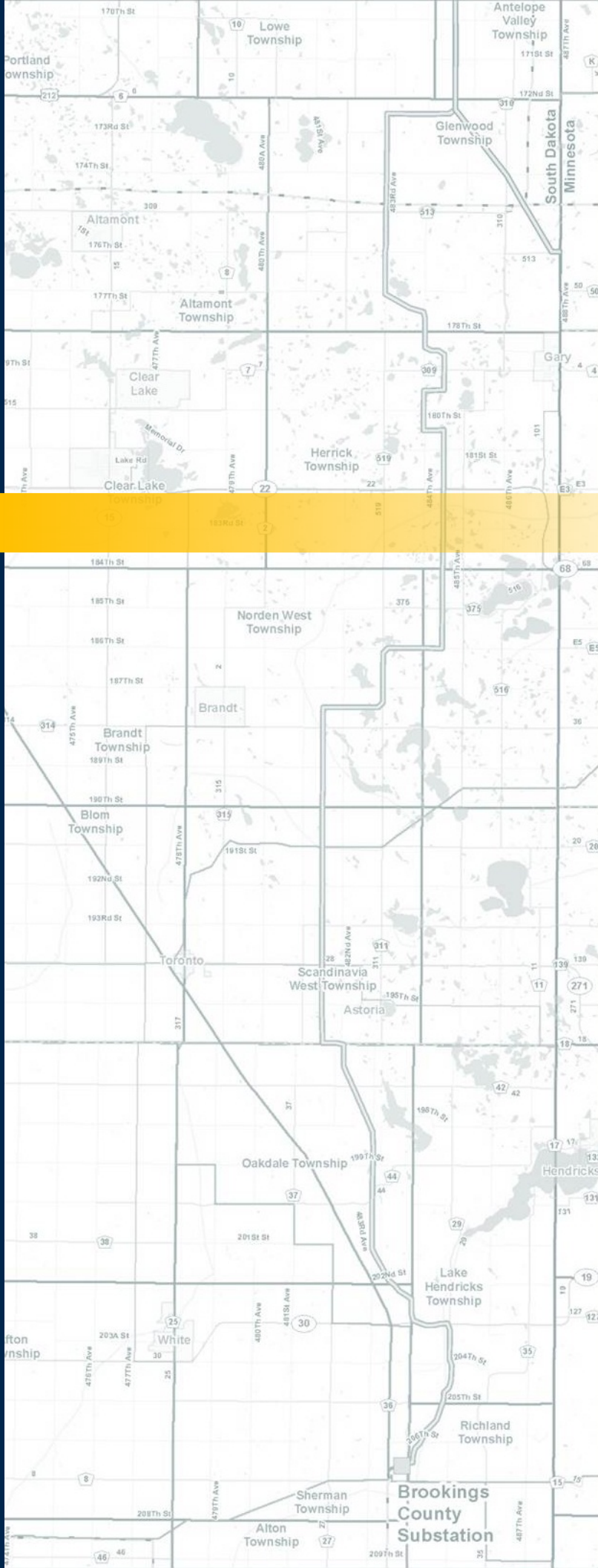
Application to the South Dakota Public Utilities Commission for a Facility Permit for the Big Stone South to Brookings County 345 kV Transmission Line Project

May 31, 2013

VOLUME 1 OF 1



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COMPLETENESS CHECKLIST

The contents required for an application with the Public Utilities Commission of the State of South Dakota ("Commission") are described in South Dakota Codified Law ("SDCL") 49-1-8 and further clarified in Administrative Rules of South Dakota ("ARSD") 20:10:13:01(1) et seq. The Commission submittal requirements are listed with cross-references indicating where the information can be found in this Application.

Table 1. Completeness Checklist

SDCL	ARDS	Required Information	Location
49-41B-11(1)	20:10:22:06	Names of participants required. The application shall contain the name, address, and telephone number of all persons participating in the proposed facility at the time of filing, as well as the names of any individuals authorized to receive communications relating to the application on behalf of those persons.	2.0
49-41B-11(7)	20:10:22:07	Name of owner and manager. The application shall contain a complete description of the current and proposed rights of ownership of the proposed facility. It shall also contain the name of the project manager of the proposed facility.	3.0
49-41B-11(8)	20:10:22:08	Purpose of facility. The applicant shall describe the purpose of the proposed facility.	4.0
49-41B-11(12)	20:10:22:09	Estimated cost of facility. The applicant shall describe the estimated construction cost of the proposed facility.	5.0
49-41B-11(9)	20:10:22:10	Demand for facility. The applicant shall provide a description of present and estimated consumer demand and estimated future energy needs of those customers to be directly served by the proposed facility. The applicant shall also provide data, data sources, assumptions, forecast methods or models, or other reasoning upon which the description is based. This statement shall also include information on the relative contribution to any power or energy distribution network or pool that the proposed facility is projected to supply and a statement on the consequences of delay or termination of the construction of the facility.	4.0, 6.0
49-41 B-11	20:10:22:11	General site description. The application shall contain a general site description of the proposed facility including a description of the specific site and its location with respect to state, county, and other political subdivisions; a map showing prominent features such as cities, lakes and rivers; and maps showing cemeteries, places of historical significance, transportation facilities, or other public facilities adjacent to or abutting the plant or transmission site.	7.0
49-41B-11(6), 49-41B-21, 34A-9-7(4)	20:10:22:12	Alternative sites. The applicant shall present information related to its selection of the proposed site for the facility, including the following: (1) The general criteria used to select alternative sites, how these criteria were measured	8.0

SDCL	ARDS	Required Information	Location
		and weighed, and reasons for selecting these criteria; (2) An evaluation of alternative sites considered by the applicant for the facility; (3) An evaluation of the proposed plant or transmission site and its advantages over the other alternative sites considered by the applicant, including a discussion of the extent to which reliance upon eminent domain powers could be reduced by use of an alternative site, alternative generation method, or alternative waste handling method.	
49-41B-11(11); 49-41B-21; 49-41B-22	20:10:22:13	Environmental information. The applicant shall provide a description of the existing environment at the time of the submission of the application, estimates of changes in the existing environment which are anticipated to result from construction and operation of the proposed facility, and identification of irreversible changes which are anticipated to remain beyond the operating lifetime of the facility. The environmental effects shall be calculated to reveal and assess demonstrated or suspected hazards to the health and welfare of human, plant and animal communities which may be cumulative or synergistic consequences of siting the proposed facility in combination with any operating energy conversion facilities, existing or under construction. The applicant shall provide a list of other major industrial facilities under regulation which may have an adverse effect of the environment as a result of their construction or operation in the transmission site or siting area.	9.0
49-41B-11; 49-41B-22	20:10:22:14	Effect on physical environment. The applicant shall provide information describing the effect of the proposed facility on the physical environment. The information shall include: (1) A written description of the regional land forms surrounding the proposed plant site or through which the transmission facility will pass; (2) A topographic map of the transmission site or siting area; (3) A written summary of the geological features of the siting area or transmission site using the topographic map as a base showing the bedrock geology and surficial geology with sufficient cross-sections to depict the major subsurface variations in the siting area; (4) A description and location of economic deposits such as lignite, sand and gravel, scoria, and industrial and ceramic quality clay existent within the plan or transmission site; (5) A description of the soil type at the plant site; (6) An analysis of potential erosion or sedimentation which may result from site clearing, construction, or operating activities and measures which will be taken for their control; (7) Information on areas of seismic risks, subsidence potential and slope instability for the siting area or transmission site; and (8) An analysis of any constraints that may be imposed by geological characteristics on the design, construction, or operation of the proposed facility and a	10.0

SDCL	ARDS	Required Information	Location
		description of plans to offset such constraints.	
49-41B-11; 49-41B-21; 49-41B-22	20:10:22:15	Hydrology. The applicant shall provide information concerning the hydrology in the area of the proposed plant or transmission site and the effect of the proposed site on surface and groundwater. The information shall include: (1) A map drawn to scale of the plant or transmission site showing surface water drainage patterns before and anticipated patterns after construction of the facility; (2) Using plans filed with any local, state, or federal agencies, indication on a map drawn to scale of the current planned water uses by communities, agriculture, recreation, fish, and wildlife which may be affected by the location of the proposed facility and a summary of those effects; (3) A map drawn to scale locating any known surface or groundwater supplies within the siting area to be used as a water source or a direct water discharge site for the proposed facility and all offsite pipelines or channels required for water transmission; (4) If aquifers are to be used as a source of potable water supply or process water, specifications of the aquifers to be used and definition of their characteristics, including the capacity of the aquifer to yield water, the estimated recharge rate, and the quality of ground water; (5) A description of designs for storage, reprocessing, and cooling prior to discharge of heated water entering natural drainage systems; (6) If deep well injection is to be used for effluent disposal, a description of the reservoir storage capacity, rate of injection, and confinement characteristics and potential negative effects on any aquifers and groundwater users which may be affected.	11.0
49-41B-11; 49-41B-21; 49-41B-22	20:10:22:16	Effect on terrestrial ecosystems. The applicant shall provide information on the effect of the proposed facility on the terrestrial ecosystems, including existing information resulting from biological surveys conducted to identify and quantify the terrestrial fauna and flora potentially affected within the transmission site or siting area; an analysis of the impact of construction and operation of the proposed facility on the terrestrial biotic environment, including breeding times and places and pathways of migration; important species; and planned measures to ameliorate negative biological impacts as a result of construction and operation of the proposed facility.	12.0
49-41B-11; 49-41B-21; 49-41B-22	20:10:22:17	Effect of aquatic ecosystems. The applicant shall provide information of the effect of the proposed facility on aquatic ecosystems, and including existing information resulting from biological surveys conducted to identify and quantify the aquatic fauna and flora, potentially affected within the transmission site or siting area, an analysis of the impact of the construction and operation	13.0

SDCL	ARDS	Required Information	Location
		of the proposed facility on the total aquatic biotic environment and planned measures to ameliorate negative biological impacts as a result of construction and operation of the proposed facility.	
49-41B-11 49-41B-22	20:10:22:18	Land use. The applicant shall provide the following information concerning present and anticipated use or condition of the land: (1) A map or maps drawn to scale of the siting area and transmission site identifying existing land use according to the following classification system: (a) Land used primarily for row and non-row crops in rotation; (b) Irrigated lands; (c) Pasturelands and rangelands; (d) Haylands; (e) Undisturbed native grasslands; (f) Existing and potential extractive nonrenewable resources; (g) Other major industries; (h) Rural residences and farmsteads, family farms, and ranches; (i) Residential; (j) Public, commercial, and institutional use; (k) Municipal water supply and water sources for organized rural water districts; and (l) Noise sensitive land uses; (2) Identification of the number of persons and homes which will be displaced by the location of the proposed facility; (3) An analysis of the compatibility of the proposed facility with present land use of the surrounding area, with special attention paid to the effects on rural life and the business of farming; and (4) A general analysis of the effects of the proposed facility and associated facilities on land uses and the planned measures to ameliorate adverse impacts.	14.0
49-41B-11	20:10:22:19	Local land use controls. The applicant shall provide a general description of local land use controls and the manner in which the proposed facility will comply with the local land use zoning or building rules, regulations or ordinances. If the proposed facility violates local land use controls, the applicant shall provide the commission with a detailed explanation of the reasons why the proposed facility should preempt the local controls. The explanation shall include a detailed description of the restrictiveness of the local controls in view of existing technology, factors of cost, economics, needs of parties, or any additional information to aid the commission in determining whether a permit may supersede or preempt a local control pursuant to SDCL 49-41B-28.	15.0
49-41B-11	20:10:22:20	Water quality. The applicant shall provide evidence that the proposed facility will comply with all water quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.	16.0
49-41B-11; 49-41B-21; 49-41B-22	20:10:22:21	Air quality. The applicant shall provide evidence that the proposed facility will comply with all air quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.	17.0
49-41B-11(3)	20:10:22:22	Time schedule. The applicant shall provide estimated time schedules for accomplishment of major events in the	18.0

SDCL	ARDS	Required Information	Location
		commencement and duration of construction of the proposed facility.	
49-41B-11(3); 49-41B-22	20:10:22:23	Community impact. The applicant shall include an identification and analysis of the effects the construction, operation, and maintenance of the proposed facility will have on the anticipated affected area including the following: (1) A forecast of the impact on commercial and industrial sectors, housing, land values, labor market, health facilities, energy, sewage and water, solid waste management facilities, fire protection, law enforcement, recreational facilities, schools, transportation facilities, and other community and government facilities or services; (2) A forecast of the immediate and long-range impact of property and other taxes of the affected taxing jurisdictions; (3) A forecast of the impact on agricultural production and uses; (4) A forecast of the impact on population, income, occupational distribution, and integration and cohesion of communities; (5) A forecast of the impact on transportation facilities; (6) A forecast of the impact on landmarks and cultural resources of historic, religious, archaeological, scenic, natural, or other cultural significance. The information shall include the applicants' plans to coordinate with the local and state office of disaster services in the event of accidental release of contaminants from the proposed facility; and (7) An indication of means of ameliorating negative social impact of the facility development.	19.0
49-41B-11	20:10:22:24	Employment estimates. The application shall contain the estimated number of jobs and a description of job classifications, together with the estimated annual employment expenditures of the applicants, the contractors, and the subcontractors during the construction phase of the proposed facility. In a separate tabulation, the application shall contain the same data with respect to the operating life of the proposed facility, to be made for the first ten years of commercial operation in one-year intervals. The application shall include plans of the applicant for utilization and training of the available labor force in South Dakota by categories of special skills required. There shall also be an assessment of the adequacy of local manpower to meet temporary and permanent labor requirements during construction and operation of the proposed facility and the estimated percentage that will remain within the county and the township in which the facility is located after construction is completed.	20.0
49-41B-11(5)	20:10:22:25	Future additions and modifications. The applicant shall describe any plans for future modification or expansion of the proposed facility or construction of additional facilities which the applicant may wish to be approved in the permit.	21.0

SDCL	ARDS	Required Information	Location
49-41B-11	20:10:22:34	Transmission facility layout and construction. If a transmission facility is proposed, the applicant shall submit a policy statement concerning the route clearing, construction and landscaping operations, and a description of plans for continued right-of-way maintenance, including stabilization and weed control.	22.0
49-41B-11	20:10:22:35.	Information concerning transmission facilities. If a transmission facility is proposed, the applicant shall provide the following information as it becomes available to the applicant: (1) Configuration of the towers and poles, including material, overall height and width; (2) Conductor configuration and size, length of span between structures, and number of circuits per pole or tower; (3) The proposed transmission site and major alternatives as depicted on overhead photographs and land use culture maps; (4) Reliability and safety; (5) Right-of-way or condemnation requirements; (6) Necessary clearing activities; and (7) If the transmission facility is placed underground, the depth of burial, distance between access points, conductor configuration and size, and number of circuits.	23.0
49-41B-7; 49-41B-22	20:10:22:36.	Additional information in application. The applicant shall also submit as part of its application any additional information necessary to meet the burden of proof specified in SDCL 49-41B-22.	24.0
49-41B-11	20:10:22:39.	Testimony and exhibits. Upon the filing of an application pursuant to SDCL 49- 41B-11, an applicant shall also file all data, exhibits, and related testimony which the applicant intends to submit in support of its application. The application shall specifically show the witnesses supporting the information contained in the application. Such filing will be made consistent with the prehearing conference order.	25.0

1.0 EXECUTIVE SUMMARY

Northern States Power Company, a Minnesota Corporation ("Xcel Energy") and Otter Tail Power Company ("Otter Tail Power"), jointly the "Applicants", submit this application for a Facility Permit ("Application") to the Public Utilities Commission of the State of South Dakota ("Commission") pursuant to South Dakota Codified Law ("SDCL") § 49-41B-1 to construct the southern portion of the Big Stone South to Brookings County 345 kilovolt ("kV") electric transmission line.

