Montana-Dakota Utilities Co. and
Otter Tail Power Company
APPLICATION TO THE
PUBLIC UTILITIES COMMISSION OF THE
STATE OF SOUTH DAKOTA
FOR A FACILITY PERMIT

Big Stone South-Ellendale Project
345-kV Transmission Line

August 14, 2013

EXHIBIT 1

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List of Acronyms and Abbreviations

Abbreviation	Meaning
ACSR	aluminum conductor steel reinforced
AM	amplitude modulated
APE	area of potential effects
APLIC	Avian Power Line Interaction Committee
Applicants	Montana-Dakota Utilities Co. and Otter Tail Power Company
ARSD	Administrative Rules of South Dakota
ASR	Antenna Structure Registration
BMPs	Best Management Practices
BPA	Bonneville Power Administration
Commission	Public Utilities Commission of the State of South Dakota (also PUC)
Coteau	Coteau des Prairies
dB	Decibels
dBA	A-weighted sound level in decibels
EF	electric field
ELF	extremely low frequency
EMF	electromagnetic field
EMI	electromagnetic interference
EPA	United States Environmental Protection Agency
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FM	frequency modulated
ft ASL	feet above sea level
G	Gauss
GIS	Geographic Information System
GLO	General Land Office
GPS	Global Positioning System
HVTL	high-voltage transmission line
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEEE	Institute of Electrical and Electronics Engineers
kcmil	thousand circular mils
kV	kilovolt
kV/m	kilovolts per meter
m	meter
mA	milliamperes
MF	magnetic field

Abbreviation	Meaning
mG	milliGauss
Midwest ISO	Midwest Independent Transmission System Operator
MISO	Midcontinent Independent System Operator, Inc., previously Midwest ISO
Montana-Dakota	Montana-Dakota Utilities Co.
MRO	Midwest Reliability Organization
MTEP	Midwest ISO Transmission Expansion Plan
MVP	Multi-Value Project
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NGO	non-governmental organization
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
Otter Tail Power	Otter Tail Power Company
pH	A measure of the concentration of Hydrogen ions, indicating the acidity or basicity of a solution
ppm	parts per million
Project	Big Stone South to Ellendale Project
PUC	South Dakota Public Utilities Commission (also Commission)
RF	radio frequency
RGOS	Regional Generation Outlet Study
ROW	right-of-way
SDARC	South Dakota Archaeological Research Center
SDCL	South Dakota Codified Laws
SDGFP	South Dakota Department of Game, Fish and Parks
SDSHPO	South Dakota State Historic Preservation Office
SSURGO	Soil Survey Geographic
STATSGO	State Soil Geographic
SWPPP	Storm Water Pollution Prevention Plan
THPO	Tribal Historic Preservation Office
TMDL	Total Maximum Daily Load
TP	twisted pair

Abbreviation	Meaning
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WPA	Waterfowl Production Area

Definitions

Term	Definition
BMPs	Best Management Practices are used during construction to minimize adverse effects to the existing environment from the time the initial excavation begins until the transmission facility is operational.
desktop survey	A method of review completed for the first phase of planning that does not typically require on-site review of resources. This methodology helps to determine areas of potential difficulty through a review of aerial photography and GIS data.
Ellendale 230-kV Substation	Existing Ellendale 230-kV substation
Ellendale 345-kV Substation	New Ellendale 345-kV Substation (constructed as a part of this Project)
kilovolt	1,000 volts; 345-kV = 345,000 volts
MISO	Midcontinent Independent System Operator, Inc., an independently governed organization tasked with ensuring transmission network reliability and efficiency. Formerly named Midwest ISO.
North Dakota Facility	North Dakota portion of this Project consisting of approximately 9 to 11 miles of single-circuit 345-kilovolt (kV) transmission line and the Ellendale 345-kV Substation located in Dickey County, North Dakota,
North Dakota Facility ROW	The 150-foot-wide right-of-way in which the North Dakota Facility will be constructed as determined by final design.
Project	The Project will consist of approximately 160 to 170 miles of single-circuit 345-kilovolt (kV) transmission line in South Dakota and North Dakota and a new 345-kV substation located near Ellendale, North Dakota.
right-of-way (ROW)	The land that must be acquired through land rights to safely construct, operate, and maintain an electrical line.
South Dakota Facility	The South Dakota portion of this Project consisting of approximately 150 to 160 miles of single-circuit 345-kV transmission line traversing through Brown, Day, and Grant counties and associated facilities (two fiber optic regeneration stations and their access roads)
South Dakota Facility area	The vinicity of the South Dakota Facility
South Dakota Facility ROW	The 150-foot-wide right-of-way in which the South Dakota Facility will be constructed as determined by final design.

1.0 Executive Summary

Montana-Dakota Utilities Co., a Division of MDU Resources Group, Inc., a Delaware corporation (Montana-Dakota), and Otter Tail Power Company, a Minnesota corporation (Otter Tail Power), (jointly, the Applicants), propose to construct the Big Stone South to Ellendale Project (Project). The Project consists of both a 345-kilovolt (kV) transmission line that is approximately 160 to 170 miles long traversing through North Dakota and South Dakota, and the Ellendale 345-kV Substation located near Ellendale, North Dakota. The Applicants submit this Application for a facility permit (Application) to the Public Utilities Commission of the State of South Dakota (the Commission) pursuant to South Dakota Codified Laws (SDCL) Chapter 49-41B and Administrative Rules of South Dakota (ARSD) Chapter 20:10:22. The South Dakota Facility for which the Applicants are seeking a facility permit in this Application consists of approximately 150 to 160 miles (for the purposes of this Application, the Applicants have used 155 miles in their calculations) of alternating current 345-kV transmission line and associated facilities. The line will cross the South Dakota and North Dakota border in Brown County, South Dakota and extend south and east through Brown, Day, and Grant counties to the Big Stone South Substation in Grant County, South Dakota near Big Stone City. Modifications to the South Dakota Facility may occur depending on the final route permitted, land rights, and final engineering design.

Exhibit 1 provides a map showing the route of the Project.

Exhibit 2 provides a more detailed map showing the South Dakota Facility.

The Project was identified as one of seventeen Multi-Value Projects (MVPs) by Midcontinent Independent System Operator, Inc. (MISO, formerly Midwest Independent Transmission System Operator [Midwest ISO]). The Applicants are MISO members. Significant study and input shows that MVPs will reduce the wholesale cost of energy delivery for consumers across the MISO region by enabling the delivery of low-cost generation to load, reducing congestion costs, and increasing system reliability.

The South Dakota Facility is anticipated to cost approximately $250 to $320 million in 2013 dollars. The total Project is expected to cost approximately $293 to $370 million in 2013 dollars and the cost will be allocated to and shared among MISO members in accordance with the MISO tariff. In general, the South Dakota Facility will be constructed with single-pole steel structures. The average height of the structures will range from approximately 100 to 155 feet. The average span between structures will range from 700 to 1,200 feet (typically about 1,000 feet) and will vary depending on geological or engineering constraints determined in final design. The right-of-way (ROW) for the South Dakota Facility will generally be 150-feet-wide. Two fiber optic regeneration stations about 100-feet-wide by 100-feet-long will be located outside of the ROW. A 30-foot-wide temporary travel path within the ROW will be used for construction. This temporary travel path is for vehicle traffic for work required to install structures and string conductors. In addition, the Project will require temporary laydown yards and wire stringing areas outside of the ROW. Specialty structures and foundations may be required in certain circumstances. Land rights procurement agreements with landowners of parcels crossed by the South Dakota Facility are currently underway. Construction on the South Dakota Facility is scheduled to begin in 2016 and is expected to be in-service in 2019.

The Applicants took a multi-faceted approach to identify a route for the South Dakota Facility. The process included more than one year of outreach to public, agency, and tribal stakeholders, publicly available data, and data gathered during route analysis such as a cultural resources literature review, bald eagle stick nest survey, and land cover modeling. Multiple alternative routes were considered and refined, and ultimately the proposed route was selected through this process. The Applicants have addressed the Application submittal requirements as described in in SDCL Chapter 49-41B and in ARSD Chapter 20:11:22 (Energy Facility Siting Rules).

1.1 Completeness Checklist

The contents required for an application with the Commission are described in SDCL 49-1-8 and further clarified in ARSD 20:10:13:01(1) et seq. The Commission submittal requirements are listed in Table 1, with cross-references indicating where the information can be found in this Application.

Table 1. Completeness Checklist

SDCL	ARSD	Required Information	Location
49-41B-35(2).	20:10:22:05	**List of Permits.** The application for a permit for a facility shall contain a list of each permit that is known to be required from any other governmental entity at the time of the filing. The list of permits shall be updated, if needed, to include any permit the applicant becomes aware of after filing the application. The list shall state when each permit application will be filed. The application shall also list each notification that is required to be made to any other governmental entity.	24.0
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.	3.0
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

SDCL	ARSD	Required Information	Location
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.	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 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.	8.0
49-41B-11(11); 49-41B-21; 49-41B-22(2)	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 affect of the environment as a result of their construction or operation in the transmission site or siting area.	9.0 – 19.0

SDCL	ARSD	Required Information	Location
49-41B-11(11); 49-41B-22(2)	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 description of plans to offset such constraints.	10.0

SDCL	ARSD	Required Information	Location
49-41B-11(11); 49-41B-21; 49-41B-22(2)	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(11); 49-41B-21; 49-41B-22(2)	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(11); 49-41B-21; 49-41B-22(2)	20:10:22:17	**Effect on 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 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.	13.0

SDCL	ARSD	Required Information	Location
49-41B-11(11); 49-41B-22(2)	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 nonrow 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; 49-41B-28	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

SDCL	ARSD	Required Information	Location
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 commencement and duration of construction of the proposed facility.	18.0
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 applicant's 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

SDCL	ARSD	Required Information	Location
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
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(2)(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

SDCL	ARSD	Required Information	Location
49-41B-7; 49-41B-22	20:10:22:36	**Additional information in application.** The applicant shall also submit as part of the application any additional information necessary for the local review committees to assess the effects of the proposed facility pursuant to SDCL 49-41B-7. 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.	25.0
	20:10:22:37	**Statement required describing gas or liquid transmission line standards of construction.** The applicant shall submit a statement describing existing pipeline standards and regulations that will be followed during construction and operation of the proposed transmission facility	Not Applicable
	20:10:22:38	**Gas or liquid transmission line description.** The applicant shall provide the following information describing the proposed gas or liquid transmission line: (1) A flow diagram showing daily design capacity of the proposed transmission facility; (2) Changes in flow in the transmission facilities connected to the proposed facility; (3) Technical specifications of the pipe proposed to be installed, including the certified maximum operating pressure, expressed in terms of pounds per square inch gauge (psig); (4) A description of each new compressor station and the specific operating characteristics of each station; and (5) A description of all storage facilities associated with the proposed facility.	Not Applicable

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2.0 Description of the Nature and Location of the South Dakota Facility

The Project will consist of approximately 160 to 170 miles of single-circuit 345-kilovolt (kV) transmission line and a new 345-kV substation located near Ellendale, North Dakota. The Project connects the new Ellendale 345-kV Substation in North Dakota and the Big Stone South Substation near Big Stone City, South Dakota. The Big Stone South Substation will be constructed as part of the Order issued by the Commission in South Dakota Docket EL-12-063. The South Dakota portion of this Project consists of about 150 to 160 miles (the Applicants have used approximately 155 miles for their calculations) of single-circuit 345-kV transmission line traversing through Brown, Day, and Grant counties and associated facilities (called the South Dakota Facility). The exact length of the South Dakota Facility will be determined during final design. The North Dakota portion of the Project consists of about 9 to 11 miles of single-circuit 345-kV transmission line and the new Ellendale 345-kV Substation all located in Dickey County, North Dakota (called the North Dakota Facility).

2.1 South Dakota Facility

The South Dakota Facility is located in Brown, Day, and Grant counties. See Exhibit 1 for a Project Overview, Exhibit 2 for a detailed view of the South Dakota Facility, and Exhibit 3 for the United States Geological Survey (USGS) topographic maps of the South Dakota Facility. At the South Dakota/North Dakota state border, the South Dakota Facility heads south, paralleling 388th Avenue in Brown County for about 19 miles. The South Dakota Facility then crosses through southeastern Brown County for approximately 20 miles, eventually turns east into Day County, paralleling 131st Street and crosses the James River. In Day County, the South Dakota Facility is generally located along the western and southern borders of the county paralleling 418th Avenue South, the South Dakota Facility then turns east along 148th Street. Eventually the South Dakota Facility turns south and follows quarter section lines through farm fields, then South Dakota Facility turns east to parallel 151st Street through Wheatland Township. The South Dakota Facility continues east, crossing Interstate 29, and continuing into southern Grant County. Once in the Melrose Township, the South Dakota Facility generally crosses farm fields, using section lines and field lines to connect with the Big Stone South Substation outside of Big Stone City, South Dakota. Please refer to Appendix A for a detailed South Dakota Facility description and table listing each section, township, and range crossed.

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3.0 Name of Owner, Manager, and Participants (ARSD 20:10:22:06; 20:10:22:07)

Montana-Dakota Utilities Co., a Division of MDU Resources Group, Inc., a Delaware corporation (Montana-Dakota), and Otter Tail Power Company, a Minnesota corporation (Otter Tail Power), (jointly, the Applicants) will share an equal percentage of ownership of the South Dakota Facility.

Montana-Dakota is headquartered in Bismarck, North Dakota, and provides natural gas and/or electric service to parts of Montana, North Dakota, South Dakota, and Wyoming. Its service area covers about 168,000 square miles and includes approximately 312,000 customers.

Otter Tail Power is headquartered in Fergus Falls, Minnesota, and provides electric service to parts of Minnesota, North Dakota, and South Dakota. Its service area covers about 70,000 square miles and includes approximately 129,400 customers in 422 communities.