This Application requests approval for elements of the Big Stone South to Brookings County 345 kV transmission line project. Portions of the Big Stone South to Brookings County project were previously approved and are therefore excluded from this Application. The elements for which approval is requested are hereafter referred to as the "Project" and consist of the following:

- Construction of an approximately 43-mile 345 kV transmission line; and
- Modifications at the existing Brookings County substation.

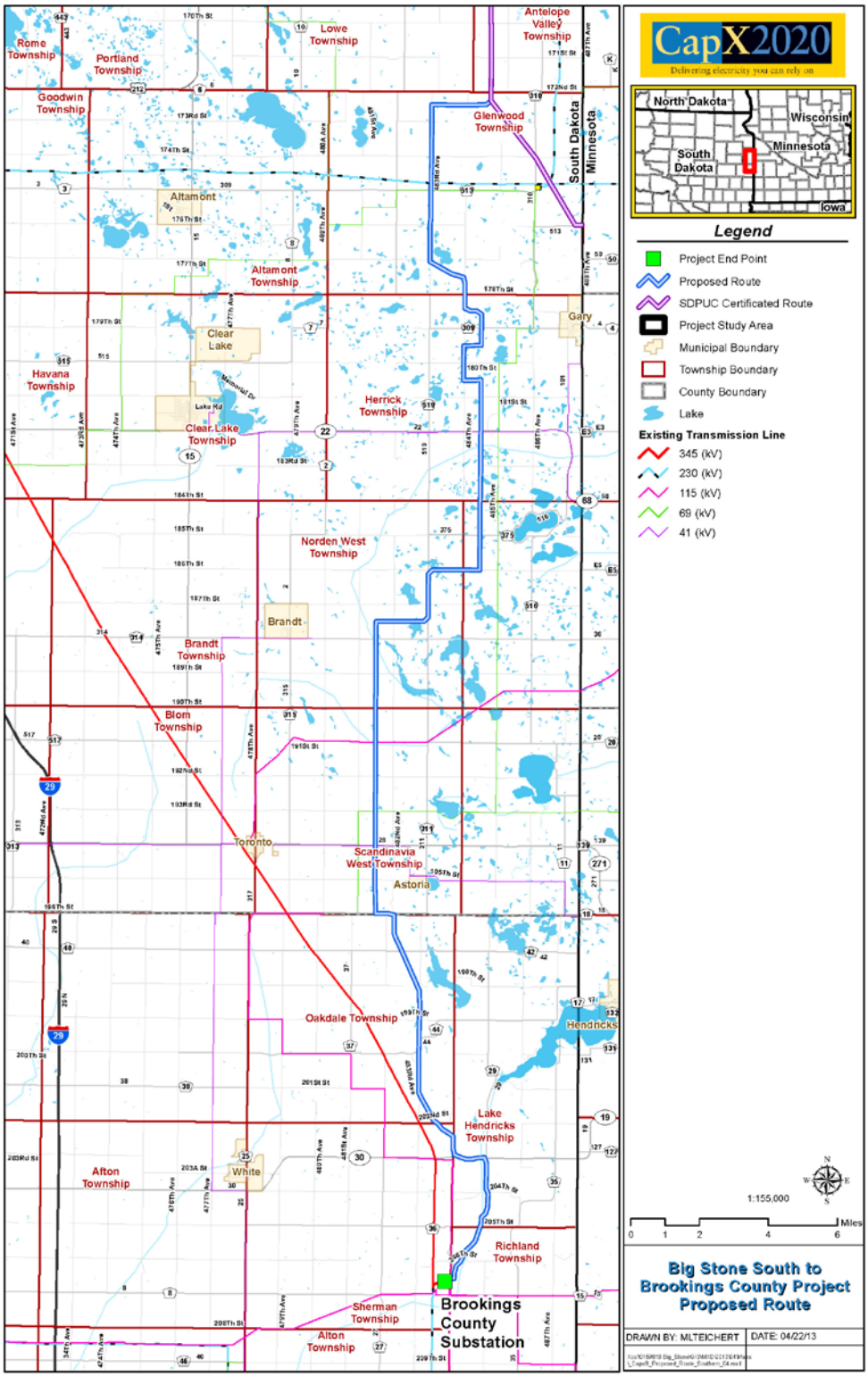
The Commission granted a permit for the northern portion of the Big Stone South to Brookings County project, on January 16, 2007 (see Docket EL06-002).

In a separate proceeding (see Docket EL12-063), the Commission certified that the northern portion of the Big Stone South to Brookings County 345 kV transmission line (approximately 33 miles), two 1.5-mile 230 kV transmission lines and the Big Stone South substation continue to meet the conditions upon which the 2007 permit was granted. The Commission approved this certification at their public meeting on April 9, 2013.

On December 7, 2011, the Midcontinent Independent System Operator ("MISO") approved a transmission expansion plan for the construction of a portfolio of Multi-Value Projects (MVPs). In total, the MVPs represent 17 electric transmission projects across the Midwest designed to reduce the wholesale cost of energy delivery for the consumers across MISO by enabling the delivery of low cost generation to load, reducing congestion costs, and increasing system reliability. One of the 17 approved projects is a 70-mile project between the Big Stone Plant substation and Xcel Energy's Brookings County substation, referred to as the Big Stone South to Brookings County project. On February 23, 2012, the Applicants gave notice to the Commission that they intend to jointly construct and operate the proposed 345 kV line.

The southern portion of the Big Stone South to Brookings County project subject to this Application is approximately 43 miles of single circuit 345 kV line extending generally south from a point northeast of Altamont, South Dakota in Deuel County to the Brookings County substation (hereafter referred to as the "Proposed Route"). The Proposed Route is depicted on Figure 1.

Figure 1. Proposed Route



The Applicants estimate that the facilities to be constructed in South Dakota as part of this Application will cost approximately $109 million in 2017 dollars. The Project is anticipated to be in service in 2017.

In this Application, the Applicants have addressed all those matters set forth in SDCL Chapter 49-41B and in Administrative Rules of South Dakota ("ARSD") Chapter 20:10:22 (entitled Energy Facility Siting Rules). Included with this Application is a Completeness Checklist (Table 1) that sets forth where in the Application each requirement of the rules is addressed.

Pursuant to SDCL § 49-41B-22, the information presented herein establishes that:

1. The proposed transmission line facilities comply with all applicable laws and rules;
2. The facilities will not pose a threat of serious injury to the environment or to the social and economic condition of inhabitants in the study area;
3. The facilities will not substantially impair the health, safety, or welfare of the inhabitants; and
4. The facilities will not unduly interfere with the orderly development of the region, giving consideration to the views of the governing bodies of the local affected units of government.

2.0 NAMES OF PARTICIPANTS (ARSD § 20:10:22:06)

The Applicants for the proposed Project are further defined below.

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3.0 NAME OF OWNER AND MANAGER (ARSD § 20:10:22:07)

Collectively the Applicants provide electrical energy and related services to wholesale and retail residential, commercial, and industrial customers in Minnesota, North Dakota, South Dakota, and Wisconsin.

The Applicants anticipate owning the proposed facilities in the proportions shown in Table 2.

Table 2. Applicants Ownership Interest in Proposed Route facilities

Applicants	Percentage of Ownership	
	345 kV Transmission Line	Brookings Substation
Xcel Energy	50	100
Otter Tail Power Company	50	0
Total	100	100

4.0 PURPOSE OF THE TRANSMISSION FACILITY (ARSD § 20:10:22:08)

On December 7, 2011, MISO approved a transmission expansion plan for the construction of Multi-Value Projects (MVPs). In total, MVPs represent 17 electric transmission projects across the Midwest designed to reduce the wholesale cost of energy delivery for the consumers across MISO by enabling the delivery of low cost generation to load, reducing congestion costs, and increasing system reliability. One of the approved projects is a 70-mile project between the Big Stone substation and Xcel Energy's Brookings County substation, now referred to as the Big Stone South to Brookings County project.

The Big Stone South to Brookings County project is part of the MISO Multi-Value Project ("MVP") portfolio. The MVP portfolio is planned to provide multiple benefits to the overall transmission system, such as reducing system losses, planning reserves, operating reserves, wind generation investment, and transmission investment.

The proposed Big Stone South to Brookings County project would provide transmission for additional generating resources such as wind farms that would be built in the Dakotas.

5.0 ESTIMATED COST OF FACILITY (ARSD § 20:10:22:09)

The estimated costs of the Project included in this Application are projected to be approximately $109 million. Table 3 provides a breakdown of estimated transmission and substation modification costs.

Table 3. Project Costs

Project Component	Ownership	Total Cost
Transmission Line and Easements – Single Circuit (Proposed Route – 43 miles)	Otter Tail Power and Xcel Energy	$99,000,000
Brookings County Substation	Xcel Energy	$9,720,000
Cost for Project		$108,720,000

6.0 DEMAND FOR TRANSMISSION FACILITY (ARSD § 20:10:22:10)

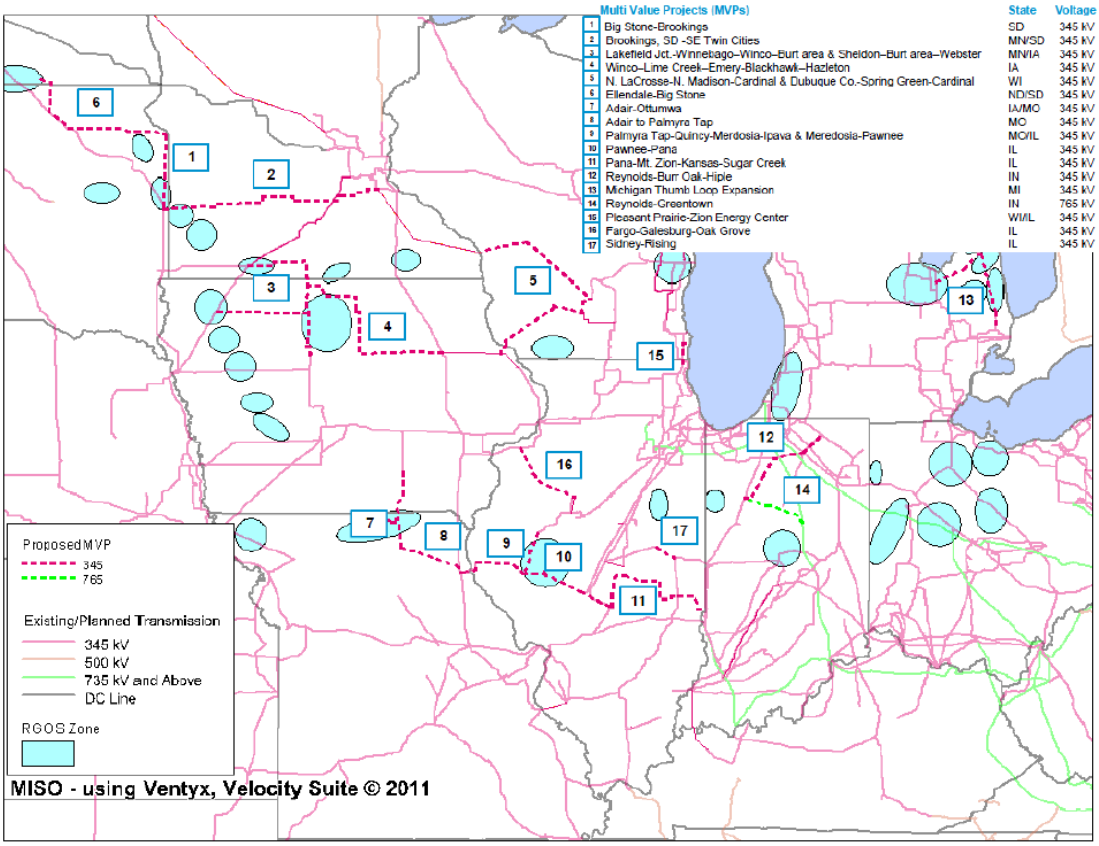
MISO is a not-for-profit, member-based organization administering wholesale electricity markets (see generally www.midwestiso.org). Xcel Energy and Otter Tail Power are members of MISO. The Big Stone South to Brookings County project is part of the MISO's Multi-Value Project ("MVP") portfolio, a regionally-planned portfolio of transmission projects supported by significant research and analysis. The MISO transmission planning report supporting the Big Stone South to Brookings County project is at https://www.midwestiso.org/Library/Repository/Study/MTEP/MTEP11/MTEP11%20Report.pdf

The Applicants have participated in MISO's transmission planning efforts that have identified the MVPs and concur with MISO's planning report as it pertains to the Big Stone South to Brookings County project.