The Applicants and individuals authorized to receive communications relating to this Application on behalf of Montana-Dakota and Otter Tail Power are shown below in Table 2.

In conjunction with extensive public outreach, members of the public have been and continue to be encouraged to call the toll-free Project information line or visit the Project website with comments and questions:

Telephone: 1-888-283-4678

Website: www.bssetransmissionline.com

Table 2. Owner Contact Information

Montana-Dakota Utilities Co.	Otter Tail Power Company
Henry Ford Project Manager 400 N. 4th Street Bismarck, North Dakota, 58501-4092 Telephone: 701-222-7944	Dean Pawlowski Project Manager 215 S. Cascade Street Fergus Falls, Minnesota 56537-0496 Telephone: 218-739-8947
Project Counsel	
Thomas Welk Boyce, Greenfield, Pashby & Welk LLP 300 S. Main Avenue Sioux Falls, SD 57104 Phone: (605) 336-2424	

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4.0 Purpose of the Transmission Facility (ARSD 20:10:22:08)

The Big Stone South to Ellendale Multi-Value Project (MVP) is one of the seventeen MVPs approved by the Midcontinent Independent System Operator, Inc. (MISO, formerly Midwest Independent Transmission System Operator [Midwest ISO]). The purpose of these MVPs is to reduce the wholesale cost of energy delivery for the consumers across the MISO region by enabling the delivery of low-cost generation to load, reducing congestion costs, and increasing system reliability. Because of the need for the South Dakota Facility, as discussed in Section 6.0, there are expected to be both short-term and long-term benefits to South Dakota from Project completion.

Short-term economic benefits will be derived from activities associated with construction of the South Dakota Facility. Local businesses will likely see an increase in revenues from construction of the South Dakota Facility and positive economic gains will result from increased spending on lodging, meals, and other consumer goods and services. In addition, short-term economic benefits will be realized by landowners that will receive payments for land rights for the South Dakota Facility to cross their properties.

Long term benefits of the South Dakota Facility include supporting public policy, increasing system capacity, and adding to the tax base. By increasing the capability of the transmission system, there will be additional opportunities to transmit energy generated from renewable and other energy resources. It is anticipated that the construction of the South Dakota Facility will reduce obstacles impeding energy development, resulting in additional economic gains to the state and local areas. Another long-term benefit is that the Applicants will pay property taxes estimated to be about $1.75 to $2.25 million dollars plus contractor excise, sales, and use tax on the South Dakota Facility, which will increase the tax base for counties in which this facility is located.

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5.0 Estimated Cost of Facility (ARSD 20:10:22:09)

The total cost of the Project is estimated to be approximately $293 to $370 million in 2013 dollars and includes expenses for surveys, engineering, materials, construction, land rights, and project management. The Project and Facility costs are identified in Table 3. Customers throughout the MISO footprint will pay for the Project. It will not be solely borne by South Dakota customers.

Table 3. Approximate Project Costs

Facility	Cost [1]
Ellendale 345-kV Substation	$28 million
North Dakota Facility	$15 - 22 million
South Dakota Facility	$250 - 320 million
Total Project Cost	**$293 - 370 million**

[1] *All Project costs are approximate and will be refined with additional engineering information. Costs are in 2013 dollars.*

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6.0 Demand for Transmission Facility (ARSD 20:10:22:10)

MISO is a not-for-profit, member-based regional transmission organization administering wholesale electricity markets (see generally www.midwestiso.org). The Applicants are members of MISO. The Project is part of MISO's MVP portfolio, a regionally-planned portfolio of transmission projects supported by significant research and analysis. The MISO transmission planning report supporting the Project is, called "Multi-Value Project Portfolio – Results and Analysis" (Appendix B.1 – please refer to Section 5.7, page 30) (Midwest ISO 2012).

The Applicants participated in MISO's transmission planning efforts that identified the MVPs and concur with MISO's planning report as it pertains to the Project.

On December 8, 2011, the MISO Board of Directors approved a regional transmission plan for the construction of a portfolio of 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 in the MISO region by enabling the delivery of low-cost generation to load, reducing congestion costs, and increasing system reliability. The Project, a MISO-approved MVP, is shown on Exhibit 4 labeled as Project #6 (Midwest ISO 2011).

6.1 Description of Studies Developed

MISO conducted several studies dating back to 2002 to investigate the reliable transmission of electrical power in the Midwest and the integration of wind energy resources to provide the best value to electric consumers. The most notable studies that contributed to the identification of the Project were the Northwest Exploratory Study completed during the Midwest ISO Transmission Expansion Plan (MTEP) 2005 (Midwest ISO 2005) planning cycle (Appendix B.2 - please refer to Section 7, page 136 – 150), the Regional Generation Outlet Study (RGOS) completed during the MTEP09 and MTEP10 planning cycles (Midwest ISO 2010) (Appendix B.3 – please refer to Section 8, pages 97 – 98), and the "Multi-Value Project Portfolio – Results and Analyses" paraphrased in the MISO Transmission Expansion Plan 2011 (MTEP11) planning report (Midwest ISO 2011) (Appendix B.4 - please refer to Section 4, page 42-75). These studies are attached as electronic copies filed on CD (Appendix B).

The overall goal for the MVP portfolio analysis was to design a transmission portfolio that takes advantage of the linkages between regional reliability and economic benefits to promote a competitive and efficient electric market within the MISO territory. The Project was identified as one such project capable of providing regional electric reliability through the construction and operation of a higher-voltage transmission system. It would stabilize the regional network by providing a backbone system and contending with system contingencies. With the construction of a new 345-kV transmission line, the regional network of distribution and lower-voltage transmission lines will benefit from enhanced connections with the high voltage transmission system. In addition, the enhanced transmission system will be better able to withstand system failures. Furthermore, the Project would remove overloads on local transmission facilities, thereby improving reliability to the local transmission system as more generation facilities are constructed within North Dakota and South Dakota.

6.2 Consequences of Delay or Termination of Project

MISO's extensive regional expansion planning process involves a stakeholder process. One objective of the process is to derive the most cost-efficient transmission expansion plan that will meet local and regional needs for reliability, optimize access to low-cost power resources, and deliver other important values that benefit the ultimate consumer and society. If one key element of the regional expansion plan, especially a 'backbone' element such as the Project, designed for both reliability and economic attributes, is not constructed, considerable redesign could be required. This would result in possible delay, additional expense, and adverse impacts to the reliable addition of new generation supplies and service to load.

If the Project is not constructed as planned, the existing transmission system would be unable to continue to provide reliable service if significant new generation is interconnected. The MISO analyses of this Project identified several 230-kV and 115-kV transmission facilities that will be loaded above safe operating levels in the future without the Project (Midwest ISO 2012). The construction of the Project will provide a new high voltage transmission path to consumers of the MISO network, including consumers of the Applicants in South Dakota. In addition, the MISO MVP analysis identified economic benefits to North Dakota and South Dakota (and all Local Resource Zones within MISO) (reference Appendix B.1 "Multi-Value Project Portfolio – Results and Analyses" Section 10 on pages 80-86 (Midwest ISO 2012)). These economic benefits would not be realized by North Dakota and South Dakota without the Project. In summary, the short-term and long-term benefits listed in Section 4 (Purpose of the Transmission Facility) would not be recognized.

7.0 General Site Description (ARSD 20:10:22:11)

The South Dakota Facility crosses portions of Brown, Day, and Grant counties. Exhibit 2 displays the South Dakota Facility from the North Dakota/South Dakota state border to the Big Stone South Substation. Table 4 provides the location of the South Dakota Facility by township, range, and section identification numbers. Modifications to the South Dakota Facility may occur as a result of permitting, engineering design, and land rights.

Table 4. Proposed Location of the South Dakota Facility

County	Township Name	Township	Range	Section(s)
Grant	Grant Center	120N	49W	4-6
	Twin Brooks	120N	50W	1,2,5,7,8
	Mazeppa	120N	51W	9-12,16-18
	Mazeppa	120N	52W	13-15
	Lura	120N	51W	4,5,6
	Lura	120N	52W	1,2,7-11
	Big Stone	121N	47N	21-24,28-30
	Melrose	121N	48W	20-25,29,32
	Kilborn	121N	49W	31-34
	Osceola	121N	50W	36
Day	Egeland	120N	53W	11,12
	Egeland	120N	54W	19-24
	Wheatland	120N	55W	14-18,23,24
	Highland	120N	56W	3,5,6,8,14-17
	York	120N	57W	1
	Troy	120N	58W	3-6
	Old Gulch	120N	59W	1
	Butler	121N	57W	31,32,33,34,35
	Valley	121N	58W	33,34,35,36
	Scotland	121N	59W	1,12,13,24,25,36
	Andover	122N	59W	7-13,24,25,36
	Ordway	125N	63W	34

County	Township Name	Township	Range	Section(s)
Brown	East Hanson	122N	60W	1,12
	Groton	123N	60W	7-13,24,25,36
	Groton	123N	61W	11,12
	Henry	123N	61W	7-10
	Henry	123N	62W	11,12
	Bath	123N	62W	3,4,10
	Cambria	124N	62W	4-6,9,16,21,28,33
	Ordway	124N	63W	1-3
	Garland	125N	63W	15-17,22,27
	Westport	125N	63W	18
	Westport	125N	64W	1,12,13
	Oneota	126N	64W	1,12,13,24,25,36
	Frederick	127N	64W	12,13,24,25,36
	Richland	127N	63W	6,7
	Osceola	128N	64W	1,12,13,24,25,36
	Savo	128N	63W	31

Source: U.S. Geological Survey, 2008

8.0 Alternative Sites (ARSD 20:10:22:12)

8.1 Route Identification and Selection Process

The South Dakota Facility route selection process centered on a multi-faceted approach in which the Applicants considered state and federal requirements, public comments received at public meetings, and extensive analysis of available environmental data. The route development process was primarily driven by extensive public participation and agency coordination programs in both South Dakota and North Dakota. Table 5 provides a general overview of the public involvement efforts undertaken by the Applicants for the Project. Additional information on the public involvement activities conducted for the Project, including materials used during open house meetings, are available on the Project website at www.bssetransmissionline.com. The South Dakota Facility defined in this Application is shown in detail in Exhibit 2.

Table 5. Summary of Public, Agency, and Tribal Involvement Activities

Year	Month	Action
2012	**July**	• Project notification letter mailed to North Dakota and South Dakota state and federal agencies
	August	• Project notification letter mailed to county, state, and local representatives, and non-government organizations in North Dakota and South Dakota • Held meetings with North Dakota and South Dakota county zoning and planning representatives (Spink, Clark, Grant, Day, Hamlin, Codington, Brown, Deuel, Marshall, Roberts, Richland, Dickey, and Sargent counties) • Held two interagency meetings with state and federal agencies for North Dakota and South Dakota
	September	• Project website and toll-free Project information line made available to the public (www.bssetransmissionline.com and 888-283-4678) • Corridor notification letter for open house meetings mailed to the public, county, state, and city representatives, and non-government organizations in North Dakota, South Dakota, and Minnesota • Corridor notification letter for open house meetings mailed to township representatives in North Dakota, South Dakota, and Minnesota

Year	Month	Action
2012	**October**	• Meeting with Sisseton Wahpeton Oyate and Standing Rock Sioux Tribal Historic Preservation Offices (THPOs) for Project introduction and study area discussion • Corridor notification postcard for open house meetings mailed to landowners within the study corridors • Paid advertisements and press releases sent to North Dakota, South Dakota, and Minnesota publications to notify the communities of the study corridor open house meetings • Corridor public open house meetings (October 15-18, 2012): o Wheaton, Minnesota o Milbank, South Dakota o Webster, South Dakota o Aberdeen, South Dakota o Ellendale, North Dakota o Britton, South Dakota
	November	• *Power Delivered* Project Newsletter (Issue 1) was posted to the website and hard copies were mailed to stakeholders in the Project open house meeting attendees and those who had commented or signed up for the mailing list
	December	• *Power Delivered* Project Newsletter from November sent electronically to contact persons above who provided email addresses
2013	**January**	• Conducted interagency meetings for North Dakota and South Dakota state and federal agencies. Follow-up letter sent to agencies which included the meeting minutes and letter from the Applicants • Hosted an online webinar and conference call with county representatives in North Dakota and South Dakota including Day, Brown, Grant, Dickey, and Marshall counties to describe the routing process and gather input on preliminary routes followed up with meeting minutes and a message from the Applicants
	February	• Meeting with South Dakota State Historic Preservation Office (SDSHPO) to discuss expected cultural resource identification efforts and tribal involvement • Paid advertisements and press releases sent to North Dakota and South Dakota publications to notify the communities of the routing open house meetings • Notification letter for routing open house meetings sent to stakeholders including state, federal, and local agencies, elected officials, and non-governmental organizations (NGOs) • Notification postcards for routing open house meetings sent to landowners within the preliminary corridors of the Project and active participants who attended a meeting or submitted a comment • Routing public open house meetings (February 25-27, 2013): o Groton, South Dakota o Ellendale, North Dakota o Britton, South Dakota o Webster, South Dakota o Milbank, South Dakota