On December 7, 2011, the MISO Board of Directors approved a regional transmission plan for the construction of a portfolio of Multi-Value Projects (MVPs). In total, the MVPs represent 17 electric transmission projects across the Midwest designed to reduce the

wholesale cost of energy delivery for the consumers across MISO by enabling the delivery of low cost generation to load, reducing congestion costs, and increasing system reliability. The proposed Project is part of the Big Stone South to Brookings County project, a MISO approved MVP as shown below labeled as Project #1.

Figure 2. MISO Multi-Value Projects



7.0 GENERAL SITE DESCRIPTION (ARSD § 20:10:22:11)

The Proposed Route extends generally south from a point northeast of Altamont, South Dakota in Deuel County (along the route certificated in Docket EL06-002 and subject to recertification in Docket EL12-063) to Brookings County substation. Appendix A provides detailed maps of the Proposed Route.

The proposed 345 kV transmission line would be located within a 150-foot-wide right-of-way. The Proposed Route parallels some roadways, section lines, and property lines. The Applicants' preferred structure type at this time is single-pole self-weathering or galvanized steel structures that will range in height between 110 and 180 feet with an approximate

range of span length between 600 and 1,200 feet depending on site-specific considerations. There may be site-specific conditions where specialty structures, such as structures having a reduced height, or multiple pole structures will be required.

Modifications to the Brookings County substation include modification of bus work, addition of support structures, circuit breakers, switches, and monitoring instrumentation. To provide voltage dampening during light loading, a shunt reactor will be installed on the existing 345-115-13.8 kV transformer. These modifications will occur within the existing fenced area of the substation. Existing transmission lines may be reconfigured outside the substation to accommodate the new 345 kV line into the substation.

8.0 ALTERNATIVE SITES (ARSD § 20:10:22:12)

8.1 ROUTE SELECTION PROCESS

The development and selection of the Proposed Route was based on a multi-faceted approach in which the Applicants considered state and federal requirements, public comments received at pre-filing public meetings, and extensive analysis of appropriate environmental data. The Proposed Route is depicted in detail on maps provided in Appendix A.

The Applicants began their analysis of potential route options by collecting Geographic Information System ("GIS") data from local, state, and federal agencies. The Applicants used this data and input received from the public as a result of open houses and meetings facilitated by the Applicants to develop an initial base map of "opportunities" and "sensitivities". Sensitivities include environmental features that may affect route location, permitting and/or timing or means of construction. The Applicants developed a "route corridor study area" that encompassed the general location of the Proposed Route. Next, the Applicants studied various iterations of route options within this study area – having evaluated options adjacent to roadways, section lines, field lines (based on a review of high resolution aerial photography), or existing utility corridors that could potentially be used for a transmission line route.

Roadways, section lines, and existing utility corridors were considered "opportunities" for the new transmission line as typically locating a new linear facility along these existing linear facilities provides for some impacts to be reduced – whether those impacts be, for example, proximity to existing homes, impacts to existing agricultural uses or impacts associated with

construction access. The various route options were then comparatively evaluated with consideration of the general factors listed below.

The factors that were analyzed in the route selection process include the following:

- Minimizing impacts to humans and human settlements, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services;
- Following existing right-of-way (roadway or other utility right-of-way) or close to property and/or section lines;
- Minimizing effects on archaeological and historic resources;
- Avoiding impacts to rare or endangered species and unique natural resources;
- Minimizing the total length;
- Avoiding airports or other land use conflicts; and
- Applying design options that maximize energy efficiencies, mitigate adverse environmental effects, and accommodate expansion of transmission or generating capacity.

The Applicants have addressed all those matters set forth in SDCL Chapter 49-41B and in ARSD chapter 20:11:22 (entitled Energy Facility Siting Rules). Pursuant to SDCL 49-41B-22, the information contained in this Application establishes that:

1. The proposed transmission line complies with all applicable laws and rules;
2. The proposed transmission line will not pose a threat of serious injury to the environment or to the social and economic condition of inhabitants in the siting area;
3. The proposed transmission line will not substantially impair the health, safety, or welfare of the inhabitants; and
4. The proposed transmission line will not unduly interfere with the orderly development of the region, giving consideration to the view of the government bodies of the local affected units of government.

8.1.1 Public Meetings

To introduce the Project, the Applicants met with local and state officials in May and June 2012, including Deuel and Brookings County representatives, as well as electric co-ops and media outlets. To identify a southern route between an area north of Gary and the Brookings County substation, the Applicants implemented an extensive communications and public outreach strategy.

Between May and December 2012, the Applicants hosted eight public meetings (Clear Lake, Gary, and White), placed newspaper ads in local papers, produced fact sheets and other information materials, and mailed four Project update direct mail pieces to a list of several thousand landowners, local officials, and media outlets in Grant, Deuel, and Brookings counties. The direct mail pieces went out in June, August, October, and December 2012.

The proposed 43-mile route that runs between an area north of Gary to the Brookings County substation was presented to local governments, state legislators, landowners, and other stakeholders in December 2012. Right-of-way agents began contacting landowners along the route in January 2013. These contacts continue to the present time resulting in option agreements for 88 percent (as of May 24th) of the parcels along the Proposed Route.

8.2 PROPOSED ROUTE

Appendix A provides detailed maps of the Proposed Route. The Proposed Route parallels roads for approximately 28 percent of the route and section lines for approximately 47 percent of the route.

9.0 ENVIRONMENTAL INFORMATION (ARSD § 20:10:22:13)

Sections 10 through 17 provide a description of the existing environment during the preparation of the Application, estimates of changes in the existing environment which are anticipated to result from construction and operation of the proposed transmission line, and irreversible changes that are anticipated to remain beyond the operating lifetime of the proposed transmission line.

10.0 EFFECT ON PHYSICAL ENVIRONMENT (ARSD § 20:10:22:14)

10.1 PHYSICAL ENVIRONMENT (GEOLOGY, ECONOMIC DEPOSITS, AND SOILS)

10.1.1 Geology

The Project lies within the Northern Glaciated Plains ecoregion; more specifically, it lies within the Prairie Coteau, Big Sioux Basin, and the Prairie Coteau Escarpment ecoregion sections. The Northern Glaciated Plains regional landscape historically was dominated by grasslands; however, it has been primarily converted to farmland. The recent glacial nature of most of the Northern Glaciated Plains' land forms contributes heavily to the land covers and uses found in the ecoregion. Drift plains, large glacial lake basins, and shallow river valleys, with level to undulating surfaces and deep soils, provide the basis for crop agriculture. The Northern Glaciated Plains ecoregion is characterized by a flat to gently rolling landscape composed of glacial drift.

The Prairie Coteau is the result of stagnant glacial ice melting beneath a sediment layer. The tightly undulating, hummocky landscape has no drainage pattern and it is perforated with closely spaced semipermanent and seasonal wetlands. The Prairie Coteau includes a chain of large lakes that were formed where there was little ice shear and higher precipitation levels that allowed widespread burr oak woodlands near wetland margins. The Prairie Coteau is glacial till over Cretaceous shale.

The Prairie Coteau Escarpment, though small, is a distinctive ecosystem, rising 300 to 600 feet in elevation from the Minnesota River valley to the brow of the Prairie Coteau. The elevation, broken topography, and sufficient precipitation favor dense deciduous forest growth in riparian areas. Cool, perennial streams flow off the escarpment, providing habitats and oxygenated water not found elsewhere in eastern South Dakota. The Prairie Coteau Escarpment is thin glacial till over Cretaceous limey shale (Niobrara Formation).

The Big Sioux Basin is a trough penetrating the core of the Prairie Coteau. Its topography was affected by pre-Wisconsinan glaciation; later advances of the Wisconsin glacier diverged around the basin. In contrast to the neighboring Prairie Coteau, the basin has a well-developed drainage network. There is more tilled land in the Big Sioux Basin due to the relative paucity of wetlands and the gentler topography. The Big Sioux Basin is glacial till over Cretaceous Pierre shale.

10.1.2 Economic Deposits

Aggregate sites along the Proposed Route were identified by aerial photographs. Governmental database listings of sites were not available at the time of the preparation of this Application. Based on a review of aerial photographs, one aggregate site is located along the Proposed Route in Section 8 of Township 111N, Range 47W. The continued expansion of the mined areas is unknown. No other aggregate sites were identified within one mile of the Proposed Route.

10.1.3 Soils

Buse-Langhei complex with 15 to 40 percent slopes (approximately nine percent), Forman-Aastad loams with one to six percent slopes (approximately seven percent), and Barnes-Svea loams with one to six percent slopes (approximately six percent) comprise the three dominant soil types in the Project area.

Prime farmland soils, as defined by the U.S. Department of Agriculture, Natural Resource Conservation Service ("NRCS"), are soils "that [have] the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops." The soils require an adequate moisture supply (through precipitation and irrigation), a sufficient growing season, acceptable levels of acidity or alkalinity, and adequate permeability to water and air to produce high crop yields with minimal consumption of energy and economic resources and minimal damage to the environment as a result of farming. Approximately 40 percent of the Proposed Route traverses soil that is listed as prime farmland; approximately 12 percent of the soil crossed is listed as prime farmland if drained and less than one percent of the soil is listed as prime farmland if irrigated.

The NRCS also states that farmland of statewide importance "is land other than prime farmland or unique farmland but that is also highly productive." Approximately 11 percent of the Proposed Route is considered farmland of statewide importance.

Hydric soils "are soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part. They make up part of the criteria for the identification of wetlands". Approximately four percent of the Proposed Route crosses hydric soils, while 95 percent of the Proposed Route crosses partially hydric soils. The remaining one percent crosses soils that are not hydric.

10.1.4 Seismic Risks

The seismic activity in South Dakota, especially in the eastern portions of the state, is fairly low. No earthquakes were recorded in Deuel or Brookings counties between 1872 and 2012.

10.2 IMPACTS AND MITIGATION

The Deuel and Brookings County digital soil survey data does not contain information regarding the potential for erosion or sedimentation associated with specific soil series. In general, areas with steep slopes, dry soils and/or minimal vegetative cover are at the greatest risk of erosion. Along the Proposed Route, the potential for erosion is highest along steep stream banks of creeks and rivers and their tributaries.

The potential for erosion near Crow Creek, Monighan Creek, West Branch Lac qui Parle River, Cobb Creek, and Deer Creek during construction will be minimized because construction equipment will not cross the creeks or river. In addition, construction plans will be developed to keep equipment away from these areas. Best management practices, such

as sediment fences and prompt revegetation within steep areas, will be implemented to minimize erosion and sedimentation resulting from construction of the proposed transmission line. Specific plans to address these issues will be developed prior to construction, based on the locations of the structures and access roads.

11.0 HYDROLOGY (ARSD § 20:10:22:15)

11.1 SURFACE WATER AND GROUNDWATER RESOURCES, FLOODPLAINS

11.1.1 Surface Water Resources

The Proposed Route crosses one major water resource region, the Missouri Region (watershed), as defined by the U.S. Geological Survey ("USGS"), which ultimately drains into the Gulf of Mexico. Appendix B provides detailed maps of surface water resources along the Proposed Route.

Within this major watershed region, two smaller watersheds, or cataloging units are crossed. These are denoted by 8-digit Hydrologic Unit Codes ("HUC"). Table 4 contains a list of the 8-digit Hydrologic Unit Code watersheds crossed by the Proposed Route.

Table 4. Watersheds (8-digit HUC) Crossed by the Proposed Route

Watershed Name	Hydrologic Unit Code (8-digit)	Crossing Length (Miles)
Upper Big Sioux	10170202	None
Lac qui Parle	07020003	None

The Upper Big Sioux watershed drains approximately 383 square miles of watershed in portions of Minnesota and South Dakota to the Big Sioux River, which is a tributary of the Missouri River.

The Lac qui Parle watershed drains approximately 1,156 square miles of watershed in portions of Minnesota and South Dakota and is part of the Minnesota River Basin, which is a tributary of the Mississippi River.

Approximately 37 miles of the Proposed Route is located within the Lac qui Parle watershed and approximately six miles of the Proposed Route is located within the Upper Big Sioux watershed.

Within the Upper Big Sioux watershed, the Proposed Route crosses one of this watershed's main tributaries, Deer Creek. Deer Creek flows southwest to its confluence with the Big Sioux River. The Proposed Route crosses several other headwater tributaries within this watershed. Within the Lac qui Parle watershed where the surface water drains east toward the Lac qui Parle River, the Proposed Route crosses three major tributaries and many smaller tributaries within this watershed. The three major tributaries include Cobb Creek, West Branch of the Lac qui Parle River, and Crow Creek.

11.1.2 Groundwater Resources

Construction of the Proposed Route will not require any groundwater for consumption. Some low quantity dewatering may be required when structure foundations are installed in high water table areas. These activities will have no impact on either municipal or private water along the Proposed Route.

11.1.3 Floodplains

Approximately 22 acres of Federal Emergency Management Agency (FEMA) designated floodplains occur along the Proposed Route. The majority of floodplains occur where the Proposed Route parallels Deer Creek near the Brookings County substation. Impacts to floodplain storage capacity will be negligible due to the long spans between transmission structures and the relatively small volume of foundation material used at the structures.

11.2 IMPACTS AND MITIGATION

The Applicants will implement standard best management practices for sedimentation and erosion control measures. The Applicants will maintain sound water and soil conservation practices during construction of the Project to minimize soil erosion and protect topsoil and adjacent water resources. These measures include silt fencing, slope breaks, containment of excavated material, protecting exposed soil, and stabilizing restored soil. These measures will be used to minimize erosion and sedimentation impacts to adjacent water resources. Construction will be completed in accordance with all permit requirements or conditions. Other mitigation measures specific to surface waters, such as wetlands, are discussed in section 13.0.

12.0 EFFECT ON TERRESTRIAL ECOSYSTEMS (ARSD § 20:10:22:16)

12.1 TERRESTRIAL ECOSYSTEMS

The Project lies within the Northern Glaciated Plains ecoregion as previously discussed in Section 10.1.

12.1.1 Flora

Pre-settlement vegetation within the area surrounding the Proposed Route likely exhibited primarily tallgrass prairie species including big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), and prairie dropseed (*Sporobolus curtipendula*). Bluejoint grass (*Calamagrostis canadensis*), prairie cordgrass (*Spartina pectinata*), sedges (*Carex sp*.), and rushes (*Juncus sp.)* likely occurred within wet prairies. Historical forested areas would have generally been limited to river floodplain corridors that consisted of silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*) and American elm (*Ulmus americana*) trees and dense willow (*Salix sp.*) stands within the floodplain.

The Northern Glaciated Plains regional landscape historically was dominated by grasslands; however, it has been primarily converted to farmland.

Today, flora along most of the Proposed Route is typical of that normally found in an agricultural setting. The majority of the Proposed Route parallels existing rights-of-way, including roads, and is also often adjacent to cultivated row crops or pastureland.

12.1.2 Fauna

Common wildlife species found within the regional area include large and small mammals, songbirds, waterfowl, raptors, fish, reptiles, amphibians, mussels, and insects. Wildlife along the Proposed Route consists of both resident and migratory species which use the area habitat for forage, shelter, breeding, or as a stopover during migration. Common animal species having widespread occurrences within the Northern Glaciated Plains ecoregion include the red and gray fox, coyote, striped skunk, long-tailed weasel, mule deer, and white-tailed deer. Marshy areas provide habitat for meadow voles, muskrats, the least weasel, mink, and several bird species, including waterfowl.

12.1.3 Sensitive Terrestrial Species

While there are various protected species that have the potential to occur within proximity to the Proposed Route, only those species listed in Table 5 were raised as species of interest by the U.S. Fish and Wildlife Service (“USFWS”) and the South Dakota Department of Game, Fish and Parks (“SDGFP”). However, not all of the species listed below are known to occur immediately near or along the Proposed Route.

Table 5. Species of Interest along the Proposed Route

Common Name	Scientific Name	Protected Status
Birds		
Bald eagle	*Haliaeetus leucocephalus*	State threatened
Osprey	*Pandion haliaetus*	State threatened
Plants		
Western prairie fringed orchid	*Platanthera praeclara*	Federal threatened
Invertebrates		
Dakota skipper	*Hesperia dacotae*	Federal candidate
Poweshiek skipperling	*Oarisma Poweshiek*	Federal candidate
Regal fritillary	*Speyeria idalia*	Not listed

12.1.4 Sensitive Management Areas and Conservation Easements

Designated habitat or conservation areas include managed areas such as state game production areas, conservation easements, and waterfowl production areas. While several of these areas occur within proximity to the Proposed Route, the Proposed Route only crosses two wetland conservation easements.

12.2 IMPACTS AND MITIGATION

12.2.1 Flora

Given that the vegetation communities that occur along the Proposed Route are regularly disturbed, mostly through livestock grazing or other agricultural uses, impacts due to construction are not anticipated to substantially disrupt vegetative community quality or function. The Applicants will span areas containing native plant communities wherever possible or practicable. The Applicants will also work to avoid and minimize direct impacts on habitat and conservation areas to the extent feasible.

Temporary impacts to flora will take place most intensively at structure locations. Temporary impacts up to one acre per pole are estimated. Tree removal for access roads and staging areas will be limited to only trees necessary to permit the passage of equipment. The Applicants will make use of existing access to the maximum extent feasible in an effort to reduce the potential for temporary flora impacts. Once construction is complete, temporary access routes will be removed, and the area will be restored and seeded to stabilize the soil.

Additionally, permanent vegetative changes will take place in wooded areas within the right-of-way, including forested wetlands as discussed further below. Trees and shrubs that may interfere with maintenance and the safe operation of the transmission line will be removed and will not be allowed to re-establish within the right-of-way. Typically,

vegetation is controlled mechanically or with herbicides on a regular maintenance schedule. Vegetation that does not interfere with the safe operation of the transmission line will be allowed to re-establish within the right-of-way after construction, unless dictated within other permits.

12.2.2 Fauna

Raptors, waterfowl, and other bird species may be affected by the construction and placement of the proposed Project. Waterfowl typically are more susceptible to transmission line collision, especially if the transmission line is placed between agricultural fields that serve as feeding areas and wetlands or open water, which serve as resting areas. In these areas, it is likely that waterfowl will be traveling between different habitats, potentially increasing the likelihood of conflicts with the transmission line. Because of the high density of birds in such nesting sites, disturbance to the site has the potential to impact individuals. However, species' reproductive success is not likely to be impacted. Further, the larger size (diameter) of transmission conductors makes them more visible to avian species than distribution lines.

Transmission line design standards for 345 kV lines provide adequate spacing to eliminate the risk of raptor electrocution. As such, electrocution is not a concern related to this Project. The Applicants will address avian issues at waterbody crossings and other areas of concern along the entire Big Stone South to Brookings County project by working with the appropriate agencies to identify any areas along the route that may require marking the proposed transmission line, such as with the use of bird flight diverters, in an effort to reduce the likelihood of collisions. Both Otter Tail Power and Xcel Energy have prepared Avian Protection Plans (APPs) for their system-wide facilities. These plans include the following elements:

- Provide APP training to employees;
- Document problem nests, bird injuries, and mortalities;
- Use of raptor-safe standards for new lines; and
- Retrofit of existing lines to minimize risk to birds.

There is potential for the displacement of wildlife and loss of habitat from construction of the Project. Wildlife could be impacted in the short-term within the immediate area of construction. The distance that animals will be displaced will depend on the species. Moreover, these animals will be typical of those found in agricultural and urban settings and will not incur population level effects due to construction.

Habitat fragmentation could be caused by a transmission line bisecting habitats, particularly native grasslands. The bisecting of native grasslands was raised as an item of concern by the USFWS and the SDGFP. However, because the proposed Project will not represent a physical barrier to movement and mostly follows existing linear features, fragmentation effects will be minimal as a result of this Project. Additionally, the Applicants intend to make use of existing access to the maximum extent feasible to reduce the potential for impact to grasslands and other habitats.

12.2.3 Sensitive Terrestrial Species

As presented above in Table 5, various species of interest were identified by the U.S. Fish and Wildlife Service and the South Dakota Department of Game, Fish and Parks as it relates to the Proposed Route. Where possible, impacts to these species will be avoided or reduced, to the extent feasible, by selective placement of poles, spanning any identified sensitive areas, and optimizing the use of existing access.

12.2.4 Sensitive Management Areas and Conservation Easements

As discussed in previous sections, the Applicants have routed the proposed Project such that only two known sensitive areas, namely two wetland conservation easements, may be affected. Impacts in these areas will be avoided or reduced, to the extent feasible, by selective placement of poles and optimizing the use of existing access.

In addition, the Applicants will implement best management practices to maintain sound water and soil conservation practices during construction of the Project to minimize soil erosion, and protect topsoil and adjacent water resources. These measures may include the implementation of silt fencing, slope breaks, containment of excavated material, protecting exposed soil, and stabilizing restored soil. Construction will be completed in accordance with all permit requirements or conditions. Potential impacts and mitigation measures specific to wetlands are discussed in Section 13.2.

13.0 EFFECT ON AQUATIC ECOSYSTEMS (ARSD § 20:10:22:17)

13.1 AQUATIC ECOSYSTEMS

13.1.1 Wetlands

Wetlands along the Proposed Route vary according to hydrology, soils, and the vegetative community occurring within the wetland. Wetlands along the Proposed Route consist of palustrine, riverine, and lacustrine wetlands in order of abundance. Palustrine wetlands are generally depressional areas that consist of forested, scrub-shrub, and emergent

(herbaceous vegetation) varying from saturated to permanently flooded basins. Riverine wetlands are associated with riparian systems, along rivers, streams, and natural drainages along the route. Lacustrine wetlands are generally associated with open water habitat, such as lakes and ponds, but in order to be considered a wetland they must be less than two meters deep. Table 6 includes a summary of data pertaining to National Wetland Inventory ("NWI") wetlands crossed by the Proposed Route.

The primary aquatic ecosystems along the Proposed Route are the tributaries, drainages, and associated wetlands to Cobb Creek, West Branch of the Lac qui Parle River, and Crow Creek. The most common wetland type crossed by the Proposed Route is palustrine emergent ("PEM") wetland, which vary from temporarily flooded potholes to expansive cattail marshes and saturated wet meadows. Overall, palustrine wetlands occur along approximately five percent of the Proposed Route, consisting of almost five percent palustrine emergent, less than one percent palustrine forested ("PFO"), and less than one percent palustrine unconsolidated bottom ("PUB").

Table 6. Wetlands Crossed by the Proposed Route

Wetland Type	Total Wetlands	
	Count	Percent of Proposed Route
PEM	96	5
PFO	2	<1
PSS	0	0
PUB	6	<1
Riverine	0	0
Lacustrine	0	0
Total	104	5

13.1.2 Sensitive Aquatic Species

While there are various aquatic protected species that have the potential to occur within proximity to the Proposed Route, only those aquatic species listed in Table 7 were raised as species of interest by the USFWS and the SDGFP.

Table 7. Aquatic Species of Interest along the Proposed Route

Common Name	Scientific Name	Protected Status
Northern river otter	*Lontra canadensis*	State threatened
Topeka shiner	*Notropis topeka*	Federal endangered

13.2 IMPACTS AND MITIGATION

13.2.1 Wetlands

Permanent wetland impacts are anticipated only where poles and their associated foundations are located in wetlands, or where forested wetlands are permanently converted within the right-of-way. The permanent impacts resulting from the foundation at each pole will be approximately 55 square feet. Of a total estimated 246 poles, only 13 are anticipated to be located in wetlands. Temporary impacts may occur within a 20-foot-wide corridor necessary for through right-of-way access. In addition, a workspace area up to one acre in size is anticipated at each pole location.

Indirect impacts to wetlands could include sedimentation reaching surface waters during construction due to ground disturbing activities such as excavations, grading, construction traffic, and dewatering. This could temporarily degrade water quality due to turbidity. These impacts will be minimized to the extent feasible through the use of appropriate sediment and erosion control practices, and other construction-related best management practices. The Applicants will also be seeking Section 401 certification from the South Dakota Department of Environmental and Natural Resources ("SDENR"), as appropriate. Once the Project is completed, there will be no significant impact to surface water quality. Wetland impacts will be minimized to the extent feasible and mitigated, disturbed soil will be restored to preconstruction conditions, and the amount of land area converted to an impervious surface will be relatively small.

Temporary impacts to wetlands will be avoided or reduced, to the extent feasible, with the selective placement of poles and access routes. Existing access will be utilized to the maximum extent feasible. If crossing through a wetland is required, efforts will be made to locate the access route at the narrowest point of crossing, or along the edge of the wetland to minimize potential temporary impacts. Where wetlands must be crossed to string new conductors and shield wires, workers may walk across, use boats, drive equipment across ice in the winter, or use temporary bridges or matting to cross over or through wetlands. Wetland boundaries along construction areas will be identified and marked prior to construction to ensure these areas are protected accordingly. Setbacks will be established to identify safe fueling areas and staging areas a sufficient distance away from wetlands when possible or as required by permit conditions. These construction practices will help to prevent siltation within wetlands and minimize the risk of an inadvertent release of harmful fluids due to fueling and lubricating of equipment.

Other mitigation measures that may be implemented, when it is not feasible to span a wetland resource, or avoid access to the right-of-way through a wetland, include the following:

- When possible, construction will be scheduled during frozen ground conditions;
- Crews will attempt to access the wetland with the least amount of physical impact to the wetland (i.e., shortest route); and
- The structures will be assembled in upland areas before they are installed within a wetland resource to minimize temporary impacts due to structure installation.

In addition, the Applicants will implement best management practices to maintain sound water and soil conservation practices during construction of the Project to minimize soil erosion, and protect topsoil and adjacent water resources. These measures may include the implementation of silt fencing, slope breaks, containing excavated material, protecting exposed soil, and stabilizing restored soil. Construction will be completed in accordance with all permit requirements or conditions.

13.2.2 Sensitive Aquatic Species

No impacts to sensitive aquatic species are anticipated since all waterways will be spanned.

14.0 LAND USE (ARSD § 20:10:22:18)

14.1 EXISTING LAND USE

The proposed Project will be located in Deuel and Brookings counties but will not be located within any municipal boundaries. The proposed Project will be located primarily on private land that is zoned as agricultural (53 percent), and regulated by Deuel and Brookings County land use plans and ordinances. In addition, the proposed Project will be located on lands zoned as Aquifer Protection Overlay Zone (44 percent) and Floodplain Overlay (three percent). A small portion of the Proposed Route (less than one percent) will be located within the Natural Resource District zone classification. The only publicly owned land directly affected by the proposed Project will be roadway right-of-way (along county, state, and U.S. roadways). No other permanent land use changes will occur beyond the Proposed Route. The Proposed Route parallels approximately 12 miles of roadway and 20 miles of section lines and/or property lines. Zoning classifications crossed by the Proposed Route are summarized in Table 8. Appendix C provides detailed maps of zoning classifications along the Proposed Route.

Table 8. Zoning Classifications Crossed by the Proposed Route

Zoning Classification	Acres in Proposed Route	Percent of Proposed Route
Agricultural District	420	53
Aquifer Protection Overlay District	346	44
Floodplain Overlay District	22	3
Natural Resources District	<1	<1
Total	788	100

Other land uses affected by the Proposed Route include federal conservation easements, landfill, and a gravel pit. No daycares, churches, schools, airports, cemeteries, or hospitals occur along the Proposed Route.

14.2 IMPACTS AND MITIGATION

Impacts to land uses include the potential for loss of land available to support a particular use, such as some forms of agricultural use, due to structure placements or right-of-way requirements. Other potential impacts include consideration of the compatibility of the proposed transmission line with existing uses. However, existing land uses that will be affected by the Proposed Route are not expected to change as a result of construction and operation of the transmission line. In agricultural areas, the majority of the land crossed by the transmission lines could still be used for agricultural purposes. Pole placement in areas where cross-country right-of-way is necessary has been planned to minimize impacts to farming operations (based on aerial interpretation).

There will be some short-term impacts to agriculture from construction. Permanent impacts to cultivated croplands include the location of each pole, in addition to an area of up to 1,000 square feet around each pole. Agricultural impacts are discussed in Section 19.2.2.