Year	Month	Action
2013	**March**	• A thank you postcard was sent to routing open house meeting attendees • Meeting with Sisseton Wahpeton Oyate and Standing Rock Sioux THPOs to discuss preliminary routes
	April	• Additional Route Segment notification letters were mailed to landowners within the 150-foot-wide right-of-way (ROW) of a new route segment added to the preliminary routes for review
	May	• Preferred route notification mailed to federal and state agencies including a map of the preferred route • Preferred route notification mailed to county officials and staff • Preferred route notification mailed to township chairs • Preferred route notification mailed to tribal representatives • Meeting held with Sisseton Wahpeton Oyate and Standing Rock Sioux THPOs to discuss general cultural resource identification and survey approach • Conference call with SDSHPO held to discuss cultural survey approach and schedule
	June	• Preferred route notification mailed to landowners within 500 feet of the South Dakota Facility centerline, landowners within the original corridors, and to people on the mailing list at the time of the mailing • Preferred route maps available on Project website • Paper and electronic copies of the Second Issue of *Power Delivered* Project Newsletter sent out to stakeholders and landowners within a half-mile of the preliminary routes, and to active participants in the Project
	July	• Meeting held with Sisseton Wahpeton Oyate and Standing Rock Sioux THPOs to finalize discussions on the South Dakota Facility and the cultural resources survey approach • Submitted Class I Literature Review report to SDSHPO

The Applicants began their analysis by collecting Geographic Information System (GIS) data from local, state, and federal agencies for much of northeastern South Dakota and southeastern North Dakota. The Applicants used these data, along with data collected during field visits to the South Dakota Facility area, to develop a Project study area and identify initial opportunities and constraints such as state and federal lands as shown on Exhibit 5. The Applicants then narrowed the study area into study corridors that were used for agency and public outreach to help identify additional opportunities and constraints to be considered during routing. Next, the Applicants developed a series of route segments within the study corridors, which were typically short linear segments in proximity to public roadways, section or quarter section field lines, or existing corridors that a potential transmission line route could be near. It was considered desirable to locate the new transmission line near facilities such as roadways, section lines, and existing corridors in order to minimize impacts to open land areas, avoid impacts to homes, businesses, or wind energy facilities, and allow for easier access to the right-of-way (ROW) for construction and maintenance purposes. The feasibility of using these segments was evaluated on an individual basis. Once evaluation of the route segments was completed, the segments were

linked together into numerous alternative preliminary transmission line routes. The Applicants evaluated the preliminary routes, measuring them against both the transmission line routing considerations for the State of South Dakota (SDCL 49-41B-22) and input on sensitive and important resources identified by the public. The transmission line route in South Dakota was selected based on several considerations, including the following:

- Minimizing total length and construction costs
- Minimizing impacts to humans and human settlements, including (but not limited to) displacement, noise, aesthetics, cultural values, recreation, and public services
- Consideration of effects on public health and safety
- Offsetting existing ROW (roadway or other utility ROW) or section lines to minimize impacts to land-based economies, including (but not limited to) agricultural fields and mining facilities
- Minimizing effects on archaeological, cultural properties, and historic resources
- Minimizing impacts to wetlands, surface waters, and rivers
- Minimizing impacts to rare or endangered species and unique natural resources
- Minimizing effects to airports or other land use conflicts

During public open house meetings conducted during the route identification and selection process, the public identified several criteria that were also considered in the routing process. These criteria included:

- Constructing the transmission lines near existing roadway ROW or close to the half section lines to minimize impacts to agricultural fields
- Placing structures to minimize impacts to agricultural production/allow for the movement of farm equipment
- Avoiding a diagonal route across agricultural fields wherever possible
- Preference for mono-pole structures rather than H-frame structures

Upon determination of the preferred route, notifications were sent to federal and state agencies in May 2013, requesting comment on the preferred route, as shown in Table 5. A table outlining agency contact and copies of the agency material correspondences are provided in Appendix C.

8.2 Alternatives Considered and Selected

The Applicants initially considered multiple alternatives for the South Dakota Facility. The Applicants evaluated preliminary routes in South Dakota based on the factors listed above and the comments received from the public. The study corridor in Minnesota was considered but not selected for the following reasons:

- Need to complete permitting process in an additional state
- Crossing of the Bois de Sioux and Minnesota Rivers which are classified as Section 10 Rivers, regulated by the United States Army Corps of Engineers (USACE), and requiring additional federal review and permitting
- Increased length resulting in increased potential effects and cost
- Engineering challenges associated with crossing Big Stone Lake north of Ortonville, Minnesota

- High density and a high potential for cultural resources in Traverse County, Minnesota
- High density of homes along Big Stone Lake, Lake Traverse, and Little Minnesota River
- United States Fish and Wildlife Service (USFWS) Waterfowl Production Area clusters near the Traverse-Big Stone County line near Beardsley, Minnesota
- National Natural Landmark along Lake Traverse
- Density of federal lands south of Hankinson, North Dakota

The route of the South Dakota Facility proposed in this Application was selected in an effort to minimize the distance between the two substation endpoints, minimize adverse impacts to human settlements and the natural environment, minimize transmission line corridor congestion, and improve the reliability of the regional electrical system. Preliminary routes were evaluated and rejected based on comments and guidance from agencies, public, and tribes. In addition, preliminary routes parallel to Interstate 29, traveling north-south near Britton, South Dakota, and a route going near Waubay, South Dakota were rejected based on specific constraints and resources present within each area. These constraints included federal and state managed lands, archaeological resources, proximity to occupied homes, crossing existing transmission lines, large lakes and water bodies, river crossings, length, and the number of corner structures required. The preferred transmission line route avoided more constraints than the alternative routes and minimized the distance between substations to the greatest extent possible. At the time of this Application, the Applicants are working with and will continue to work directly with affected property owners to address routing issues and concerns. Applicants have no reason to believe that eminent domain powers could be reduced by use of an alternative site.

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9.0 Environmental Information (ARSD 20:10:22:13)

Chapters 10 through 19 provide a description of the existing environment at the time of the submission of the Application, an estimate of changes to the existing environment which are anticipated to result from construction and operation of the South Dakota Facility, and identification of irreversible changes which are anticipated to remain beyond the operating lifetime of the South Dakota Facility, along with mitigation measures to be taken by the Applicants. Documentation of formal consultation with agencies regarding the South Dakota Facility is discussed in Section 8 and Appendix C.

ARSD 20:10:22:13 states that "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." No cumulative or synergistic consequences as to environmental effects contemplated by the regulation are known to exist for the South Dakota Facility.

In addition, the Applicants are not aware at this time of any major industrial facilities under regulations in the siting area which may have an adverse effect on the environment as a result of the construction or operation of the South Dakota Facility.

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10.0 Effect on Physical Environment (ARSD 20:10:22:14)

10.1 Existing Environment

10.1.1 *Description of Land Forms*

The South Dakota Facility traverses four physiographic regions in northeast South Dakota. From northwest to southeast, these are the James River Lowlands, the Lake Dakota Plain, the Coteau des Prairies, and the Minnesota River Lowlands. The Coteau des Prairies is the most conspicuous landform of eastern South Dakota and consists of a highland area (an erosional remnant) between the Minnesota-Red River Lowland to the east and the James River Lowland to the west (Patterson et al., 1995). It is drained to the south by the Big Sioux River, whose tributary streams enter mainly from the east. West of the Big Sioux River, the surface of the Coteau des Prairies is dotted with lakes and depressions, while very few lakes occur east of the river. The Minnesota River and its tributaries drain the eastern lowlands and the eastern flank of the Coteau des Prairies. The James River basin receives runoff from the western slope of the Coteau des Prairies. The Lake Dakota Plain region lies within the James River Lowlands and is bisected by the James River. Elevations along the South Dakota Facility range from 1,420 feet above sea level (ft ASL) in the north to about 1,300 ft ASL west of the Coteau des Prairies to the range of 1,700-1,850 ft ASL crossing the Coteau des Prairies and terminating near 1,000 ft ASL in the Minnesota River Lowlands. The topography of the South Dakota Facility is shown in Exhibit 3.

10.1.2 *Geological Features and Constraints*

During the Ice Age, the Coteau des Prairies was covered by glaciers that deposited glacial drift over its surface. Glacial cover in the South Dakota Facility area is thicker than the surrounding regions. Drift thicknesses on the Coteau area range from 600 to 700 feet (Patterson et al., 1995). The glacial drift is comprised of till from the Des Moines lobe deposited during the Late Wisconsin period. The geologic materials of the Minnesota River valley are similar to those on the Coteau des Prairies, but are at lower elevation and are limited to about 100 feet of thickness. In the James River Lowlands, the drift was deposited by the James lobe in the pre-Late Wisconsin period. The combined drift thicknesses of the James River Lowlands and Lake Dakota Plain are typically 100 feet or less.

The South Dakota Facility area is underlain by undifferentiated Cretaceous bedrock. The uppermost bedrock in Brown and Day counties is the Pierre Shale. This shale is dark-greenish gray to dark-blackish-gray, brittle, and fissile. In Grant County, the Pierre Shale is the uppermost bedrock in the western half and the Carlile Shale is the uppermost bedrock in the eastern half. The Carlile Shale is described as dark gray to blue-gray shale and contains numerous calcareous concretions and a few thin layers of sandstone. Neither of these bedrock formations are significantly developed for groundwater supplies.

Exhibit 6 illustrates the bedrock geology and Exhibit 7 illustrates the surficial geology in the area of the South Dakota Facility.

10.1.3 *Economic Deposits*

Based on data provided by the South Dakota Department of Environment and Natural Resources, review of aerial photographs, and field observations, one gravel pit was identified

within the South Dakota Facility ROW. The gravel pit is located in Section 2 of Lura Township (T120N R52W). However, this gravel pit appears to have not been used in recent years.

10.1.4 *Seismic Risks*

Seismic risk of the South Dakota Facility area is considered low. Since 1900, five earthquakes have been recorded in the counties through which the South Dakota Facility passes and adjacent counties: two in Brown County in 1900, one in Marshall County (north of Day County) in 1934, one in Spink County (south of Brown County) in 1959, and one in Roberts County (north of Grant County) in 1995. The Applicants are not aware at this time of subsidence potential or slope instability problems associated with the Project.

10.1.5 *Soils*

Soils within the South Dakota Facility ROW can be grouped by soil associations. An association is a group of individual soil series that occur together in a characteristic geographic pattern or a distinctive pattern of soils, relief, and drainage. Each soil association is typically composed of one or more major soils and one or more minor soil components. Soil associations are defined by each county's Natural Resources Conservation Service (NRCS) office.

GIS soils data for general State Soil Geographic (STATSGO) soil associations and Soil Survey Geographic (SSURGO) data are made available by the NRCS. These data sets were analyzed using the ArcInfo license of ESRI® ArcMap™ 10.0 to determine which soil associations and series were located in the South Dakota Facility area. Fifteen soil associations comprised of 32 soil series were identified in the South Dakota Facility area. Descriptions and acreages of the soil associations within the South Dakota Facility ROW are tabulated in Appendix D.

Soil databases do not have attributes to identify erodible or highly erodible soils. In general, soils of six percent or greater slope have a higher potential for erosion due to surface runoff, if disturbed.

10.1.6 *Prime Farmland*

Prime farmlands are areas that have been determined by the South Dakota NRCS to have adequate pH, water supply, growing season length, and temperature for growing crops. Soils in prime farmlands are not excessively erodible or wet throughout the growing season. Table 6 shows the percent of farmland classifications for the South Dakota Facility ROW.

Table 6. Prime Farmland Classifications for South Dakota Facility ROW

Prime Farmland Classification	Percent of ROW
Prime farmland	49.9
Farmland of statewide importance	11.5
Prime farmland if drained	14.3
Prime farmland if irrigated	2.5
Total	**78.2**

Source: SSURGO

10.2 Potential Impacts

The characteristics of the geologic materials in the area generally limit the risks posed by the South Dakota Facility. Unconsolidated geologic and soil materials are glacial till or lacustrine sediments. These materials are generally of low permeability, although the potential exists for high permeability granular lenses of limited size.

The greatest risk to the geologic environment is soil erosion. Where land slopes are relatively flat, for example in the James River and Minnesota River Lowlands, the potential for soil erosion is low. However, steep slopes occur along the margins of the Coteau des Prairies and the topography of the Coteau des Prairies is variable. Where steep slopes, i.e., greater than 6 percent, occur, the potential for soil erosion significantly increases. Please see Appendix D for a list of soil associations and series and their respective slope ranges. Soil properties that also influence erosion from water runoff include soil texture, percent organic matter, structure infiltration capacity, and soil permeability. Soils containing high proportions of silt and fine sand are most erodible. Well-drained and well-graded gravels and gravel sand mixtures with little or no silt are the least erodible materials. General drainage ability is also described in Appendix D. Erosion from water runoff is also influenced by slope length and gradient, as well as frequency, intensity, and duration of rainfall and the amount of time bare soils are exposed. Erosion could be caused by site clearing and earthmoving in addition to natural processes.

Impacts to economic deposits are not anticipated. The Applicants will work with the owner of the gravel pit located within the ROW during negotiation of land rights agreements to minimize effects.

10.2.1 *Soils*

Construction of the South Dakota Facility will impact soils within the ROW. A 30-foot-wide temporary travel path within the ROW will be used for vehicle traffic to each structure location. In woodlands and shrublands, the full 150-foot-width of the ROW will be cleared. These activities will result in an estimated 1,580 acres of temporary impacts to soils. The Applicants estimate approximately 2.2 acres of permanent impacts to soils will occur from the installation of pole structures, regeneration stations and their associated access roads (1.47 acres from structure locations and 0.7 acres from regeneration stations and their associated access roads).

Impacts to soils could include compaction, potential loss of soil due to erosion, and the potential contamination of soils by spills from construction equipment.

10.2.2 *Prime Farmland Impacts*

Table 7 provides the estimated temporary and permanent impacts to prime farmland associated with construction and operation of the South Dakota Facility.

Table 7. Estimated Temporary and Permanent Impacts to Prime Farmland

South Dakota Facility	Farmland Classification	Temporary Impacts (acres)[1]	Permanent Impacts (acres)[2]
Structure locations and temporary travel path	Prime farmland	685.5	0.73
	Farmland of statewide importance	157.8	0.17
	Prime farmland if drained	197.0	0.21
	Prime farmland if irrigated	34.9	0.04
	Not prime farmland	298.7	0.32
Laydown areas and Wire stringing areas[3]	NA	202.9	0.0
Fiber optic regeneration stations and access roads[3]	NA	0.0	0.7
Total[3]		1,576.8	2.2

[1] Temporary impacts are calculated assuming one acre of temporary impact around each structure locations and a 30-foot-wide temporary travel path within and along the entire ROW. Additional temporary impacts are anticipated from laydown areas and wire stringing areas.