14.2.1 Displacement

National Electric Safety Code ("NESC") and the Applicants' standards require certain clearance between transmission line facilities and structures for safe operation of a transmission line. The Applicants will acquire a right-of-way for the proposed transmission line that is sufficient to maintain these clearances. Displacement can occur when an existing structure is located within the right-of-way for a new transmission facility.

Table 9 below identifies the number of residences within various distances from the representative centerline of the Proposed Route. No homes or businesses will be displaced by the proposed transmission line. While the proposed transmission line will be located within 500 feet of two homes, the nearest of these homes will be approximately 100 feet

from the transmission line. Up to 21 non-residential structures are within immediate proximity of the representative centerline of the Proposed Route and may be affected by the required right-of-way. Impacts to non-residential structures will also be minimized with final engineering and design, to the extent feasible.

Table 9. Residences within Proximity of the Representative Centerline of the Proposed Route

Proximity (Feet)	Proposed Route
Right-of-Way	150 (feet in width)
0-75	0
75-150	1
150-300	0
300-500	1
Total Residences	2

14.2.2 Noise

Noise is defined as unwanted sound. Noise may include a variety of sounds of different intensities across the entire frequency spectrum. Noise is measured in units of decibels ("dB") on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted decibel ("dBA") scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA. A noise level change of three dBA is barely perceptible to average human hearing. A five dBA change in noise level, however, is clearly noticeable. A 10 dBA change in noise levels is perceived as a doubling or halving of noise loudness, while a 20 dBA change is considered a dramatic change in loudness.

Cumulative noise increases occur on a logarithmic scale. If a noise source is doubled, there is a three dBA increase in noise, which is barely discernible to the human ear. For cumulative increases resulting from sources of different magnitudes, the rule of thumb is that if there is a difference of greater than 10 dBA between noise sources, there will be no additive effect (i.e., only the louder source will be heard and the quieter source will not contribute to the noise levels). Therefore, predicted noise levels associated with the transmission line are typically much lower than the ambient noise in the Project area and will not increase the existing background noise levels in the Project area. Table 10 provides noise levels associated with common, everyday sources and places the magnitude of noise levels discussed here in context.

Table 10. Noise Levels Associated with Common Sources

Sound Pressure Level (dBA)	Noise Source
120	Jet aircraft takeoff at 100 feet
110	Same aircraft at 400 feet
90	Motorcycle at 25 feet
80	Garbage disposal
70	City street corner
60	Conversational speech
50	Typical office
40	Living room (without TV)
30	Quiet bedroom at night

Source: Environmental Impact Analysis Handbook, ed. by Rau and Wooten, 1980

Construction activities will generate noise that is short-term and intermittent. Construction activities will be limited to daytime hours to the extent feasible. As such, the Project will not have significant noise effects for the surrounding area during construction.

Transmission lines produce audible noise under certain conditions. The level of noise or its loudness depends on conductor conditions, voltage level, and weather conditions. Noise emission from a transmission line occurs during heavy rain and wet conductor conditions. In foggy, damp, or rainy weather conditions, transmission lines can create a subtle crackling sound due to the small amount of electricity ionizing the moist air near the conductors. During heavy rain, the general background noise level is usually greater than the noise from a transmission line. As a result, people do not normally hear noise from a transmission line during heavy rain. During light rain, dense fog, snow, and other times when there is moisture in the air, the proposed transmission lines will produce audible noise higher than rural background levels but similar to household background levels. During dry weather, audible noise from transmission lines is a faint, sporadic crackling sound.

The primary land use along the Proposed Route is rural agricultural land. Typical noise sensitive receptors near the proposed transmission line may include residences, churches, schools, and parks. Current average noise levels in these areas are typically in the 30 to 40 dBA range and are considered acceptable for residential land use activities. Ambient noise in rural areas is commonly made up of rustling vegetation and infrequent vehicle pass-bys. Higher ambient noise levels, typically 50 to 60 dBA, will be expected near roadways, urban areas, and commercial and industrial properties in the Project area. It is not expected that noise from the Project will exceed the typical background noise levels.

14.2.3 Aesthetics

The visual character and quality crossed by and surrounding the Proposed Route are characterized by open agricultural fields to rolling hills broken by small lakes and wetland complexes. Dispersed residential areas and existing transmission lines are also part of the human-made elements in the vicinity of the Proposed Route. In addition, there are existing wind turbines located near the Proposed Route, as well as permitted wind turbines to be constructed. Land uses that will be affected by the Proposed Route are dominated by agricultural uses, characterizing the regional setting as mostly rural around dispersed population centers.

Sensitive viewpoints include locations from which a significant number of people who have a concern for scenic resources would view a landscape or an area that may be affected by the Project, or would otherwise be visually exposed to the Project. Potential sensitive viewpoints along the Proposed Route may include existing transportation corridors, existing residences within immediate proximity of the Proposed Route having an unobstructed line of sight of the proposed line, and recreational use areas.

The Proposed Route parallels existing transportation rights-of-way generally considered pre-disturbed in nature, for a portion of the route. Motorists along any roadways of which the Proposed Route parallels would view the line. Although traffic volumes are typically highest when associated with major roads such U.S. highways, and state highways, motorist views may be considered more intermittent in that these roadways typically do not support local traffic. Local secondary roads of which the Proposed Route parallels do support motorists who use these roads more regularly or repeatedly.

Residential uses occurring near the Proposed Route include dispersed rural residential uses. Residences having an unobstructed line of sight of the proposed transmission line would view the line. The distance between these residences and the line would also dictate the field of view, for example, a foreground or background view.

Recreational uses occurring along or near the Proposed Route include various parks or open space associated with established population centers, a state game production area, and other non-private sensitive management areas or areas generally hosting various types of conservation such as existing federal wetland and grassland easements. Visitors of these various recreational use areas may view the line.

Visual resources would be impacted by the introduction of the proposed transmission line into the regional landscape. The transmission line would introduce new vertical forms or lines in areas where it would not otherwise parallel an existing transmission line. Since the area is largely rural, the proposed transmission line may introduce color contrasts during some lighting conditions or seasons. In addition to the proposed pole structures, establishment of the required right-of-way may alter color and textural contrasts as a result of vegetation removal. Vegetative tree species and some shrub species will be permanently removed within the right-of-way.

The degree to which the transmission line will be visible will vary by location. The Applicants have not identified any unique aesthetic resources that would be impacted by this transmission line.

15.0 LOCAL LAND USE CONTROLS (ARSD § 20:10:22:19)

The majority of the Project will be constructed on land zoned as agricultural and Aquifer Protection Overlay as regulated by Brookings and Deuel counties pursuant to their land use plans and ordinances. As previously noted, a small portion of the proposed transmission line would be located within the Floodplain Overlay District (Brookings County) and the Natural Resources District (Deuel County).

Based on the 2007 Brookings County Zoning Ordinance, public utilities/transmission lines are not specifically listed as a permitted use or a conditional use for the agricultural district. However, under the conditional uses for the agricultural district, “the County Zoning Commission may permit other uses which, in its opinion, are not detrimental to other uses and are in the general character of the Agricultural District”. In the Brookings County Aquifer Protection Overlay District, “necessary public utilities/facilities designed so as to prevent contamination of ground water” is a permitted use. A Development Permit from Brookings County will be required for those portions of the Project located within the Floodplain Overlay District.

Based on the 2004 Deuel County Zoning Ordinance, a transmission line would be a special exception in the agricultural district and would be a use permitted by special exception if deemed not detrimental to the Natural Resources District. In the Deuel County Aquifer Protection Overlay District, “necessary public utilities/facilities designed so as to prevent contamination of groundwater” is a permitted use.

The Applicants will obtain all required permits or approvals in advance of construction.

16.0 WATER QUALITY (ARSD § 20:10:22:20)

16.1 EXISITNG WATER RESOURCES

Section 303(d) of the Clean Water Act requires states to publish, every two years, a list of streams and lakes that are not meeting their designated uses because of excess pollutants; these are also referred to as impaired waters. The list, known as the 303(d) list, is based on violations of water quality standards. The majority of impairments to surface waters are caused by agricultural sources (fecal coliform, dissolved oxygen, turbidity, excess nutrients/eutrophication) or industrial sources (Mercury, Polychlorinated Biphenyls). The SDENR has jurisdiction over determining 303(d) waters in the state of South Dakota. No surface waterbodies within the vicinity of the Project are listed as 303(d) waters.

16.2 IMPACTS AND MITIGATION

To avoid impacting the water quality for the surface water features along the Proposed Route, the Applicants will employ the best management practices and mitigative measures discussed in prior sections.

17.0 AIR QUALITY (ARSD § 20:10:22:21)

17.1 EXISITNG AIR QUALITY

No permanent adverse impacts to air quality are anticipated as a result of the construction and operation of the Project.

17.2 IMPACTS AND MITIGATION

Temporary air quality impacts caused by construction-related emissions are expected to occur during this phase of activity. During construction of the Project, there will be limited emissions from vehicles and other construction equipment and fugitive dust from right-of-way clearing. The magnitude of the construction emissions is influenced heavily by weather conditions and the specific construction activity occurring. Exhaust emissions, primarily from diesel equipment, will vary according to the phase of construction, but will be minimal and temporary. Adverse impacts to the surrounding environment will be minimal because of the short and intermittent nature of the emission and dust-producing construction phases. The Applicants anticipate nominal impacts to air quality, and therefore, no mitigative measures are proposed.

18.0 TIME SCHEDULE (ARSD § 20:10:22:22)

The Applicants anticipate that the Project will be in service in 2017. A general permitting and construction schedule for the Project is provided below.

Table 11. General Permitting and Construction Schedule

Activity	Duration or Anticipated End Date
Negotiate Easement Options	February 2013 – Present
Commission Route Permit Review	June 2013 - March 2014
Transmission Line and Substation Design	February 2013 – December 2014
Acquire Easements	April 2014 – April 2015
Transmission Line and Substation Construction	January 2015 – September 2017
Project In-Service	October 2017

19.0 COMMUNITY IMPACT (ARSD § 20:10:22:23)

19.1 EXISTING SOCIOECONOMIC CONDITIONS, AGRICULTURAL USES, AND TRANSPORTATION

19.1.1 Socioeconomic Conditions

The Project is located in Deuel and Brookings counties. The general setting of the Project is mostly agricultural, including cultivated croplands and grazed pasturelands. The largest residential areas near the proposed transmission line are the cities of Gary and White, as shown in Table 12.

Table 12. Demographic Characteristics of the Project Area

Location	Population	Percentage of Population Below Poverty Level	Per Capita Income
City of Gary, South Dakota	227	14	$20,209
City of White, South Dakota	485	6	$19,209
Deuel County	4,364	5	$24,518
Brookings County	31,965	19	$22,036
South Dakota	814,180	14	$24,925

Source: U.S. Census Bureau, 2010

The South Dakota Department of Labor and Regulation (SDLR) projects a population decline of five percent for Deuel County and a 27 percent population increase for Brookings County over the next 20 years (SDLR, 2012). According to the U.S. Census Bureau, the majority of the population in the Project area is white (U.S. Census Bureau, 2010). Both the percentage of population below poverty level and the per capita income in Deuel County are lower than that of the State of South Dakota. Brookings County has a higher percentage of population below poverty level and a lower per capita income than the State of South Dakota. According to the U.S. Census Bureau Quick Facts, the largest industry in terms of

employment within the Project area is manufacturing, followed by educational services and agriculture (U.S. Census Bureau, 2010).

19.1.2 Agricultural Uses

According to the U.S. Department of Agriculture 2007 Census of Agriculture, the number of farms in Deuel County remained the same (583 farms) between 2002 and 2007. The average farm size decreased by three percent to 544 acres. Crop sales in 2007 were $87,249,000 (47 percent of agricultural products sold in the County) and livestock sales were $99,477,000 (53 percent). Crops in Deuel County are primarily corn for grain and wheat for grain. Livestock sold in Deuel County is primarily cattle and hogs.

The number of farms in Brookings County increased by three percent to 986 acres between 2002 and 2007. The average farm size also increased by eight percent to 469 acres. Crop sales in 2007 were $42,785,000 (44 percent of the agricultural products sold in the County) and livestock sales were $54,809,000 (56 percent). Primary crops in Brookings County are corn for grain and wheat for grain. Primary livestock found within Brookings County include cattle and hogs.

19.1.3 Transportation

The Project area is accessible from nearby Interstate 29, U.S. Highway 14, and State Highways 15, 22, and 28. Additionally, the Applicants will use county roads and township roads to access the project area. The Applicants will observe all applicable laws and regulations regarding use of the roads and will enter into road use agreements with counties and townships.

19.2 IMPACTS AND MITIGATION

19.2.1 Socioeconomic and Community Impacts

The construction and operation of the Project is expected to have minimal influence on the local (county and municipal) economies. Deuel and Brookings counties may see a small boost in economic benefit due to payroll earnings, employment opportunities, and construction expenditures. Long-term beneficial impacts from the Project will include incremental increases in revenues from utility property taxes and other impacts due to development able to occur due to the execution of the proposed line. No adverse socioeconomic impacts are anticipated, and therefore, no mitigative measures are proposed.

19.2.2 Agricultural Impacts

The Project will create impacts to cultivated cropland along the Proposed Route, though only nominal impacts to grazed pasturelands are anticipated. Impacts to cultivated cropland will be minimal and will occur primarily due to pole placement. Temporary impacts during construction may include soil compaction and disruption of agricultural practices and crop damages within the right-of-way at proposed structure locations, locations of permanent access, and other work areas. Temporary impacts are estimated at approximately 246 acres, up to one acre per pole. Permanent impacts on agricultural land can include loss of agricultural land due to pole placement (55 square feet per pole) and crop loss (up to 1,000 square feet per pole).

Landowners will be compensated for the use of their land through Applicants' easement acquisition. To minimize loss of farmland and to ensure reasonable access to the land near the poles, the Applicants would prefer to place the poles approximately eight feet from road rights-of-way. When possible, the Applicants will attempt to construct the transmission line before crops are planted or following harvest. The Applicants will compensate landowners for crop damage and soil compaction that occurs as a result of the Project. Traffic on the right-of-way between poles will be limited to the extent feasible. Construction mats may also be used to minimize impacts on the access paths and in construction areas.