[2] Permanent impacts are calculated as a 5-foot radius (78.5 sq. ft) per structure. Temporary travel path has no permanent impact to prime farmland.

[3] The exact locations of laydown areas, wire stringing areas, fiber optic regeneration station and their access roads are not known at this time but will be determined during final design – therefore it is not known what type of prime or statewide importance soil will be impacted by these facilities.

10.3 Mitigation

The South Dakota Facility has been routed to minimize impacts to land forms, geology, and economic deposits. Available geologic data indicate that the South Dakota Facility will not significantly affect soil conditions or bedrock geology. Seismic activity is not anticipated to affect the performance of the transmission line structures. The placement of structure foundations in the ground will have a minor impact to the underlying geologic conditions. Except as described in this application, the Applicants are not aware of any additional constraints that may be imposed by geological characteristics on the design, construction, or operation of the facility.

Soil erosion is possible in areas of steep slopes, particularly on the edges of the Coteau des Prairies. To reduce adverse effects to and from soils, the Project will develop and utilize Best Management Practices (BMPs) during construction to protect topsoil and adjacent wetland resources, and minimize soil erosion. Soils disturbed during construction will be decompacted and restored to preconstruction contours to the extent practicable and in accordance with landowner agreements so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate re-vegetation, provide for proper drainage, and prevent erosion. Construction laydown areas and temporary travel paths will be restored per the landowner agreement.

11.0 Hydrology (ARSD 20:10:22:15)

11.1 Existing Environment

The South Dakota Facility area includes two distinct hydrologic regions. In the central portion of the South Dakota Facility lies the broad valley floor of the James River. The valley is situated in the sediments of glacial Lake Dakota. Topography is relatively flat, with well-defined creeks and streams. Small isolated wetlands are present but in relatively lower density than in the rest of the South Dakota Facility area. The eastern and western portions of the South Dakota Facility area tend to have a lower frequency of well-defined stream channels and a higher density of pothole lakes and wetlands; the topography tends to be more rolling and lacks a well-defined dendritic stream pattern. Exhibit 8 shows the hydrologic resources discussed in this section.

11.1.1 *Rivers and Streams*

Creeks and streams are generally meandering, limited to the toe slopes and stream valleys, and are intermittent or perennial depending on the watershed location. Stream channels along the edges of the James River valley tend to be linear.

The South Dakota Facility crosses 12 major watershed units, as defined by the USGS. They include: Maple River, Sand Lake-James River, Lower Elm River, Moccasin Creek – James River, Lower Mud Creek, Antelope Creek, Pierpont Lake, Upper Mud Creek, Grass Lake, Bitter Lake, Headwaters Big Sioux River, and South Fork Whetstone River.

Table 8 lists the USGS-named streams that are crossed by the South Dakota Facility as well as their floodplain listing. The James River is the widest river crossed by the South Dakota Facility, but is less than 1,000-feet-wide at the crossing location. The James River is identified as a Section 10 Navigable Waterway by USACE. Electronic Federal Emergency Management Agency (FEMA) floodplain data is only available for Brown County and part of Grant County. There are a total of 38 mapped floodplains crossed by the South Dakota Facility. Nine floodplain crossings are greater than 1,000 feet wide and cannot be spanned by the South Dakota Facility. The widest floodplains are associated with the James River and Mud Creek in Brown County and the Whetstone River in Grant County. Many other named and unnamed streams and water bodies have designated 100-year-floodplains.

Table 8. USGS-Named Streams/River Crossings

Surface Water Name	Number of Crossings	Floodplain Present at River Crossing[1]
Big Sioux River	3	Unknown
Elm River	1	Yes
Indian River	7	Unknown
James River	1	Yes
Maple River	1	Yes
Mud Creek	4	Unknown
South Fork Whetstone River	1	Yes
Whetstone River	2	Yes
Total Number	**20**	**NA**

[1.] *Includes review of available digital floodplain data for Brown County and part of Grant County.*

Source: National Hydrography Data set, USGS Streams data set and FEMA

11.1.2 *Wetlands*

According to the National Wetlands Inventory (NWI), the South Dakota Facility will cross mostly freshwater emergent wetlands. Table 9 provides a summary of the NWI wetland types within the South Dakota Facility ROW.

Table 9. NWI-Mapped Wetlands Identified within South Dakota Facility ROW

NWI Wetland Type	NWI-mapped Wetland Area within ROW (Acres)	Percent of ROW Containing Wetlands[1]
Freshwater Emergent Wetland	162.2	5.8%
Freshwater Forested/Shrub Wetland	2.4	0.1%
Freshwater Pond	3.1	0.1%
Riverine	5.0	0.2%
Total	172.7	6.2%

[1] *Total ROW area is 2,795.9 acres*

Source: National Wetlands Inventory data

Because the boundaries of NWI wetlands were determined by the use of aerial photography and is dependent on the year the photograph was taken and the level of water in the wetland at that time, the NWI data in South Dakota may not reflect the true size of wetlands. The NWI data were developed between 1977 and 2009, with 2009 listed as the most recent publication date.

Through field observation, conversations with stakeholders, and aerial photography interpretation, the Applicants attempted to address the known rise in water levels in the South Dakota Facility area. To provide an estimate of wetland size and potential impact, the Applicants performed a desktop analysis of wetlands within the South Dakota Facility ROW. This desktop assessment was based on recent aerial photography and the NWI mapping.

The resulting digitized boundaries are used for siting purposes and will be the basis for any field assessment of wetlands that may be performed. These digitized wetlands do not have specific wetland types associated with them, but are meant to provide a conservative estimate of wetlands in the South Dakota Facility ROW. Note that the conservative estimate of wetland area within the South Dakota Facility ROW based on current aerial photo interpretation, shown in Table 10, is more than double the estimate based on NWI data.

Table 10. Digitized Wetlands Identified within the South Dakota Facility ROW

Wetland	Wetland Area within ROW (Acres)	Percent of ROW Containing Wetlands
Digitized Wetlands	395.7	14.2%
Total	**395.7**	**14.2%**

Source: HDR Engineering, Inc.

The USFWS manages many wetland easements in the South Dakota Facility area. The habitat preserved by these easements supports the reproduction and habitat of wildlife species, particularly waterfowl and game-birds. Often the surrounding uplands in the wetland easements are in agricultural use such as crops or pasture. Within the South Dakota Facility ROW, about 264.3 acres of land contain USFWS wetland easements. Only the designated wetland portion of these parcels is actually encumbered by the easement.

11.1.3 *Other Water Resources*

No municipal wells are known to occur within the South Dakota Facility ROW. There are several locations where the South Dakota Facility crosses the edge of fields with center pivot irrigation. These agricultural irrigation systems are described in Section 19.3 and 19.4.

Water resources in the South Dakota Facility area are shown on Exhibit 8, and aquifers are shown on Exhibit 9.

11.2 Potential Impacts

11.2.1 *Rivers and Streams*

Given the flexibility of pole locations and a typical span distance of 1,000 feet, the South Dakota Facility is expected to span all rivers and streams, thus avoiding potential permanent impacts. Some structures may be placed within the designated floodplain; the locations will be determined during final design. 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.

Temporary impacts to rivers and streams may occur during construction, due to travel path crossings. The location and extent of these temporary impacts will be determined during final design.

11.2.2 *Wetlands*

Given the flexibility of pole locations and a typical span distance of 1,000 feet, the South Dakota Facility can span most wetlands, thus minimizing permanent impacts. There are 19 digitized wetlands that cannot be spanned because the crossing length is greater than

1,000 feet. Assuming one structure would be placed in each of the 19 wetlands, with an estimated permanent impact of approximately 78.5 sq. ft. for each structure, the South Dakota Facility would permanently impact about 0.03 acres of wetlands. Note that NWI data was not used to calculate wetland impacts, because the digitized data is more conservative. In addition to these impacts, there may be other wetlands that cannot be avoided because of siting constraints on adjacent lands that result in placing a structure in a wetland. The location of these impacts will be determined during final design. Note that the exact location of the fiber optic regeneration stations and their associated access roads, laydown areas, and wire stringing areas are not known at this time. It is not anticipated that laydown areas and regeneration stations will be placed in a wetland and no permanent impacts are anticipated.

Temporary impacts to wetlands will occur during construction. A 30-foot-wide temporary travel path within the South Dakota Facility ROW will be used during construction, resulting in about 78.7 acres of temporary impact to the digitized wetlands. Temporary construction impacts for each pole structure are estimated to be about one acre. This amounts to about 19 acres of temporary impact for the 19 digitized wetlands that cannot be avoided by spanning. Total temporary impacts to wetlands will be about 97.7 acres. Note that the exact location of the fiber optic regeneration stations and their associated access roads, laydown areas, and wire stringing areas are not known. However, it is not anticipated that laydown areas and regeneration stations will be placed in a wetland and no temporary impacts are anticipated.

As stated above, the South Dakota Facility ROW crosses USFWS wetland easements. However, the easement pertains only to the actual wetland and the Applicants will work with the USFWS to span all wetlands in these easements. Once field delineations occur and the wetland boundaries are identified in coordination with USFWS Wetland Management District staff, the Applicants will work with the USFWS to document temporary and/or permanent wetland impacts on easement lands.

11.2.3 *Other Water Resources*

Permanent impacts to municipal, private, communities, agricultural, recreational, fish, and wildlife water users are not anticipated and permanent impacts to surface water and groundwater are also not expected to occur.

Construction of the South Dakota Facility has the potential to impact water resources on a temporary basis. Water crossings may be required to access structure locations, resulting in the potential for erosion or other impacts to aquatic resources.

There is risk for groundwater contamination resulting from releases of contaminants during construction. The unconsolidated geologic and soil materials (as discussed in Section 10.0) are generally of low permeability, although the potential exists for high permeability granular lenses of limited size. As a result, the potential for groundwater development is limited. Similarly, the uppermost bedrock units consist of shales that are not suitable for groundwater development and have low susceptibility to contamination. Groundwater dewatering may be necessary in localized areas during construction, but potential effects of dewatering such as drawdown are local and temporary.

Temporary dewatering may be required during construction. The appropriate permits will be obtained and BMPs implemented as needed, prior to dewatering activities. The South Dakota Facility does not require water storage, reprocessing, cooling, or deep well injection. Effects to aquifers and potable water supplies by the South Dakota Facility are not anticipated. Permanent impacts to surface waters or groundwater aquifers are not expected to occur. In addition, the South Dakota Facility will not alter surface water drainage patterns (Exhibit 7).

11.3 Mitigation

Direct impacts to rivers and streams are not anticipated.

To the extent practicable, wetland impacts will be avoided through the siting process. Should any structures be placed in wetlands, the Applicants will develop appropriate mitigation, if required, in coordination with USACE under the Section 404 permit process. The permit will cover both permanent and temporary impacts. Permanent impacts to wetlands under USFWS easements will require a permit from the USFWS.

To limit impacts to hydrologic resources caused by soil erosion, groundwater contamination or stormwater runoff, the Applicants will follow applicable permit conditions as appropriate and use BMPs to reduce impacts during construction. Should vehicle fueling be required within the South Dakota Facility ROW, BMPs will be employed to ensure that equipment fueling and lubricating occur at a distance from waterways.

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12.0 Effect on Terrestrial Ecosystems (ARSD 20:10:22:16)

12.1 Existing Environment

12.1.1 *Field and Mapping Methods*

A reconnaissance-level field review of the South Dakota Facility area was conducted in October 2012. This field visit was conducted to provide field verification of remote data by cataloging the presence of wetlands, native prairie resources and existing land uses. Observations were made from road rights-of-way within the South Dakota Facility area to verify the accuracy of remote data sources.

In addition, a GIS model was developed using infrared imagery and an on-the-ground assessment method to map areas of native prairie and other land covers within the South Dakota Facility. The main purpose of this analysis was to focus on native communities in the South Dakota Facility area, particularly native prairie habitat (Appendix E) (Applicants have requested confidential treatment). The prairie habitats were ranked as high or low quality by identifying species assemblages, estimating anthropogenic disturbance, and noting other dominant land-use types in the South Dakota Facility area. This system is used to standardize prairie habitat ranking by considering the diversity of native grasses and forbs, the degree of human disturbance, the presence of non-native vegetation, the presence of woody vegetation, and evidence of fire suppression, among other factors. Those grasslands featuring native communities and those lacking non-native or woody species with little to moderate levels of human disturbance were ranked as high quality. Highly disturbed grasslands, those with low native species diversity or those dominated by non-natives were considered low quality habitat. The extents of several additional land cover types were also recorded to enhance the classification process of high quality native prairies. Table 11 provides more information on the land cover types identified by the GIS habitat model, along with their approximate corresponding National Land Cover Database (NLCD) classification.