Drain tile lines may be present along the Proposed Route. The Applicants will work with landowners to identify locations of drain tiles along the route and will minimize interference with tiles, where possible. In the event that the Applicants locate a tile line that the landowner did not discuss, the Applicants will work with landowners to resolve any unintended damage to drain tiles.

Crop dusting may occur within agricultural fields along the Proposed Route. If this farming practice is utilized, and has the potential to become impacted by the Project, the Applicants will work with the landowner to identify mitigative measures to avoid or reduce changes to farming practices caused by the Project.

19.2.3 Transportation Impacts

The proposed transmission line is not expected to create any permanent impacts to the area's transportation resources. There may be some temporary impacts to local roads during construction. The Applicants will work with Deuel and Brookings counties to

minimize any impacts to area transportation from the proposed transmission line and affected townships around agreements.

19.3 EXISTING CULTURAL RESOURCES

In March 2013, the Applicants requested and received data from the South Dakota Archaeological Research Center pertaining to known archaeological sites and architectural historic properties located within one mile of the Proposed Route. Based on a preliminary review, it was determined that there are known sites and properties in the general vicinity of the Project. Currently, however, the Applicants do not anticipate impacts to previously or newly identified resources as a result of the Project. The Applicants plan to avoid impacts to previously and newly discovered resources by adjusting pole spacing to span any resources, as appropriate or to the extent feasible. In the event that impacts cannot be avoided, the Applicants will determine, in consultation with the South Dakota State Historic Preservation Office ("SHPO"), whether or not the resource is eligible for listing in the National Register of Historic Places ("NRHP"). Any future correspondence will be forwarded to the Commission upon receipt.

19.3.1 Literature Review Results

Three archaeological sites (39BK0004, 39DE0010, and 39DE0047) have been recorded within proximity to the Proposed Route (see Table 13). Sites 39BK0004 and 39DE0047 are Native American artifact scatters. Site 39DE0010 consists of a Native American stone circle. None of these three sites have been evaluated for listing in NRHP. The placement of structures will strive, however, to avoid these sites to the extent feasible or practicable.

Table 13. Previously Identified Archaeological Sites within Proximity to the Proposed Route

Site No.	Period/Group	Type	NRHP Status
39BK0004	Native American	Artifact Scatter	Not evaluated
39DE0010	Native American	Stone Circle	Not evaluated
39DE0047	Native American	Artifact Scatter	Not evaluated

One architectural historic property (BK00000953) has been inventoried within proximity to the Proposed Route (see Table 14). BK00000953, a bridge located in Astoria, South Dakota, has not been evaluated for inclusion in the NRHP. The placement of structures will strive, however, to avoid this property to the extent feasible or practicable.

Table 14. Previously Inventoried Architectural Historic Properties within Proximity to the Proposed Route

Inventory No.	Description	Location	NRHP Status
BK00000953	Bridge	483rd Avenue, Astoria, South Dakota	Not evaluated

Additionally, 25 architectural historic properties have been identified within 0.25 miles of the Proposed Route (see Table 15). The majority of these represent agricultural properties. The remaining properties consist of bridges, residences, and schools.

Table 15. Previously Inventoried Architectural Historic Properties within 0.25 miles of the Proposed Route

Inventory No.	Description	Location	NRHP Status
BK00000913	Nash, Paul (Site #2); Building	Railroad Avenue, Astoria, South Dakota	Not evaluated
BK00000955	Trulak, James; Building	Railroad Avenue, White, South Dakota	Not evaluated
BK00000980	Strohschein, Erwin; Building	Railroad Avenue, Astoria, South Dakota	Not evaluated
BK00001151	Abandoned Farm	Railroad Street, Hendricks, South Dakota	Not evaluated
BK00001391	Peirce (#2) Building	Railroad Street, Hendricks, South Dakota	Not evaluated
BK00001393	Abandoned School House	Railroad Street, Hendricks, South Dakota	Not evaluated
BK00001401	Peirce, Arlen; Building	Railroad Street, Hendricks, South Dakota	Not evaluated
BK00002192	Steele Stringer Bridge	204th Street, White, South Dakota	Not eligible
BK04700001	Farmstead	205th Street/483rd Ave, White, South Dakota	Not eligible
BK04700002	Farmstead	205th Street/483rd Ave, White, South Dakota	Not eligible
BK04700003	Farmstead	205th Street/483rd Ave, White, South Dakota	Not eligible
BK04900001	Farmstead	206th Street, White, South Dakota	Not eligible
BK04900002	Farmstead	206th Street, White, South Dakota	Not eligible
BK04900003	Farmstead	206th Street, White, South Dakota	Not eligible
BK04900004	Farmstead	206th Street, White, South Dakota	Not eligible
BK04900005	Farmstead	206th Street, White, South Dakota	Not eligible
BK04900006	Farmstead	206th Street, White, South Dakota	Not eligible
BK04900008	Farmstead	206th Street, White, South Dakota	Not eligible
BK04900010	Farmstead	206th Street, White, South Dakota	Not eligible
BK04900011	Farmstead	206th Street, White, South Dakota	Not eligible
BK04900012	Farmstead	206th Street, White, South Dakota	Not eligible
BK04900013	Farmstead	206th Street, White, South Dakota	Not eligible
DE00000062	School	Not Available	Not eligible
DE00000065	Unspecified Building	Not Available	Not eligible
DE00000177	Channel Beam Bridge	188th Street, Brandt, South Dakota	Not eligible

19.4 IMPACTS AND MITIGATION

Adverse impacts to archaeological sites result from ground disturbance during construction or operation of the Project facilities that displace or destroy information important to prehistory and history. Three archaeological sites have been identified along the Proposed Route. Impacts to most, if not all, of these sites can be avoided by designation of sensitive areas, minor adjustments to Project design, and designation of no-traffic areas during construction. Archaeological survey will be completed in areas of proposed ground disturbance (archaeological area of potential effect [archaeological "APE"]) that have not been previously surveyed to identify any undocumented archaeology sites that may be affected by the Project. The Applicants' archaeologists will design a survey methodology to document the existing conditions within the archaeological APE, identify existing archaeological resources within that area (including previously identified sites), provide recommendations for NRHP eligibility of identified archaeological resources within the archaeological APE, and offer recommendations for archaeological site avoidance, impact minimization, or mitigation, if necessary.

Architectural historic survey will be completed to inventory any undocumented architectural historic properties that may be affected by the proposed Project within and adjacent to the intended locations of above-ground structures associated with the Project. The Applicants' architectural historians will design a methodology to identify properties within 0.25 miles of the Project's above-ground structure locations (architectural history APE) and assess impacts to NRHP-listed or eligible properties.

Currently, the Applicants do not anticipate impacts to previously or newly identified archaeological or architectural history resources as a result of the Project. The Applicants plan to avoid impacts to previously and newly discovered resources by adjusting pole spacing to span any resources along the Proposed Route. In the event that an impact would occur, the Applicants will determine, in consultation with the SHPO, whether or not the resource is eligible for listing in the NRHP. If necessary, site and/or property specific treatment plans will be developed to mitigate the adverse impacts of this Project upon any archaeological sites or architectural historic properties determined to be eligible for listing in the NRHP.

20.0 EMPLOYMENT ESTIMATES (ARSD § 20:10:22:24)

Table 16. Annual Employment Expenditures by Job Classification

Job Classification	Manpower	Annual Labor Expenditure
Land Rights	1	$50,000
Survey	2	$200,000
Substation Foundations	4 to 8	$300,000
Substation Apparatus	4 to 8	$1,200,000
Line Foundation	8 to 12	$400,000
Line Construction	8 to 12	$3,300,000

Construction of the Project will provide economic benefits to the region. The new infrastructure will provide a foundation for the region's projected electric growth, ensure reliability, and connect into renewable energy sources proposed in eastern South Dakota. The Project provides significant additional benefits through ensuring a strong, reliable electric transmission system that can deliver affordable electricity to customers throughout the region. After completion of construction, operation and maintenance of the proposed transmission line will likely be provided by existing the Applicants' employees. Indirect economic benefits will also be created in sectors closely related to the construction industry, such as food services, lodging, wholesale trade businesses, real estate services, retail stores, and others.

21.0 FUTURE ADDITIONS AND MODIFICATIONS (ARSD § 20:10:22:25)

The Applicants are not aware of any system upgrades related to the proposed Project that will be needed in the future, and present planning studies have not identified any additional modifications that will result from this Project.

22.0 TRANSMISSION FACILITY LAYOUT AND CONSTRUCTION (ARSD § 20:10:22:34)

22.1 ROUTE CLEARING

To maintain North American Energy Reliability Council ("NERC") reliability standards, the right-of-way will be cleared of the amount of vegetation necessary to construct, operate and maintain the Proposed Route. Clear cutting (i.e., the removal of all trees, brush, and other low-growing vegetation) will be used at construction, within the easement, and maintenance access roads and at structure erection sites. Future maintenance will also require access to and travel on the right-of-way. Trees outside of the right-of-way which could, in falling, hit the transmission line, and trees which are decayed or leaning, or may become a potential hazard to the transmission line, will also be removed. Disposal of

vegetative materials will comply with state and local ordinances. Wood from the clearing operation will be offered to the landowner or removed from the site. During the acquisition process, individual property owners will be advised as to the construction schedules, needed access to the site and any vegetation clearing required for the property.

22.2 TRANSMISSION CONSTRUCTION PROCEDURES

Construction will begin after federal, state, and local approvals are obtained; property and rights-of-way are acquired; soil conditions are established; and final design is completed. The precise timing of construction will take into account various requirements that may be in place due to permit conditions, system loading issues, and available workforce.

The actual construction will follow standard construction and mitigation practices that were developed from experience with past projects following an agricultural impact mitigation plan. These best practices address right-of-way clearance, staging, erecting transmission line structures, and stringing transmission lines. Construction and mitigation practices to minimize impacts will be developed based on the proposed schedule for activities, permit requirements, prohibitions, maintenance guidelines, inspection procedures, terrain, and other practices. In some cases these activities, such as schedules, are modified to minimize impacts to sensitive environments.

Transmission line structures are generally designed for installation at existing grades. Typically, structure sites with 10 percent or less slope will not be graded or leveled. Sites with more than 10 percent slope will have working areas graded level or fill brought in for working pads. If the landowner permits, it is preferred to leave the leveled areas and working pads in place for use in future maintenance activities, if any. If permission is not obtained, the site is graded back to its original condition as much as possible and all imported fill is removed from the site.

Typical construction equipment used on a project consists of tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front end loaders, bucket trucks, bulldozers, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks, and various trailers. Many types of excavation equipment are set on wheel or track-driven vehicles. Poles are transported on tractor-trailers.

Staging areas will be required for the Project. Staging involves delivering the equipment and materials necessary to construct the new transmission line facilities. The materials are stored at staging areas until they are needed. Temporary lay down areas may be required

for additional space for storage during construction. These areas will be selected for their location, access, security, and ability to efficiently and safely warehouse supplies. The areas are chosen to minimize excavation and grading. The temporary lay down areas and any staging areas outside of the transmission line right-of-way will be obtained from affected landowners through rental agreements.

Access to the right-of-way is typically made directly from existing roads or trails that run parallel or perpendicular to the transmission line right-of-way. In some situations, private field roads or trails are used. Permission from the property owner is obtained prior to accessing the transmission line corridor. Where necessary to accommodate the heavy equipment used in construction, including cranes, cement trucks, and hole-drilling equipment, existing access roads may be upgraded or new routes may be constructed. New access routes may also be constructed when no current access is available or the existing access is inadequate to cross roadway ditches.

When it is time to install the poles, the poles are generally moved from the staging areas and delivered to staked locations. The poles are typically placed within the right-of-way until set. Insulators and other hardware are attached while the pole is on the ground. The pole is then lifted, placed, and secured using a crane. The conductors are then clipped to the insulators.

In general, poles will have drilled pier concrete foundations. Drilled pier foundations may vary from six to nine feet in diameter and may be 25 feet or more deep, depending on soil conditions. After the concrete foundation is set, the pole is bolted to the foundation. Concrete trucks are required to bring the concrete in from a local concrete batch plant.

Construction mats are also placed in wet or soft soil locations and narrow ditches to minimize disturbances. These mats can also provide access to sensitive areas during times when the ground is not frozen to minimize impacts at the site.

If landowner permission is obtained, it is preferred to spread excess soil from foundation holes on the structure site. If not allowed, it will be offered to the landowner or will be completely removed from the site.

The conductors are then installed by establishing stringing setup areas within the right-of-way or on temporary construction easements outside the right-of-way. These stringing setup areas are usually located between two to four miles along a final route. Conductor

stringing operations also require brief access to each structure to secure the conductor wire to the insulator hardware and the shield wire to clamps once final sag is established. When the transmission line crosses streets, roads, highways, or other energized conductors or obstructions, a temporary guard or clearance poles may be installed. This ensures that conductors will not obstruct traffic or contact existing energized conductors or other cables during stringing operations; it also protects the conductors from damage.

Environmentally sensitive areas and wetlands may also require special construction techniques in some circumstances. During construction, the most effective way to minimize impacts to wet areas will be to span all streams and rivers. In addition, the Applicants will not allow construction equipment to be driven across waterways except under special circumstances and only after discussion with the appropriate resource agency. Where waterways must be crossed to pull in the new conductors and shield wires, workers may walk across, use boats, or drive equipment across ice in the winter. These construction practices help prevent soil erosion and ensure that equipment fueling and lubricating will occur at a distance from waterways. Additional mitigative measures relating to wetlands are contained in Section 13.2.1.

22.3 RESTORATION PROCEDURES

During construction of the Project, crews will attempt to limit ground disturbance wherever possible. However, areas are disturbed during the normal course of work, which can take several weeks in any one location. As construction on each parcel is completed, disturbed areas will be restored to their original condition to the extent practicable. The right-of-way agent will contact each property owner after construction is completed to see if any damage has occurred as a result of the Project. If damage has occurred to crops, fences or the property, the Applicants will fairly reimburse the landowner for damages sustained.

In some cases, the Applicants may engage an outside contractor to restore the damaged property to as near as possible to its original condition. Portions of vegetation that are disturbed or removed during construction of the transmission line will naturally reestablish to pre-disturbance conditions. Resilient species of common grasses and shrubs typically reestablish with few problems after disturbance. Areas with significant soil compaction and disturbance from construction activities along the Proposed Route will require assistance in reestablishing the vegetation stratum and controlling soil erosion. Commonly used methods to control soil erosion and assist in re-establishing vegetation include, but are not limited to:

- Prompt revegetation;
- Erosion control blankets;

- Silt fences; and
- Straw bales/bio-logs.

These erosion control and vegetation establishment practices are regularly used in construction projects and are referenced in the construction permit plans. Long-term impacts are minimized by utilizing these construction techniques.

22.4 MAINTENANCE PROCEDURES

Transmission lines are designed to operate for decades and require only moderate maintenance, particularly in the first few years of operation. The estimated service life of a transmission line for accounting purposes is approximately 40 years. However, from a practical perspective, high voltage transmission lines are seldom completely retired.

The principal operating and maintenance cost for transmission facilities is the cost of inspections, usually done monthly by air. Annual operating and maintenance cost for transmission lines in South Dakota and the surrounding states vary. For voltages from 115 kV through 345 kV, the Applicants' experience shows that costs are approximately $300 to $500 per mile. Actual line-specific maintenance costs depend on the setting, the amount of vegetation management necessary, storm damage occurrences, structure types, materials used, and the age of the line.

23.0 INFORMATION CONCERNING TRANSMISSION FACILITIES (ARSD § 20:10:22:35)

23.1 CONFIGURATION OF TOWERS AND POLES

Table 17 summarizes the structure designs and foundations for the proposed single pole structures that will be installed for the Project. However, site-specific conditions may require other structure types to reduce the potential for impact.

Table 17. Structure Design Summary

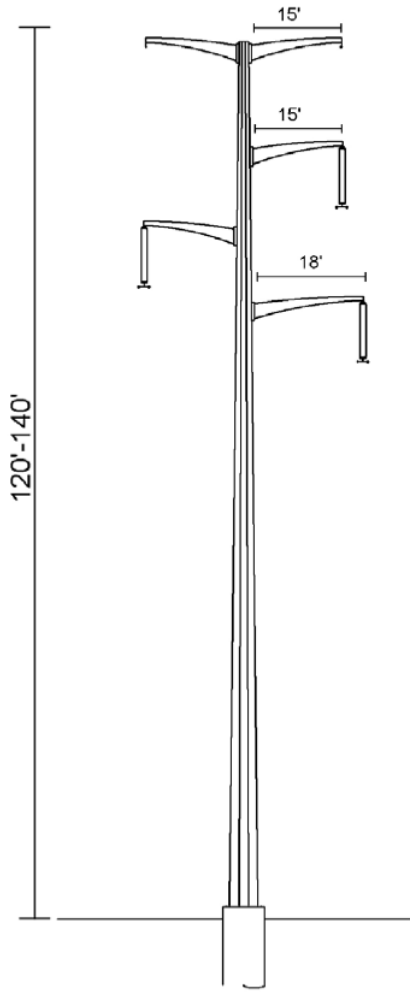
Line Type	Structure Type	Structure Material	Right-of-way Width (feet)	Typical Structure Height (feet)	Typical Structure Base Diameter (inches)	Typical Foundation Diameter (feet)	Typical Span Length Between Structures (feet)
345 kV	Single Pole Davit Arm	Weathering or galvanized steel	150	130-175	36-48 (tangent structures) 48-72 (angle structures)	6-12	600-1,200
345 kV	Single Pole, Davit Arm, Tangent, Suspension	Weathering or galvanized steel	150	110-170	40-60	6-8	800-1100
345 kV	Single Pole, Vertical Running angle, suspension	Weathering or galvanized steel	150	120-180	60-80	7-10	800-1100
345 kV	Single Pole, Vertical, 90 degree dead-end, strain	Weathering or galvanized steel	150	120-180	80-100	10-12	800-1100

The Proposed Route will be designed to meet or surpass all relevant local and state codes, NESC and NERC requirements, and the Applicants' standards. Appropriate standards will be adhered to for construction and installation and all applicable safety procedures will be followed during and after installation.

23.2 STRUCTURE CONFIGURATION

The expected structure type for the Project will be single poles supported by drilled pier concrete foundations. Each structure will support two shield wires and three phases. One of the shield wires will have glass fibers in the center and will serve as a means of communication between the substations while the other shield wire will provide just lightning protection. Both shield wires will be located at the top of the structures and will be supported by steel davit arms. Each of the three phases will consist of two subconductors. Each subconductor will be a twisted pair of conductors. The twisted pairs are used to eliminate/minimize conductor galloping. Four different types of structures are planned to be used on this Project. A diagram of a typical single circuit 345 kV structure is shown in Figure 3.

Figure 3. Typical Single Circuit 345 kV Structure



23.3 PROPOSED TRANSMISSION SITE AND MAJOR ALTERNATIVES

Appendix A provides detailed maps of the Proposed Route. No obvious major alternative to the Proposed Route exists.

23.4 RELIABILITY AND SAFETY

23.4.1 Transmission Line Reliability

Transmission infrastructure is built to withstand weather extremes that can be encountered within this region. With the exception of severe weather conditions such as tornadoes and extreme ice, transmission lines usually only fail when they are subjected to conditions beyond the design parameters.

Transmission lines are automatically taken out of service by the operation of protective relaying equipment when a fault is detected on the system. Such interruptions are usually only momentary. Scheduled maintenance outages are also infrequent on high voltage transmission lines. As a result, the average annual availability of transmission infrastructure is very high, in excess of 99 percent.

23.4.2 Safety

Proper safeguards will be implemented for construction and operation of the Project. The Project will be designed to meet the local, state, NESC, and the Applicants' standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials, and right-of-way widths. Construction crews will comply with local, state, NESC, and the Applicants' standards regarding installation of the Project.

The proposed transmission line will be equipped with protective devices to safeguard the public from the transmission line if an accident were to occur and if a structure or conductor were to fail. The protective devices are breakers and relays located where the transmission line connects to the substation. The protective equipment will de-energize the transmission line should such an event occur. In addition, the substation will be fenced and access limited to authorized personnel. These measures are standard practice for the Applicants.

23.4.3 Electric and Magnetic Fields

The term electromagnetic field ("EMF") refers to electric and magnetic fields that are coupled together such as in high frequency radiating fields. For the lower frequencies associated with power lines, EMF should be separated into electric fields ("EFs") and magnetic fields ("MFs"), which arise from the flow of electricity and the voltage of a line and are measured in kilovolts per meter ("kV/m") and milliGauss ("mG"), respectively. The intensity of the electric field is proportional to the voltage of the line, and the intensity of the magnetic field is proportional to the current flow through the conductors. Transmission lines operate at a power frequency of 60 hertz (cycles per second).

The electric field from a transmission line can couple with a conductive object, such as a vehicle or a metal fence, if the object is in close proximity to the line. This could induce a voltage on the object. The magnitude of the voltage is dependent on many factors, including the weather condition, object shape, object size, object orientation, object to ground resistance, object capacitance, and location along the right-of-way. If objects are insulated or semi-insulated from the ground and if a person were to touch them, a small

current would pass through the person's body to the ground. This might be accompanied by a spark discharge and mild shock, similar to what can occur when a person walks across a carpet and touches a grounded object or another person.

Current passing through any conductor, including a wire, produces a magnetic field in the area around the wire. The magnetic field associated with a high-voltage transmission line surrounds the conductor and decreases rapidly with increasing distance from the conductor. The magnetic field is expressed in units of magnetic flux density, expressed as gauss ("G").

Considerable research has been conducted throughout the past three decades to determine whether exposure to power-frequency (60 hertz) magnetic fields causes biological responses and health effects. Epidemiological and toxicological studies have shown no cause and effect relationship between MF exposure and health risks. The possible impact of exposure to MFs upon human health has also been investigated by public health professionals for the past several decades. While the scientific consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields can cause biological responses or health effects continues to be debated.

23.4.4 Stray Voltage

"Stray voltage" is a condition that can occur on the electric service entrances to structures from distribution lines — not transmission lines. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. However, transmission lines can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line. Appropriate measures will be taken to address potential stray voltage issues on a case by case basis.

23.4.5 Farming Operations, Vehicle Use, and Metal Buildings Near Power Lines

All normal and current farming operations in the location are compatible with the construction and operation of the proposed Project.

23.5 RIGHT-OF-WAY OR CONDEMNATION REQUIREMENTS

For transmission lines, utilities must acquire easement rights to accommodate the facilities across private property. During the route development process, the Applicants reached out to landowners in an attempt to obtain feedback on proposed routes and to negotiate land rights. Status of land rights acquired for this Project is presented in Table 18 below. More detail of the easement acquisition process is provided in this section.

Table 18. Easement Acquisition Progress (as of May 24, 2013)

By the Parcel	Total	By the Owner
167	Total	111
147	Options Signed	93
20	Negotiating	18
88	Percent Complete	84

The first step in the right-of-way process was to identify all persons and entities of whom may have a legal interest in the real estate upon which the facilities may be built. A right-of-way agent or other persons engaged by the Applicants completed a public records search of all land involved in the Project. A title report was then developed for each parcel to determine the legal description of the property and the owner(s) of record of the property and to gather information regarding easements, liens, restrictions, encumbrances, and other conditions of record. The Applicants also engaged the services of a local valuation expert to assist in the determination of the just compensation.

Landowners are engaged through public meetings and one-on-one contacts with the utilities right-of-way representatives. Each landowner is offered a one-on-one meeting with the right-of-way agent. During the initial and subsequent meetings the agent describes the need for the transmission facilities, how the specific facility may affect their parcel, explains the acquisition process and documents, and seeks information from the landowner regarding any specific concerns. The right-of-way agent may also request the owner's permission to enter the property to conduct preliminary survey work and/or to take soil borings to assess soil conditions and determine appropriate foundation design. Surveys are conducted to locate right-of-way corridors, natural features, man-made features, and associated elevations used during the detailed engineering of the transmission line. The soil analysis is performed by an experienced geotechnical testing laboratory.

The right-of-way agent then presents an offer to the property owner(s) based on preliminary survey information. In the event that a complicated appraisal problem arises, an appraisal is completed by the utility's representative(s) to determine the value of the land rights being acquired. The landowner is allowed a reasonable amount of time to consider the offer and present any material that the owner believes is relevant to determining the property's value.

In the majority of cases, utilities are able to work with landowners to address their concerns and an agreement is reached for the utilities' purchase of land rights. The right-of-way

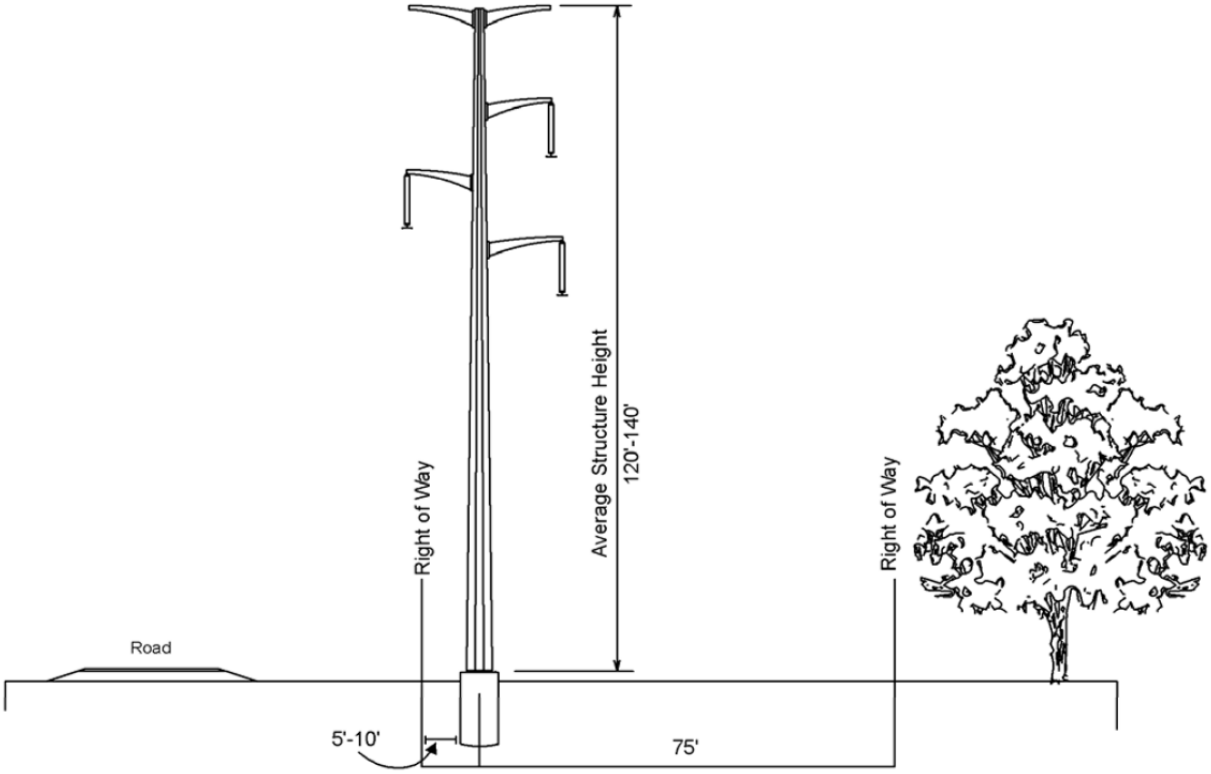
agent prepares all of the documents required to complete each transaction. Required documents include an Option Agreement for Easement and Electric Line Easement, as well as supporting documents for payment agreements.

In rare instances, if a negotiated settlement cannot be reached, the landowner may choose to have an independent third party determine the value of the land acquisition. Such valuation is made through the utility's exercise of the right of eminent domain pursuant to SDCL Chapter 21-35.

After a permit is issued and prior to construction, the right-of-way agent will again contact the owner of each parcel to exercise the option and discuss the construction schedule. To ensure safe construction of the transmission line, special consideration may be needed for fences, crops or livestock. For instance, fences may need to be moved or temporary or permanent gates may need to be installed, crops may need to be harvested early, and livestock may need to be moved. In each case, if damages to the crops or personal property occur, the landowner is compensated for such damages.