Table 11. Land-cover Types in South Dakota Facility Area as Identified by GIS Habitat Model

Land Cover Type[1]	Characteristics
Dry Hill Prairie – High Quality NLCD category: Grassland	High diversity of native grasses and forbs dominate Minimal or absent non-native species Moderate to steep slopes Abundant glacial material, such as cobble or boulders
Dry Hill Prairie – Low Quality NLCD category: Pasture/Hay	Native grasses and forbs present Non-native species persist throughout area Moderate to steep slopes Abundant glacial material, such as cobble or boulders
Mesic Prairie – High Quality NLCD category: Grassland	High diversity of native grasses and forbs dominate Minimal or absent non-native species Flat to gently rolling terrain Somewhat poorly drained

Land Cover Type[1]	Characteristics
Mesic Prairie – Low Quality NLCD category: Pasture/Hay	Native grasses and forbs present Non-native species persist throughout area Flat to gently rolling terrain Somewhat poorly drained
Non-native Grassland NLCD category: Pasture/Hay	Dominated by non-native grasses (*Bromus inermis, Poa pratensis*, etc) Native species absent
Cropland NLCD category: Cultivated crops	Row crops, corn, soybeans etc.
Small Grains NLCD category: Cultivated crops	Wheat or alfalfa
Emergent Wetland NLCD category: Emergent Herbaceous Wetland	Wetland area dominated by *Typha spp, Spartina pectinata* or other hydrophytes Open, standing water minimal
Open Water NLCD category: Open Water	Lakes, ponds, rivers
Woodland NLCD category: Deciduous Forest and/or Shrub	Mature deciduous or evergreen canopy
Gravel NLCD category: NA	Gravel pits or other aggregate extraction facilities
Pavement NLCD category: Developed, Open Space	Roads, parking lots, airport runways
Urban NLCD category: Developed, Open Space	Commercial, downtown core (not present in corridor)
Exposed Rock NLCD category: NA	Exposed granite
Cloud Cover/No Data NLCD category: NA	Areas with pervasive data gaps or significant cloud cover were not available for this portion

[1] *There is not an exact correlation between the GIS habitat model categories and NLCD categories – there may be overlaps or discrepancies (e.g., two parcels both quantified as "Pasture" in the NLCD database may be classified as different types of prairie or grassland under the GIS habitat model)*

12.1.2 *Terrestrial Vegetation and Wildlife Cover/Habitat Types*

The South Dakota Facility ROW is located in the Prairie Parkland (Temperate) and the Great Plains Steppe Ecological Provinces as defined in the Ecological Subregions of the United States (McNab, 1994). Historically, land cover in the North Central Glaciated Plains Section of the Prairie Parkland (Temperate) Province near the South Dakota and Minnesota state border was characterized by a predominance of treeless fire-dependent grassland and brushland types interrupted by lakes, rivers, streams, marshes, and pothole wetlands. The western portion of the South Dakota Facility area lies within the Northeastern Glaciated Plains Section of the Great

Plains Steppe and occurs as an area of nearly level to undulating continental glacial till and glacial lake plains dominated by fire-dependent grasslands, wetlands, and stream courses.

The geomorphology in the area is characterized by nearly level to gently rolling till plains with potholes and well defined drainages. Moderate to steep slopes occur along river and creek valleys. The Coteau des Prairies occurs on the eastern portion of the South Dakota Facility area. This landform is a moderately dissected, relatively high plateau that rises out of a nearly level till plain. This feature and the Minnesota River's broad valley were created by the Pleistocene draining of Glacial Lake Agassiz.

The South Dakota Facility ROW includes five general habitat or cover types: native grassland, non-native grassland, upland/riparian woodland, wetland, and cropland. However, native plant communities largely have been removed or degraded by agricultural activities in the South Dakota Facility ROW. Land uses are generally dictated by the terrain of a given area. Level stream valley floors and the drier portions of the till plains are cultivated and steeper slopes or drainage slopes are used for pasture, remain as native prairie, or have been degraded by intensive grazing. Roadways generally follow section or half-section lines where the terrain allows. Farms are typically located along roadways and may feature woody groves or wind breaks.

Cropland is the most common type of land cover in the South Dakota Facility ROW. These areas generally present limited and seasonal habitat opportunities for local wildlife, but they can provide cover or serve as food sources for a variety of mammals and birds. Agricultural products such as soybeans, wheat, sunflower and corn are common.

Grasslands are mostly restricted to the Coteau des Prairies or to slopes adjacent to riparian corridors. The varied topography (Exhibit 3) in these areas has prevented agricultural production from occurring directly adjacent to the river channel, so the uneven terrain serves as pastureland. This has allowed for some native characteristics to persist. Stands of little bluestem, big bluestem, grama species, prairie cordgrass, and native forbs such as pale purple coneflower among others were observed to persist alongside introduced species such as smooth brome in some grasslands. Moderate to heavy grazing has reduced the quality of these grasslands.

The results of the GIS habitat model described above identified blocks of high and low quality native prairie in the South Dakota Facility area, along with other cover types, including non-native grasslands, croplands, and others. In general the grassland areas in the South Dakota Facility ROW (high and low quality prairie, and non-native grasslands) are currently being used for pasture. It also should be noted that cover types from the GIS model are not exact matches with the NLCD data as discussed in Section 14.1; rather both of these land cover files should be considered as separate data giving information on the vegetation types in the ROW. Table 12 provides the percentage that each of these GIS habitat model cover types represents in the South Dakota Facility ROW.

Table 12. Habitat Model Land Cover Types in South Dakota Facility ROW

GIS Habitat Model Land Cover Category	Acres in ROW	Percent of ROW
Cropland	1,346.0	48.2%
Dry Hill Prairie - High Quality	109.8	3.9%
Dry Hill Prairie - Low Quality	231.9	8.3%
Emergent wetland	348.0	12.4%
Grains	361.0	12.9%
Gravel	4.4	0.2%
Mesic Prairie - High Quality	97.9	3.5%
Mesic Prairie - Low Quality	120.6	4.3%
Non-native grassland	106.9	3.8%
Open water	26.7	1.0%
Pavement	3.3	0.1%
Rock	10.6	0.4%
Urban	2.7	0.1%
Woodland	26.0	0.9%
Total	**2,795.8**	**100.0%**

12.1.3 *Local Terrestrial Wildlife*

The South Dakota Facility area supports fauna associated with agricultural lands, a fragmented grassland landscape that contains small parcels of non-native grassland, and tallgrass prairie in the prairie pothole region. Species typical of the Upper Great Plains can be found here, although densities and relative abundance have not been determined. Those species most likely to occur in the South Dakota Facility area are those filling a general ecological niche, or demonstrating a capacity to adapt to an agricultural landscape with patchy grasslands and wetlands. Common mammals could include raccoon, Virginia opossum, mink, eastern cottontail, white-tailed deer, coyote, thirteen-striped ground squirrel, muskrat, and striped skunks. Avian species found in the area will likely include red-winged blackbird, yellow-headed blackbird, mourning dove, mallard, ruddy duck, gadwall, killdeer, horned lark, barn swallow, house wren, common yellowthroat, vesper sparrow, common grackle, western meadowlark, American robin, and American goldfinch. The South Dakota Facility area also includes stopover habitat during migration for large numbers of waterfowl, shorebirds, and sandhill cranes. Wintering habitat for snow buntings and longspurs is also likely present.

Reptiles or amphibians likely present in and near the South Dakota Facility area could include snapping turtle, western painted turtle, plains garter snake, common garter snake, Canadian toad, American toad, gray tree frog, and northern leopard frog. These species are generally associated with wetlands, riparian corridors, or grasslands located in the South Dakota Facility ROW.

Native plant communities support higher densities of vertebrate and native invertebrate use than areas used for row crop production. Additionally, these areas may provide habitat characteristics preferred by sensitive species including prairie obligate butterflies such as the Dakota skipper

and Poweshiek skipperling. Outside of these areas, native characteristics are generally absent and row crop production has diminished the quality of habitat available to grassland species.

Wetland features are relatively numerous throughout this portion of the state. The pothole features attract high numbers of migratory waterfowl to the area. Waterfowl flight paths are likely present along stream valleys and between lakes, wetlands, and agricultural fields that can serve as feeding areas. The presence of numerous waterfowl and fish using these wetlands and lakes also attract predatory species such as bald eagles and osprey. Mammals utilizing these resources include species such as red fox, muskrat, and mink.

The prevalence of pasture and grasslands near the South Dakota Facility area provides moderate to high quality habitat for grassland-dependent species such as red fox, loggerhead shrike, ring-necked pheasant, sharp-tailed grouse, marbled godwit, and predatory raptors, such as great horned owls, short-eared owls, Swainson's and red-tailed hawks.

Agricultural lands are used by species that tolerate or thrive on grain or seed crops such as corn, wheat, and sunflowers. Ring-necked pheasants, horned lark, vesper sparrow, killdeer, American robins among others are present within agricultural lands but occur at lower densities than areas that provide year-round food and cover such as native grassland or woodlands.

A review of the USFWS South Dakota Field Office list of endangered species by county (2013) indicated that the federally listed threatened (T), endangered (E), and candidate (C) species present within Brown, Day and Grant counties are the whooping crane (E), piping plover (T), Topeka shiner (T), Dakota skipper (C), and Poweshiek skipperling (C). Given the native characteristics found along portions of the transmission line, it is possible that listed species may be found in these areas.

The South Dakota Department of Game, Fish and Parks (SDGFP) also publishes a list of threatened, endangered, and candidate species (SDCL Chapter 34A-8 and 34A-8A). The South Dakota Natural Heritage Program maintains a database of observations of South Dakota special status species. Table 13 identifies the South Dakota special status species that have been observed within one mile of the South Dakota Facility.

Table 13. Special Status Species Observed Within One Mile of the South Dakota Facility

Species Type	Common Name	Scientific Name	Federal Status	South Dakota Status	State Conservation Rank[1]
Aquatic-Fish	Blackside Darter	*Percina maculata*	Not Listed	Not Listed	S2
Aquatic-Fish	Carmine Shiner	*Notropis percobromus*	Not Listed	Not Listed	S2
Aquatic-Fish	Golden Redhorse	*Moxostoma erythrurum*	Not Listed	Not Listed	SH
Aquatic-Fish	Hornyhead Chub	*Nocomis biguttatus*	Not Listed	Not Listed	S3
Aquatic-Fish	Slenderhead Darter	*Percina phoxocephala*	Not Listed	Not Listed	SX
Aquatic-Fish	Topeka Shiner	*Notropis topeka*	Threatened	Not Listed	S2

Species Type	Common Name	Scientific Name	Federal Status	South Dakota Status	State Conservation Rank[1]
Aquatic-Mussel	Creek Heelsplitter	*Lasmigona compressa*	Not Listed	Not Listed	S1
Aquatic-Mussel	Creeper	*Strophitus undulatus*	Not Listed	Not Listed	S3
Aquatic-Mussel	Lilliput	*Toxolasma parvus*	Not Listed	Not Listed	S3
Aquatic-Mussel	Pink Heelsplitter	*Potamilus alatus*	Not Listed	Not Listed	S3
Aquatic-Mussel	Plain Pocketbook	*Lampsilis cardium*	Not Listed	Not Listed	S1
Aquatic-Mussel	Threeridge	*Amblema plicata*	Not Listed	Not Listed	S2
Aquatic-Mussel	Wabash Pigtoe	*Fusconaia flava*	Not Listed	Not Listed	S1
Aquatic-Mussel	Yellow Sandshell	*Lampsilis teres*	Not Listed	Not Listed	S1
Aquatic-Plant	Spiny Naiad	*Najas marina*	Not Listed	Not Listed	SNR
Aquatic-Reptile	Spiny Softshell	*Apalone spinifera*	Not Listed	Not Listed	S2
Avian	Black-necked Stilt	*Himantopus mexicanus*	Not Listed	Not Listed	S1B
Avian	Osprey	*Pandion haliaetus*	Not Listed	Threatened	S1B
Insect	Dakota Skipper	*Hesperia dacotae*	Candidate	Not Listed	S2
Mammal	Eastern Gray Squirrel	*Sciurus carolinensis*	Not Listed	Not Listed	SU
Mammal	Northern River Otter	*Lontra canadensis*	Not Listed	Threatened	S2

[1] *G1/S1: Critically imperiled because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.*

G2/S2: Imperiled because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3/S3: Either very rare and local throughout its range, or found locally (even abundantly at some of its locations) in a restricted range, or vulnerable to extinction throughout its range because of other factors; in the range of 21 of 100 occurrences.

GU/SU: Possibly in peril, but status uncertain, more information needed.

GH/SH: Historically known, may be rediscovered.

GX/SX: Believed extinct, historical records only.

GNR/SNR: Not ranked at this time

**Bird species may have two state ranks, one for breeding (S#B) and one for nonbreeding seasons (S#N)*

Source: South Dakota Natural Heritage Database, South Dakota Department of Game, Fish and Parks, 2012

12.3 Potential Impacts

Temporary impacts to terrestrial communities will include increased human use and heavy equipment activity during construction. As part of these activities, vehicle traffic could also increase between pole locations, which will likely compact soils, trample vegetation, or create areas of exposed soil.

Impacts to native communities and listed species will be minimized by minimizing structure placement within native habitat to the extent practicable.

Approximately 14 percent of the South Dakota Facility ROW crosses wetlands or open water habitats that can serve as resting areas, foraging areas, and as source areas for local trading flights for waterfowl. Many avian species also use agricultural fields for foraging. Due to the matrix of wetland and agricultural habitat types along the South Dakota Facility ROW, there may be daily movements between areas used for roosting, nesting, and foraging. The presence of a transmission line in these areas could create a potential for avian species to collide with the South Dakota Facility during daily and seasonal movements.

The South Dakota Facility will introduce additional perching opportunities that could attract hunting raptors. Electrocution of large birds, such as raptors, is a concern generally associated with smaller distribution lines. Electrocution occurs when birds with large wingspans come in contact with either two conductors or a conductor and a grounding device. The Applicants' transmission line design standards provide adequate spacing to minimize the risk of raptor electrocution. Therefore, avian electrocution is not a significant concern for the South Dakota Facility.