The Project will be built primarily with single pole structures, which typically require a right-of-way 150 feet in width for the length of the line. In some limited instances, where specialty structures are required for long spans, poor soil conditions, or in environmentally sensitive areas, up to 180 feet of right-of-way may be needed. A diagram of a structure with associated right-of-way is shown in Figure 4.

Figure 4. 345 kV Structure within Right-of-Way



If the transmission line parallels other existing infrastructure right-of-way (e.g., roads, railroads, other utilities), an easement of lesser width may be required as parts of the right-of-way of the existing infrastructure can sometimes be combined with the right-of-way needed for the proposed transmission line. When paralleling existing right-of-way, such as a road, the typical practice is to place the poles on adjacent private property, approximately eight feet from the existing right-of-way. With this pole placement, the transmission line shares the existing right-of-way, thereby reducing the size of the easement required from the private landowner. For example, if the required right-of-way is 150 feet, and the pole is placed 10 feet off of an existing road right-of-way, an 85-foot-wide easement will be required from the landowner and the additional 65 feet of the needed right-of-way will be shared with the road right-of-way. The lowest davit arms on the pole will be approximately 60 feet above the ground and average 70 feet above ground depending on span length. Davit arms will extend approximately 18 feet from the center of the pole. In each instance of sharing right-of-way, the Applicants will acquire necessary approvals from the right-of-way owner (e.g., railroad) or the agency overseeing use of a particular right-of-way.

23.6 NECESSARY CLEARING ACTIVITIES

Impacts on wooded lands have been minimized by locating the Proposed Route to minimize tree clearing to the extent feasible. No other mitigative measures have been identified. Isolated trees may need to be cleared to allow safe operation of the transmission line. General right-of-way clearing and maintenance is described in Section 22.0.

23.7 UNDERGROUND TRANSMISSION

No portion of the Proposed Route will require underground transmission.

24.0 ADDITIONAL INFORMATION IN APPLICATION (ARSD § 20:10:22:36)

The Applicants believe that this Application contains all the information required to meet the burden of proof specified at SDCL 49-41B-22. No additional information is provided.

24.1 AGENCY CONTACTS

24.1.1 Federal and State Agencies

Federal and state agencies were contacted by the Applicants to inform them of the Project and to request information regarding potential environmental effects under each agency's jurisdiction. Key affected agencies include the USFWS, SDGFP, and SHPO. Any future involvement, coordination, or correspondence will be provided to the Commission, as appropriate.

United States Fish and Wildlife Service

Representatives of the Applicants met with the U.S. Fish and Wildlife Service on April 29, 2013 to discuss the Proposed Route. Species and areas of interest, as discussed in previous sections, were identified by the U.S. Fish and Wildlife Service. The Applicants will continue consultation with the U.S. Fish and Wildlife Service as route design is finalized.

South Dakota Department of Game, Fish and Parks

Representatives of the Applicants met with the South Dakota Department of Game, Fish and Parks on April 29, 2013 to discuss the Proposed Route. Species and areas of interest, as discussed in previous sections, were identified by the South Dakota Department of Game, Fish and Parks. The Applicants will continue consultation with the South Dakota Department of Game, Fish and Parks as route design is finalized.

South Dakota State Historic Society

As recently as March 2013, the Applicants requested and received data from the South Dakota State Historic Society pertaining to known archaeological sites and architectural historic properties located within one mile of the Proposed Route. Further, representatives of the Applicants met with the SHPO on April 22, 2013 via telephone conference to discuss the Proposed Route. The Applicants will continue consultation with the SHPO as route design is finalized.

24.1.2 Local Government Units

The Applicants engaged potentially affected local government units within Deuel and Brookings counties as part of the route selection process. The Applicants will continue to coordinate with local government units affected by the Proposed Route to the extent such coordination is required or appropriate, in advance of and during construction.

24.2 PERMITS AND APPROVALS

The Applicants will be required to obtain additional permits or approvals from federal, state, and local agencies prior to construction of the proposed transmission line. A list of potential permits and other approvals that may be required for the Project are presented in Table 19.

Table 19. Potential Permits and Approvals

Agency/Department	Permit/Approval
Federal	
U.S. Fish and Wildlife Service	Endangered Species Act Coordination/Consultation
	Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act Coordination/Consultation
U.S. Army Corps of Engineers	Section 404 Permit
U.S. Federal Aviation Administration	14 C.F.R. Part 77 Review
State	
South Dakota Department of Environment and Natural Resources	National Pollutant Discharge Elimination System – General Permit Authorization to Discharge Stormwater Associated with Construction Activity
	Section 401 Clean Water Act, Water Quality Certification
South Dakota Department of Game, Fish and Parks	South Dakota Endangered Species Act Coordination/Consultation
South Dakota State Historic Preservation Office	National Historical Preservation Act
South Dakota Public Utilities Commission	Facility Permit
Local	
Affected County and Local Jurisdiction or Planning Department, Department of Transportation	Roadway Access, Crossing, or Encroachment Permits
	Over-Weight/Width Permits
Brookings County	Conditional Use Permit
Deuel County	Special Use Permit
Other	
State or Federal Conservation Easement Programs	Coordination or approval to cross enrolled lands

24.2.1 Federal Permits and Approvals

U.S. Army Corps of Engineers

A Section 404 permit is required from the U.S. Army Corps of Engineers under the Clean Water Act for discharges of dredged or fill material into waters of the U.S.. A permit will be required for the Project if the placement of poles or other disturbances within jurisdictional waters cannot be avoided. The Applicants will seek permit authorization in advance of construction.

U.S. Federal Aviation Administration

Notice to and review by the Federal Aviation Administration ("FAA") is required for structures 200 feet and greater in height, or when the structure height will exceed a slope requirement in relation to airport runways or heliports as defined in 14 C.F.R. Part 77. Further, structures near public use airports will need to take into account any terminal

procedures surfaces, as defined by the airport and the FAA. The nearest public use airport is located approximately eight miles from Proposed Route.

U.S. Fish and Wildlife Service

The Applicants will consult with the USFWS regarding the potential for occurrence of federally protected species or their habitats in accordance with the Endangered Species Act, as well as the crossing of any USFWS wetland or conservation easement. The Applicants will also consult with the USFWS to minimize impacts on migratory birds and other species of concern during construction of the Project.

24.2.2 State Permits and Approvals

In addition to a Facility Permit from the Commission, the following state agencies are also affected by the Project.

South Dakota Department of Game, Fish and Parks

The Applicants have consulted with the SDGFP regarding the potential for occurrence of threatened or endangered species, and their habitats, that may be affected by the Project. The Applicants will continue to coordinate with the SDGFP.

South Dakota Department of Environment and Natural Resources

A National Pollutant Discharge Elimination System ("NPDES") Permit from the SDENR is required for stormwater discharges associated with ground disturbing construction activities equal to or greater than one acre. A requirement of the permit is to develop and implement a Storm Water Pollution Prevention Plan ("SWPPP"), which includes implementation of construction best management practices intended to establish sediment and erosion control and minimize discharge of pollutants. The Applicants will prepare a SWPPP for the Project and submit an application to the SDENR to obtain permit coverage prior to beginning construction activities.

Section 401 water quality certification may be required for activities that may result in a discharge to waters of the U.S. This certification ensures that projects will comply with state water quality standards in accordance with the Clean Water Act.

South Dakota Department of Transportation

A permit to occupy right-of-way from the South Dakota Department of Transportation is required for the Applicants to gain access to the Project from highway right-of-way.

South Dakota State Historic Preservation Office

The Applicants have consulted with SHPO to determine if sites eligible for listing in the National Record of Historic Places are present and may be affected by the Proposed Route. The Applicants will continue to coordinate with SHPO.

24.2.3 Local Permits and Approvals

Typical local approvals associated with transmission line construction are listed below.

Road Crossing/Right-of-Way Permits

These permits are required to cross or occupy county, township, and city road rights-of-way.

Land Use Permits

These permits may be required to occupy county, township or city lands such as park lands, watershed districts, and other properties administered by these entities. A Conditional Use Permit is anticipated in Brookings County and a Special Use Permit is anticipated in Deuel County.

Building Permits

These permits may be required by the local jurisdictions for the Brookings County substation modifications and construction.

Over-Width/Load Permits

These permits may be required to move over-width or heavy loads on county, township, or city roads.

Driveway/Access Permits

These permits may be required to construct access roads or driveways from county, township, or city roadways.

25.0 TESTIMONY AND EXHIBITS (ARSD § 20:10:22:39)

The Applicant's witnesses will include the following:

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25.1 LIST OF PREPARER'S

The following groups contributed to this Application:

- Xcel Energy
- Otter Tail Power
- May Adam Gerdes and Thompson, LLP
- Environmental Resources Management

25.2 APPLICANTS' VERIFICATION

State of Minnesota)

:SS

County of Hennepin)

Joseph Samuel, signing for both Xcel Energy and Otter Tail Power, as the Applicants in this Application, states that he does not have personal knowledge of all of the facts recited in the foregoing Application, but the information in the Application has been gathered by and from employees, contractors of the owners of the Project; and that the information in this Application is verified by him as being true and correct on behalf of the Applicants.

Dated this 31st day of May, 2013.

Signature

26.0 DEFINITIONS

Avian	Of or relating to birds.
A-weighted Scale	The sensitivity range for human hearing.
Circuit	An electrical path.
Conductor	1. A material or object that permits an electric current to flow easily. 2. A wire or combination of wires suitable for carrying an electrical current. Conductors may be insulated or bare. 3. Any material that allows electrons to flow through it.
Corona	The breakdown or ionization of air in a few centimeters or less immediately surrounding conductors.
Electromagnetic Fields (EMF)	The term EMF refers to electric and magnetic fields that are coupled together, such as in high frequency radiating fields. For the lower frequencies associated with power lines, EMF should be separated into electric and magnetic fields. Electric and magnetic fields arise from the flow of electricity and the voltage of a line. The intensity of the electric field is related to the voltage of the line. The intensity of the magnetic field is related to the current flow through the conductors.
Fauna	The collective animals of any place or time that live in mutual association.
Flora	The collective plants of any place or time that live in mutual association.
Hydrocarbons	Compounds that contain carbon and hydrogen and that are found in fossil fuels.
Insulator	A device that is used to electrically isolate a conductor or electrical device from ground or a different electrical potential.
Ionization	Removal of an electron from an atom or molecule.
Kilovolt	1,000 volts; 345 kV = 345,000 volts.
Oxide	A compound of oxygen with one other more positive element or radical.

Ozone	A form of oxygen in which the molecule is made of three atoms instead of the usual two.
Raptor	A member of the order Falconiformes, which contains the diurnal birds of prey, such as the hawks, harriers, eagles and falcons.
Right-of-Way	The land rights that must be acquired to safely construct, operate, and maintain an electrical line.
Span	The distance between two supporting structures.
Stray Voltage	"Stray voltage" is a condition that can occur on the electric service entrances to structures from distribution lines, not transmission lines. More precisely, stray voltage is a voltage that exists between the neutral wire of the service entrance and grounded objects in buildings, such as barns and milking parlors. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. Transmission lines, however, can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line.
Ultraviolet Radiation	A portion of the electromagnetic spectrum with wavelengths shorter than visible light.
Voltage	Electric potential or potential difference expressed in volts.
Wetland	Wetlands are areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted for life in saturated soil. Wetlands include swamps, marshes, bogs, and similar areas.

27.0 ABREVIATIONS

APE	Area of Potential Effect
ARSD	Administrative Rules of South Dakota
CFR	Code of Federal Regulations
dB	Decibel
dBA	A-weighted Decibel
EF	Electric Field
EMF	Electromagnetic Field/Electric and Magnetic Field
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
G	Gauss
GIS	Geographic Information System
HUC	Hydrologic Unit Code
HVTL	High Voltage Transmission Line
kV	Kilovolt
kV/m	Kilovolts per Meter
MF	Magnetic Field
mG	MilliGauss
MISO	Midwest Independent System Operator
MVP	Multi Value Project
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
PEM	Palustrine Emergent
PFO	Palustrine Forested
PSS	Palustrine Scrub-shrub
PUB	Palustrine Unconsolidated Bottom
SDCL	South Dakota Codified Law
SDENR	South Dakota Department of Environment and Natural Resources
SDGFP	South Dakota Department of Game, Fish and Parks
SWPPP	Storm Water Pollution Prevention Plan
U.S.	United States

USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

28.0 REFERENCES

Brookings County 2007. Brookings County Zoning Ordinance. Revised November 27, 2007.

Deuel County 2004. Deuel County Zoning Ordinance. August 12, 2004.

South Dakota Game Fish and Parks (SDGFP). 2013. South Dakota Wildlife Action Plan: The Big Picture. Accessed at http://gfp.sd.gov/wildlife/docs/wildlife-action-plan-article.pdf

South Dakota Department of Labor and Regulation. 2012. Preliminary Population Projections for South Dakota and Counties, 2010-2035. Available online at http://dlr.sd.gov/lmic/menu_demographics.aspx. Accessed March 2013

South Dakota Department of Transportation. 2012 South Dakota Traffic Flow Map. Available online at http://www.sddot.com/transportation/highways/traffic/docs/Traffic_2012.pdf. Accessed March 2013.

United States Census Bureau. 2010. State and County Quick Facts, South Dakota. Available online

United States Department of Agriculture. 2002 Census of Agriculture. Available online at http://www.agcensus.usda.gov/. Accessed March 2013.

United States Department of Agriculture. 2007 Census of Agriculture. Available online at http://www.agcensus.usda.gov/Publications/2007/Full_Report/ and http://quickfacts.census.gov/qfd/states/46000.html . Accessed March 2013.

United States Environmental Protection Agency. 2013 Ecoregions of North Dakota and South Dakota. Available online at http://www.epa.gov/wed/pages/ecoregions/ndsd_eco.htm. Accessed March 2013.

United States Fish and Wildlife Service (USFWS). 2000. Environmental Assessment: Dakota Tallgrass Prairie, Wildlife Management Area, Grassland Easement Program.

USGS 2013. Earthquake Hazards Program. South Dakota Earthquake Information. Web Site accessed on March 22, 2013. http://earthquake.usgs.gov/earthquakes/states/?region=South Dakota.