12.3.1 *Raptor and Eagle Nests*

Impacts to raptor stick nests will be limited to habitat loss and inactive nest removal during construction. If a bald eagle or golden eagle nest is identified prior to construction, the Applicants will comply with the Bald and Golden Eagle Protection Act. Woodlands will be cleared from the South Dakota Facility ROW, which will be surveyed for nesting birds if tree removal is to occur during the breeding season. If tree removal occurs outside of the breeding season (April 1-July 31), impacts to nesting birds are not anticipated. Eight raptor stick nests (including bald eagle nests) were observed within one mile of the South Dakota Facility ROW and two of the eight are located within the South Dakota Facility ROW. To consider impacts to nesting bald eagles, the Applicants conducted a bald eagle nest survey in April/May 2013 and found two active bald eagle nests were located within one mile of the South Dakota Facility ROW, but the closest is approximately 0.8 miles east of the South Dakota Facility ROW in northern Brown County, South Dakota along the Maple River (Appendix F) (Applicants have requested confidential treatment). No bald eagle stick nests were located within the South Dakota Facility ROW during the survey; therefore, no impacts are anticipated to bald eagle nests.

12.3.2 *Sharp-Tailed Grouse Leks*

No sharp-tailed grouse leks were located within the South Dakota Facility area during the April 29 to May 2, 2013 field surveys. According to the SDGFP, there are no known lek sites within the South Dakota Facility ROW, two known lek sites within one mile of the South Dakota Facility ROW, and six known lek sites with two miles of the South Dakota Facility

ROW. The impact to sharp-tailed grouse may be displacement from a lek site during construction near the lek within the lekking period.

12.3.3 *Waterbird Colonies*

There are records of 11 waterbird colonies within 0.5 mile of the South Dakota Facility. The GIS records, as provided by the SDGFP, are one-mile radius plots somewhere within which are the documented colonies. Four of the 11 records are "active sites" and seven are listed as having "no evidence of breeding." Of the 11 documented colonies within one mile of the South Dakota Facility, seven of the one-mile radius polygons intersect the South Dakota Facility ROW, of which there are four "active sites" and three that show "no evidence of breeding." The impact to waterbird colonies may be displacement during construction near an active site within the breeding period.

12.3.4 *Whooping Crane*

There are no known records of whooping cranes within one mile of the South Dakota Facility ROW (Cooperative Whooping Crane Tracking Project, 2007).

Potential direct effects to whooping cranes include collisions with transmission lines. According to USFWS, collisions with power lines are the greatest known source of mortality for fledged whooping cranes. Specifically, Stehn and Wassenich (2007) stated that shield wires are the wires most often struck by birds in flight. About 15 miles of the South Dakota Facility is located within the 95th percentile band of the whooping crane migration corridor. Migrating cranes are most vulnerable to collisions with structures in the early morning or late evening when light levels are diminished, as they fly at very low altitudes between roost and foraging sites, or when flying at low altitude when starting or ending a migration flight, especially when thermal currents are minimal.

The primary indirect effect is the potential for complete avoidance of the stopover habitat located near the South Dakota Facility by the whooping cranes. Loss of migration habitat is a growing concern for the Aransas-Wood Buffalo population. Searching for suitable stopover habitat may cause increased exposure to hazards as birds are required to fly low for longer distances. However, due to the location of the Facility near existing roadways and other facilities and the abundance of suitable habitat nearby, the observed loss of suitable habitat is presumed to be low. The increased disturbance within the migration route could also place the cranes at greater risk of exposure to other hazards encountered during migration such as structures, hunters, disease, and predation.

12.3.5 *Piping Plover*

Possible impacts to piping plover include potential collision, potential for impacts to nesting habitat, and potential disruption during nesting. A direct impact to piping plover could occur in the event of a collision with the transmission line. While typical flight height information is not readily available, at times piping plovers walk or run rather than fly (Elliott-Smith et al. 2004). However, trading flights between nesting and foraging locations do occur.

There is no known nesting habitat or designated critical habitat near the South Dakota Facility area. Piping plovers typically utilize alkali wetlands and river courses with broad beaches for nesting. They may stop at flooded fields, along lake edges, or along wetland shores during migratory periods. The Applicants propose to conduct pre-construction surveys for active

nesting piping plovers within the South Dakota Facility ROW. If active nesting areas are identified during the surveys, the Applicants propose to maintain a 0.5-mile buffer from active piping plover nesting areas. Therefore, no indirect effects due to construction are anticipated. Prudent construction activities will help to minimize direct and indirect impacts to the piping plover and its associated aquatic beach habitat.

12.3.6 *Topeka Shiner*

The Topeka shiner is a small minnow inhabiting slow moving, small- to mid-sized prairie streams with sand, gravel, or rubble bottoms that are consistent with some of the stream types crossed in Brown County. They prefer pool and oxbow areas that are outside main channel courses. Pools occupied by this species are in contact with groundwater and usually contain vegetation and areas of exposed gravel.

The Topeka shiner has occurred in a branch of the Maple River. The South Dakota Facility will not include the permanent placement of structures in any streams or tributaries so no permanent impacts to the Topeka shiner or aquatic species habitat are anticipated. Direct impacts to the Topeka shiner will be avoided by spanning appropriate aquatic habitats. Indirect impacts will be minimized by utilizing erosion and sedimentation control measures that reduce or prevent sediment from reaching adjacent waterways.

12.3.7 *Prairie Butterflies – Dakota Skipper and Poweshiek Skipperling*

The Dakota skipper and Poweshiek skipperling prefer native dry mesic to dry prairie where mid-height grasses such as little bluestem, prairie dropseed, and side oats grama are a major component of the vegetation. Potential habitat for both of these species is limited to prairie remnants or wetland areas surrounded by prairie remnants. The majority of known sites occur along the Coteau des Prairies at the eastern end of the South Dakota Facility area. Habitats used by both of these species are limited to remnant prairie located on steep slopes within the South Dakota Facility ROW.

The direct effect to the Dakota skipper is possible loss of habitat. Generally, South Dakota Facility impacts will be limited to localized permanent impacts due to structure installation or temporary impacts due to construction activities. Much of the South Dakota Facility ROW is located in disturbed lands. The Applicants will conduct pre-construction surveys for the prairie butterflies in high probability areas and reasonable efforts will be made to avoid impacting these areas.

12.4 Mitigation

Tree removal, ground clearing, or mowing within the South Dakota Facility ROW in late fall or early spring (before the bird breeding season) to discourage tree and ground nesting within temporary or permanent disturbance areas is anticipated. If the South Dakota Facility ROW is not cleared between late fall and early spring (outside of the typical bird nesting period), a survey of the South Dakota Facility ROW for active nests of protected species will be conducted and if an active nest is found a construction buffer around the nest will be established. Restricting construction activities in the uncleared areas during this timeframe will allow nesting birds to breed without direct disturbance. In areas where construction activity disturbs vegetative cover, the Applicants will reseed these areas using a native seed mix to restore habitat to a similar condition as it was before construction and as per landowner agreements.

In continuing discussion with USFWS, the Applicants will develop a line marking plan to reduce the potential for bird strikes with the transmission line. In addition, the transmission line will be designed following Avian Power Line Interaction Committee's (APLIC) *Suggested Practices for Avian Protection On Power Lines: State of the Art in 2006*.

The Applicants propose to conduct pre-construction surveys for active nesting piping plovers within the South Dakota Facility ROW. If active nesting areas are identified during the surveys, the Applicants propose to maintain a 0.5-mile buffer from active piping plover nesting areas.

Terrestrial habitats will be managed by avoidance of alterations to stream channels or drainage patterns, minimizing placement of fill in wetlands and restoration of areas temporary impacted, installation and maintenance of appropriate erosion control measures, and replanting disturbed areas, if necessary, with a diverse mix of native cool and warm season grasses.

Wetland mitigation will occur as required by applicable permits. Temporary impacts will be minimized by utilizing erosion and sedimentation control BMPs that minimize or prevent sediment from reaching adjacent waterways and protect topsoil.

Prior to construction, the Applicants will conduct lek surveys for new and verified lek sites. If during surveys, a lek site is found that is active and within one mile of the South Dakota Facility, construction activity timing will be restricted so that construction does not occur between sunrise and 3 hours after sunrise during the active lekking season (March 1st through June 30th), to avoid disturbance to the birds attending the lek.

The Applicants will attempt to span suitable Dakota skipper and Poweshiek skipperling habitat and limit disturbance in these areas to the extent practicable.

13.0 Effect on Aquatic Ecosystems (ARSD 20:10:22:17)

13.1 Existing Environment

Aquatic resources are present as lakes, rivers, wetlands, creeks, and intermittent streams. These aquatic resources have been altered to various levels, ranging from wetlands that are annually cultivated to channelized watercourses to naturally occurring pothole wetlands that have little physical alteration. Wetland resources are discussed in Section 11.0.

13.1.1 *Fisheries*

Many of the lakes and rivers present within the South Dakota Facility area likely support large fish populations used by wildlife and sportsmen. These fisheries can be of high value and produce desirable game species, such as northern pike, walleye, perch, and other game fish.

In South Dakota, SDGFP maintains public access for fishing and other water recreation. There are no public accesses for fishing within the South Dakota Facility ROW.

13.1.2 *Aquatic Invertebrates*

A comprehensive inventory of aquatic invertebrates was not conducted since the South Dakota Facility will span most aquatic environments and utilize sediment and erosion control BMPs to minimize impacts to aquatic invertebrates. However, it is reasonable to assume that aquatic invertebrate populations occur in many or most of the surface water resources crossed by the South Dakota Facility. Aquatic invertebrates are a primary food source for many other species, such as fish and waterfowl.

13.2 Potential Impacts

Potential impacts to aquatic resources are primarily related to installation of structures within the aquatic habitat area or sediment deposition related to construction activities. To the extent practicable, the Applicants will avoid major disturbance of individual wetlands and drainage systems during construction.

It is anticipated that the South Dakota Facility will span the rivers and streams it crosses, depending on geologic or engineering constraints determined in final design.

During construction there is the possibility of sediment reaching surface waters as the ground is disturbed by excavation, grading, and construction traffic. Maintaining water quality during construction of the transmission line through the use of BMPs will minimize potential impacts to rare and common aquatic organisms and the aquatic environment. Once the transmission line is completed, it will have no impact on surface water quality.

13.3 Mitigation

In the event construction activities could cause a disturbance to aquatic ecosystems, the Applicants will ensure BMPs are utilized to minimize impacts to surface waters. Temporary erosion and sediment control methods will be properly placed, monitored, and maintained adjacent to water resources. These erosion control methods will remain in place until work areas become re-vegetated or are stable. BMPs may include vegetative buffers, silt fencing, mulching, seeding, and straw wattles. Where appropriate, the Applicants will revegetate

disturbed areas to as close to preconstruction conditions as possible in consultation with the landowner and as per appropriate permit requirements.

14.0 Land Use (ARSD 20:10:22:18)

The following section discusses the existing environment of, potential impacts on, and mitigation measures to land use features within or adjacent to the South Dakota Facility. It includes a discussion of land use, displacement, noise, communication facilities, and aesthetics. Land use and land cover in the South Dakota Facility area are shown in Exhibit 10.

14.1 Current Land Use

14.1.1 *Existing Environment*

The South Dakota Facility will be located primarily on private land that is zoned as agriculture under the Brown, Day and Grant county zoning ordinances. The prevailing land use within the South Dakota Facility ROW is cultivated agricultural land used for planted row crops, grassland herbaceous, and pastureland/hay. Planted row crops include corn and soybeans, along with other miscellaneous crops. The South Dakota Facility will also cross lands used for open pasture and grazing. Along the South Dakota Facility, the land crossed is characterized as a mixture of flat and rolling hillside terrain, depending on location, with relatively steep slopes on the edges of the Coteau des Prairies. Typically, small patches of trees are clustered around rural homes and natural water features. Table 14 illustrates the types of land cover crossed by the South Dakota Facility ROW, according to the National Land Cover Dataset.

Table 14. Land Cover Crossed by South Dakota Facility ROW

NLCD Land Cover Category	Acres in ROW	Percent in ROW
Barren Land (Rock/Sand/Clay)	0.2	0.01%
Cultivated Crops	1,592.7	57.0%
Deciduous Forest	7.1	0.3%
Developed, Low Intensity	4.3	0.2%
Developed, Medium Intensity	0.1	0%
Developed, Open Space	93.7	3.4%
Emergent Herbaceous Wetlands	88.1	3.2%
Grassland/Herbaceous	519.8	18.6%
Open Water	38.2	1.4%
Pasture/Hay	449.8	16.1%
Shrub/Scrub	1.7	0.1%
Total	**2,795.8**	**100%**

Source: USGS NLCD 2006 Data

As stated in Section 12.0, the Applicants also performed a South Dakota Facility-specific habitat analysis using infrared imagery and an on-the-ground assessment to map areas of native prairie and other land covers within the South Dakota Facility area. The main purpose of this analysis was to focus on native communities in the South Dakota Facility area, particularly native prairie habitat. The prairie habitats were ranked as high or low quality by

identifying species assemblages, estimating anthropogenic disturbance, and noting other dominant land-use types in the South Dakota Facility area. See Section 12.0 for more information on the habitat model and a definition of the land cover types it identifies. The Habitat Analysis is included in Appendix E.

The results of the habitat model identified blocks of high and low quality native prairie in the South Dakota Facility area, along with other cover types, including non-native grasslands, croplands and others. In general, the grassland areas (high and low quality prairie and non-native grasslands) are currently being used for pasture. It also should be noted that cover types from the GIS model are not exact matches with the NLCD data; rather both of these land cover files should be considered as separate data giving information on the land cover in the South Dakota Facility area.

The South Dakota Facility area is lightly populated. Rural residential development is widely dispersed throughout the South Dakota Facility area and some residences (typically less than one home per linear mile) are found along each of the roads paralleled by the South Dakota Facility. No vacant or occupied home is within the South Dakota Facility ROW. There are a total of 21 occupied homes and six vacant homes within 500 feet of the South Dakota Facility (Table 15). The South Dakota Facility is not anticipated to affect the use or operation of any commercial or industrial establishment. During negotiation of land rights agreements, the Applicants will work with the owners of any businesses located within the South Dakota Facility ROW, such as the inactive gravel pit, to minimize impacts.

Table 15. Occupied and Vacant Homes within 500 Feet of the South Dakota Facility

Home (west to east)	County	Civil Township Name	Township	Range	Section	Comment
1	Brown	Frederick	127	64	1	Vacant
2	Brown	Frederick	127	64	1	Occupied
3	Brown	Frederick	127	64	1	Occupied
4	Brown	Brainard	126	63	6	Occupied
5	Brown	Oneota	126	64	12	Occupied
6	Brown	Garland	125	63	8	Occupied
7	Brown	Garland	125	63	9	Occupied
8	Brown	Cambria	124	62	5	Occupied
9	Brown	Cambria	124	62	34	Vacant
10	Brown	Cambria	124	62	34	Vacant
11	Brown	Bath	123	62	4	Occupied
12	Day	Andover	122	59	5	Vacant
13	Day	Troy	120	58	1	Occupied
14	Grant	Mazeppa	120	51	2	Occupied
15	Grant	Mazeppa	120	51	1	Occupied
16	Grant	Twin Brooks	120	50	4	Occupied
17	Grant	Twin Brooks	120	50	3	Occupied
18	Grant	Kilborn	121	49	35	Occupied
19	Grant	Melrose	121	48	31	Occupied
20	Grant	Melrose	121	48	31	Occupied

Home (west to east)	County	Civil Township Name	Township	Range	Section	Comment
21	Grant	Melrose	121	48	20	Occupied
22	Grant	Melrose	121	48	27	Occupied
23	Grant	Melrose	121	48	27	Occupied
24	Grant	Melrose	121	48	27	Occupied
25	Grant	Melrose	121	48	25	Occupied
26	Grant	Big Stone	121	47	22	Vacant
27	Grant	Big Stone	121	47	22	Vacant

All homes are within 500 ft of the South Dakota Facility centerline, and are either field or desktop verified. Home points are buffered by a 25 ft radius to provide conservative estimates

In recent years, the growth of the wind energy industry in eastern South Dakota has contributed to the industrial development of the landscape. There are existing wind projects near the South Dakota Facility area. There is a wind energy facility about two miles from the South Dakota Facility in Brown County and a second wind energy facility approximately 0.8 miles from the South Dakota Facility in Day County. It is possible more development will occur in the future.

Several USFWS wetland and grassland easement parcels are located along or are crossed by the South Dakota Facility. Approximately 13.1 percent of the South Dakota Facility parallels or crosses USFWS easement parcels (3.0 percent grassland, 9.5 percent wetland, and 1.0 percent grassland/wetland). In addition, State School & Public Lands, NRCS easements, and state-funded walking/hunting areas are crossed by the South Dakota Facility (Exhibit 2). There are no Nature Conservancy lands, Wildlife Protection Areas, National Wildlife Refuges, Game Protection Areas, or parks within the South Dakota Facility ROW.

14.1.2 *Potential Impacts*

The South Dakota Facility is compatible with and will have minimal impacts on land uses in the South Dakota Facility area. Land uses within the South Dakota Facility ROW are not expected to change as a result of construction and operation of the line. Agriculture is the principal land use surrounding the South Dakota Facility and the majority of land within the South Dakota Facility ROW will still be usable for agricultural production following construction. The land no longer suitable for agricultural production will be associated with the structure locations and fiber optic regeneration stations and their associated access roads.

Short-term construction impacts to agricultural lands resulting from construction are anticipated. The Applicants will purchase land rights for private property crossed by the South Dakota Facility pursuant to state and federal land acquisition requirements, which will be recorded as part of the property record. Agricultural impacts are discussed further in Section 19.2.

Structure placement will attempt to minimize impacts to farming operations. Several grassland and wetland easements are located in the South Dakota Facility area; however, the South Dakota Facility will not substantially impact the easements. The South Dakota Facility will not affect existing wind developments.

14.1.3 *Mitigation*

Because the South Dakota Facility is generally compatible with the existing land uses in the area, no additional mitigation is required. As described above, the South Dakota Facility has been chosen to minimize impacts to farming operations. The Applicants will coordinate with the USFWS and NRCS in order to obtain necessary permits to cross easement lands, and determine appropriate mitigation measures for these crossings.

14.2 Displacement

14.2.1 *Existing Environment*

Displacement results from ROW acquisitions that require the use of property occupied by a residence or business. A displacement was defined by the Applicants as an impact to an occupied home or business whose structure is located within the South Dakota Facility ROW.

Residences near the South Dakota Facility were identified through field observation, analysis of aerial photography, and comments received at Applicant-sponsored public open house meetings.

14.2.2 *Potential Impacts*

No occupied homes are located within the South Dakota Facility ROW; therefore, no homes are expected to be displaced by the South Dakota Facility. One inactive gravel pit was identified within the South Dakota Facility ROW. The gravel pit is located in Section 2 of Lura Township (T120N R52W). During negotiation of land rights agreements, the Applicants will work with the owners of any businesses located within the South Dakota Facility ROW, such as the inactive gravel pit, to minimize impacts. The South Dakota Facility will not displace any businesses.

14.2.3 *Mitigation*

No mitigation is proposed because no displacement of residences or businesses is occurring.

14.3 Noise

14.3.1 *Existing Environment*

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 frequency sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA. A noise level change of 3 dBA is barely perceptible to average human hearing. A 5 dBA change in noise levels, 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 3 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 louder noise levels). Table 16 provides noise levels associated with common, everyday sources and places the magnitude of noise levels discussed here into context.

Table 16. Noise Levels Associated with Common Sources

Sound Pressure Level (dBA)	Noise Source
140	Jet Engine (at 25 meters)
130	Jet Aircraft (at 100 meters)
120	Concert
110	Pneumatic chipper (powered by compressed air or hydraulics)
100	Jointer/planer
90	Chainsaw
80	Heavy truck traffic
70	Busy business office
60	Conversational speech at 3 feet
50	Library
40	Bedroom
30	Secluded woods
20	Whisper

Source: A Guide to Noise Control in Minnesota, MPCA (revised, 1999)

The State of South Dakota does not regulate noise from transmission lines (corona noise) with measureable standards. Also, corona noise does not contain high levels of low frequency noise. Generally, background noise levels in rural areas vary between 40 and 50 dBA, while in suburban areas these levels increase to 50 to 60 dBA. In urban areas, noise levels vary between 60 and 70 dBA (FRA 2006). Most of the South Dakota Facility area has background levels consistent with rural areas. Windy conditions in the South Dakota Facility area tend to increase ambient noise levels compared to other rural areas. Additionally, higher levels exist near roads and other areas of human activity. Exhibit 2 shows noise sensitive land uses in the South Dakota Facility area. These were conservatively estimated to be homes within 1,000 feet of the South Dakota Facility.

14.3.2 *Potential Impacts*

Construction activities will generate short-term and intermittent noise. Construction noise will affect nearby residences on a short-term basis. During operation, transmission lines produce noise under certain conditions, called corona noise. The level of noise depends on conductor conditions, voltage level, and weather conditions. In foggy, damp, or rainy weather, transmission lines can create a crackling sound due to a small amount of electricity ionizing the moist air near the conductors. During heavy rain, the background noise level of the rain is usually greater than the noise from the 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, transmission lines will produce audible noise approximately equal to household background levels.

The South Dakota Facility was modeled to evaluate audible noise from high voltage transmission lines using the Bonneville Power Administration's Corona and Field Effects Program CORONAII version 3.0 (U.S. Department of Energy – Undated). The model was executed under normal and maximum operating conditions for an H-frame and mono-pole structure at the edge of the South Dakota Facility ROW, to ensure that noise was not under-predicted. Model results are expressed as a mean average sound pressure level (L50), which means that 50 percent of the data points are greater and 50 percent of the data points are less than the stated value for a given time period. Noise from the transmission line is expected to be below average rural background noise levels. Table 17 lists the calculated audible noise.

Table 17. Calculated Audible Noise Levels

Structure Type	Normal Operating Condition[1]	Maximum Operating Condition[2]
H-Frame Structure	17.0 dBA (L50)	42.0 dBA (L50)
Mono-Pole Structure (Delta)	18.2 dBA (L50)	43.2 dBA (L50)

[1] *Normal Operating Condition value is based on fair weather noise level.*

[2] *Maximum Operating Condition is based on foul weather noise level.*

Source: Bonneville Power Administration's Corona and Field Effects Program CORONAII version 3.0

14.3.3 *Mitigation*

During construction, noise levels will be minimized by ensuring that construction equipment is equipped with mufflers that are in good working order. Construction activities will generally be limited to the hours of 7 a.m. to 9 p.m. No additional mitigation measures are necessary since there will be minimal noise impacts from the operation of the South Dakota Facility.

14.4 Satellite, Cellular, Radio, TV, and GPS Reception

Corona, which consists of the breakdown or ionization of air within a few centimeters of conductors and hardware, can generate electromagnetic "noise" at the same frequencies that radio waves are transmitted. This noise can cause interference with the reception of these signals depending on the frequency and strength of the radio signal. The effects of corona "noise" can intensify during wet weather (Chen, 2012). Routine maintenance activities such as tightening loose hardware on the transmission line can help minimize corona noise.

If radio interference from transmission line corona does occur, satisfactory reception from amplitude modulated (AM) radio stations can be restored by appropriate modification of (or addition to) the receiving antenna system. Moreover, AM radio frequency interference typically occurs immediately under a transmission line and dissipates rapidly outside of the ROW.

Frequency modulated (FM) radio receivers usually do not pick up interference from transmission lines because:

- Corona-generated radio frequency noise currents decrease in magnitude with increasing frequency and are quite small in the FM broadcast band (88-108 Megahertz).
- The interference rejection properties inherent in FM radio systems make them virtually immune to amplitude-type disturbances.

Cellular phones are not expected to pick up interference from transmission lines because cellular phones operate on a wide range of radio frequencies which continue to increase as telecommunication carriers broaden the abilities of cellular phones. Corona-generated noise has too small of a frequency to be significant. Coupled with satellite communication capabilities built into almost all phones today, interference is not expected to occur with cellular phones.

Two-way mobile radios may experience interference because of signal-blocking effects in the immediate vicinity of transmission lines and metallic transmission structures. Movement of mobile units away from the transmission line ROW should restore communications.

Television interference is rare but may occur when a large transmission structure is aligned between the receiver and a weak distant signal, creating a shadow effect. Loose and/or damaged hardware may also cause television interference.

Global Positioning System (GPS) units collect location data from at least three or more satellites at any given time to triangulate location. The accuracy of the location data is affected by the number of satellites, how they are dispersed across the sky at any instant and atmospheric and satellite information factors. Since satellites are in constant motion above the earth, GPS units are constantly picking up and dropping satellite signals.

In 2002, the Institute of Electrical and Electronics Engineers (IEEE) published a study that investigated the effects of overhead power lines on GPS receivers (Silva & Olsen, 2002). Measurements evaluated whether GPS signals could be blocked by overhead conductors or whether use of a GPS signal could be affected by electromagnetic interference (EMI) (i.e., corona discharge or gap discharge noise). The study found that neither occurred.

The 2002 IEEE study found that conductors and associated EMI will not block or affect use of GPS satellite signal. However, it should be noted that a GPS receiver may experience less accuracy due to temporarily poor satellite alignment and/or outages to the base station or transmitter. On rare occasions, a transmission line structure may cause a temporary drop in GPS accuracy due to blockage of line-of-sight to one satellite, but this will only occur if the receiver, structure, and satellite are in a line, which is rare. Connection is usually restored within moments and the GPS units return to normal function.

14.4.1 *Existing Environment*

One Federal Communications Commission (FCC)-licensed communication tower is located within 1,000 feet of the South Dakota Facility ROW. This tower is listed in the data provided by the FCC as a "Land Mobile – Private" tower. These types of towers are the most common type of FCC-licensed tower and their uses and function vary widely from private wireless providers to local governments (FCC, 1996). Because of the wide array of

uses, private land mobile towers operate on a large spectrum of frequencies they frequently share with other private entities registered to use the tower.

There are 29 additional FCC-licensed towers (24 Land Mobile – Private, two Directional Microwave, one Antenna Structure Registration (ASR), one Cellular, and one unknown use as it was identified in the field) within one mile of the South Dakota Facility ROW.

14.4.2 *Potential Impacts*

The South Dakota Facility hardware will be designed and maintained to minimize gap and corona discharges. There is a potential for interference impacts to occur to omnidirectional communication towers (communication towers that radiate radio waves uniformly in one direction across a plane). The height of the transmission line may interfere with beam paths if they are aligned at the same height.

14.4.3 *Mitigation*

As stated above, the South Dakota Facility hardware will be designed and maintained to minimize gap and corona discharges. If interference to any communication facilities occurs, the Applicants will work with the tower owner to mitigate the impacts. If the transmission line results in radio or television interference to any residences within the South Dakota Facility area, the Applicants will work with the residents to achieve satisfactory reception. Mitigation may include making the appropriate modifications to the receiving antenna system.

The nation-wide transition to digital TV broadcasts was completed June 12, 2009. Digital reception is in most cases more tolerant of "noise" and somewhat less resistant to multipath reflections (i.e., reflections from structures) than analog broadcasts. Although digital reception is more tolerant of radio frequency noise, if the noise levels or reflections are great enough, they will impact digital television reception. In the unlikely event that the South Dakota Facility causes interference within a television station's primary coverage area, the Applicants will work with the affected viewers to correct the problem at the Applicants' expense. This problem can usually be corrected with the addition of an outside antenna.

No impacts to GPS navigation systems are anticipated. No mitigation measures are necessary.

14.5 Aesthetics

Determining the relative scenic value or visual importance of an area is a complex process involving both the philosophical and/or psychological response to what may be perceived as beautiful by an individual. Generally, landscapes that incorporate a balanced mixture of diversity and harmony have the greatest potential for high scenic value and may be considered important to persons living in or traveling through a region. Viewer response is based on the sensitivity and exposure of the viewer to a particular viewshed. Sensitivity relates to the magnitude of the viewer's concern for the viewshed, while exposure is a function of the type, distance, perspective, and duration of the view. The discussion of visual quality and aesthetics contained in this section is based on a qualitative review of the existing landscape environment surrounding the South Dakota Facility area. Visual and aesthetic resources within the South Dakota Facility area were identified through review of county comprehensive land use plans, comments received from participating citizens at public open

house meetings, and through a review of high-resolution aerial photography and field observation. Generally, sensitive visual and aesthetic resources within the area include historical structures, open space areas, designated scenic routes, and water resources.

14.5.1 *Existing Environment*

The visual character and quality along the South Dakota Facility can be characterized in many different ways that include cultivated lands, natural habitats, topography, existing man-made structures, and parks. Within the South Dakota Facility ROW, the dominant visual characteristic is agricultural land (both cultivated and grazed). The remaining land cover is a mixture of rural residential, wetland, and water features.

Man-made infrastructure including homes, cities, transmission lines, highways, county roads, railroads, barns, silos, communication towers, and other structures exist throughout the South Dakota Facility area.

Along the eastern portion of the South Dakota Facility lies the Coteau des Prairies, extending from eastern South Dakota to southwestern Minnesota. This feature consists of a relatively high plateau, rising from a nearly level till plain, including prairie flatlands with slopes along its borders. The slopes of the Coteau des Prairies that intersect the South Dakota Facility ROW are near the cities of Marvin and Twin Brooks and also near the cities of Andover and Groton. Where the Coteau des Prairies ascends and descends, visual characteristics of the area include a higher concentration of rivers and creeks while the top of the Coteau des Prairies includes a larger viewshed of flat prairie grasses. Within the South Dakota Facility area, the top of the Coteau des Prairies extends south of areas near the cities of Webster, Waubay, and Ortley.

In the area west of the Coteau des Prairies, the topography remains relatively flat, dominated by cultivated agricultural land and with scattered infrastructure and gentle slopes leading to the James River which runs from north to south in the South Dakota Facility area.

14.5.2 *Potential Impacts*

The South Dakota Facility and associated facilities will create a new visual element within the South Dakota Facility area, but the degree to which the transmission line will be visible will vary by location. The visual impact of the transmission line could affect landowners who live along or near the South Dakota Facility, or community residents who travel along the roads regularly. The natural landscape in the South Dakota Facility area is often characterized as rolling or flat terrain used for agricultural purposes, with the exception of the steeper slopes at the edges of the Coteau des Prairies. The exact viewshed of the South Dakota Facility will be determined by the engineering of the individual structures, elevation, and natural and man-made objects. Depending on a viewer's physical location, the terrain conditions, and natural landscape features such as tree cover or man-made features such as a barn, the transmission line structures could be visible for distances up to two miles. A viewer's degree of discernible detail decreases as the physical distance from an object increases.

The South Dakota Facility will be visible to landowners and community residents who live near the South Dakota Facility ROW and travel along the roads and highways adjacent to or crossing the transmission line. While the South Dakota Facility will be located outside of local communities, using two miles as an extreme for viewshed possibilities, it may be visible from several communities including Frederick, Westport, Columbia, Groton, Andover,

Butler, Marvin, Twin Brooks, Milbank, and Big Stone City. There are nine properties on the National Historic Register within one mile of the South Dakota Facility (see Sections 20.7.1-7 for more detailed information). No state parks or scenic highways are within two miles of the South Dakota Facility.

14.5.3 *Mitigation*

The Applicants will continue to work with landowners and public agencies to identify concerns related to the transmission line and aesthetics. Many of these areas have already been impacted visually by the existing roadways, transmission lines, and railroads. In general, mitigation includes enhancing positive effects as well as minimizing or eliminating negative effects. Potential mitigation measures include the following:

- Where feasible, the location of structures, fiber optic regeneration stations, and other disturbed areas will be determined by considering input from landowners or land management agencies to minimize visual impacts.
- Structure types (designs) will be uniform to the extent practical. In general, the Applicants propose to use single pole steel structures ranging in height from approximately 125 to 155 feet. H-frame structures would potentially allow for lower structure height; however, during public meetings a strong preference for mono-pole structures was expressed by the public. This was primarily voiced by area farmers as a way to limit the footprint of a pole and concerns about navigating farm equipment around the pole.
- Care will be used to preserve the natural landscape; construction and operation will be conducted to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings. During operation, clearing of trees and shrubs will be conducted only as necessary per North American Electric Reliability Corporation (NERC) standards and to allow safe operation and inspection of the South Dakota Facility.
- Most of the lands crossed by the South Dakota Facility are currently used for agriculture. Following construction, most of these lands will return to their current agricultural use and visual characteristics.

15.0 Local Land Use Controls (ARSD 20:10:22:19)

The South Dakota Facility will be constructed on agricultural land regulated by the Brown, Day, and Grant counties' zoning ordinances and land use control policies specified in county plans or specific ordinances. Comprehensive land use plans were available for Brown and Grant counties. A comprehensive land use plan is not available for Day County at this time. Construction of the Project will comply with the applicable local ordinances and may require those permits set forth in Section 24.0.

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16.0 Water Quality (ARSD 20:10:22:20)

16.1 Existing Environment

Pursuant to the Clean Water Act, every two years, the State releases a list of streams and lakes that are not meeting their designated uses because of excess pollutants (impaired waters). The impaired waters list, known as the 303(d) list, is based on violations of water quality standards. Table 18 lists the water bodies crossed by the South Dakota Facility that are listed as impaired by the United States Environmental Protection Agency (EPA).

Table 18. Crossings of EPA-Designated Impaired Waters

Waterbody Name	Cause of Impairment for Reach Within South Dakota Facility Area
Big Sioux River	Dissolved Oxygen and Escherichia Coli (E. Coli)
James River	Dissolved Oxygen
South Fork Whetstone River	E. Coli

Source: South Dakota Department of Environment & Natural Resources, 2010

16.2 Potential Impacts

During construction there is a limited possibility of sediment reaching surface waters as the ground is disturbed by excavation, grading, and construction traffic. This could potentially affect water quality if the erosion is not controlled.

16.3 Mitigation

It is anticipated that all rivers and streams will be spanned by the South Dakota Facility, and no structures will be located within these features. Therefore, direct impacts to these features are not expected. The Applicants anticipate receiving a National Pollutant Discharge Elimination System (NPDES) permit, as applicable. The Applicants will also prepare and follow the commitments set forth in the associated Storm Water Pollution Prevention Plan (SWPPP). As necessary, the SWPPP will identify BMPs specific for impaired waters.

Once the South Dakota Facility is constructed, there will be no significant impact on surface water quality because wetland and waterway impacts will be minimized and mitigated, disturbed soil will be restored to previous conditions and the amount of land area converted to an impervious surface will be small.

The Applicants will implement BMPs during construction of the South Dakota Facility to protect topsoil and adjacent water resources and minimize soil erosion. Construction practices will be completed in accordance with the NPDES permit requirements. BMPs may include:

- Containment of stockpiled material away from stream banks and shorelines as required by the NPDES permit
- Stockpiling and respreading topsoil at laydown areas and/or permitted areas
- Reseeding and revegetating disturbed areas as required by the NPDES permit
- Implementing erosion and sediment controls as required by the NPDES permit
- Waste waters generated by construction will be minimized by following BMPs

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17.0 Air Quality (ARSD 20:10:22:21)

17.1 Existing Environment

South Dakota has adopted the federal government's ambient air quality standards regarding permissible concentrations of air pollutants (ARSD 74:36:02). The areas crossed by the South Dakota Facility are currently in attainment for both national and South Dakota Ambient Air Quality Standards, as is the entire state. The nearest Ambient Air Quality Monitoring Site is located at the Brookings City Hall in Brookings County, South Dakota, which is southeast of the South Dakota Facility.

17.2 Potential Impacts

Temporary air quality impacts caused by emissions from construction vehicles and concrete batch plants, and by fugitive dust from South Dakota Facility ROW clearing and construction may occur. Exhaust emissions from diesel equipment will vary during construction, but only minor short-term impacts are anticipated. The concentration of pollutants during construction will be greatest near the South Dakota Facility ROW, but will decrease rapidly with distance from the South Dakota Facility ROW. Concentrations of all air pollutants during construction are expected to remain well below the National Ambient Air Quality Standards (NAAQS).

No impacts to air quality due to the operation of the transmission line are anticipated. Corona consists of the breakdown or ionization of air within a few centimeters of transmission line conductors and hardware. Usually water or some imperfection such as a sharp edge, a protrusion on hardware, or a scratch on the conductor is necessary to cause corona. Corona can produce small concentrations of ozone and oxides of nitrogen in the air surrounding the conductor. Ozone also forms in the lower atmosphere from lightning discharges and from reactions between solar ultraviolet radiation and air pollutants, such as hydrocarbons from auto emissions. The natural production rate of ozone is directly proportional to temperature and sunlight and inversely proportional to humidity. Thus, humidity or moisture, the same factor that increases corona discharges from transmission lines, inhibits the production of ozone. Ozone is a very reactive form of oxygen molecules and combines readily with other elements and compounds in the atmosphere. Because of its reactivity, ozone is relatively short-lived.

The ambient air quality standard for ozone is 0.075 parts per million (ppm), based on a 3-year average of the annual fourth-highest daily maximum 8-hour averaging period. Numerous environmental assessments cite calculations of ozone concentrations from 345-kV transmission lines using the Corona and Field Effects Program Version 3, supplied by the Bonneville Power Administration. These environmental assessments cite maximum one-hour concentrations during foul weather (worst case) of 0.0007 ppm, which is well below federal and South Dakota standards for ozone.

17.3 Mitigation

BMPs may be used to control fugitive dust during construction; this could include use of water or other dust minimization methods, per NPDES permit. Dust suppression will be required of the construction contractors who will access and maintain the South Dakota Facility ROW during construction, as necessary.

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18.0 Time Schedule (ARSD 20:10:22:22)

The Applicants propose that the South Dakota Facility be in-service in 2019. A preliminary permitting and construction schedule for the South Dakota Facility is provided below.

This schedule is based on information known as of the date of this filing and upon planning assumptions. This schedule may be subject to adjustment and revision as further information is developed. The Applicants plan to give milestone updates through the Project's newsletter and website.

Submit PUC Facility Permit Application ..... August 2013
Land Rights Acquisition Initiated..... 2013
Applicants' Anticipated Date of Commission Decision on Facility Permit..... August 2014
Material Procurement Commitments 2015
Final Transmission Line and Substation Connection Design..... 2016
Construction Start..... 2016
In-Service Operations 2019
Final Project Close-out 2020

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19.0 Community Impact (ARSD 20:10:22:23)

This section describes the primary community characteristics within the South Dakota Facility area, and identifies the impacts of the South Dakota Facility with respect to socioeconomics, community resources, agriculture, transportation, and cultural resources. Socioeconomic factors evaluated include population, race and ethnicity, poverty, and per capita income. A forecast of the impact on community and government facilities and services is provided, in addition to detailed estimates of projected tax impacts. A forecast of the impact on income and integration of communities is provided.

19.1 Socioeconomic and Community Resources

19.1.1 *Existing Environment*

The South Dakota Facility is located in Brown, Day, and Grant counties on land used primarily for agricultural purposes. The largest residential areas near the South Dakota Facility area are Ellendale, North Dakota and Groton, Bristol, and Big Stone City, South Dakota. Table 19 provides a comparison of demographic characteristics of the South Dakota Facility area by Census Tract.

Table 19. Demographic Characteristics of the South Dakota Facility Area

Location	Population	Race Percentage (White)	Percentage of Population Below Poverty Level	Per Capita Income
Census Tract 952700 – Day County	1,379	95.4	7.7	$20,701
Census Tract 952600 – Day County	764	98.4	20.3	$19,325
Census Tract 940600 – Day and Grant Counties	290	93.3	19.3	$18,868
Census Tract 951100 – Brown County	928	81.6	7.1	$23,156
Census Tract 951200 – Brown County	1,978	96.8	5.9	$26,287
Census Tract 951900 – Brown County	850	98.7	7.2	$24,576
Census Tract 953200 – Grant County	608	97.9	10.4	$23,317
Census Tract 953100 – Grant County	701	96.0	12.8	$22,577
Brown County	37, 331	93.6	9.7	$24,671
Day County	5,613	88.3	16.7	$20,870
Grant County	7,259	89.1	12.6	$24,344
South Dakota	833,354	86.6	13.8	$24,952

Source: U.S. Census Bureau, Census Tract 2010.

The Census Bureau provides periodic socioeconomic estimates for selected geographies to help provide information on the changing demographics of the population between decennial censuses. Through the American Community Survey, the Census provided 3-year population estimates for Brown County and the State of South Dakota. American Community Survey Data for Day and Grant counties were unavailable. These statistics are provided in Table 20.

Table 20. Population Demographic Forecasts

Location	Population	Race Percentage (White)	Percentage of Population Below Poverty Level	Per Capita Income
Brown County	36,547	93.5	8.0	$25,488
South Dakota	815,914	86.1	14.0	$24,706

Source: U.S. Census Bureau, American Community Survey, 3-Year Population Estimates, 2009-2011

19.1.2 *Socioeconomic and Community Resource Impacts and Mitigation*

There will be short- and long-term benefits to the South Dakota Facility area. These benefits include an increase to the counties' tax base resulting from the incremental increase in revenues from utility property taxes, which are based on the value of the Project. Also, the capability of the transmission line to transmit energy generated from renewable and other energy resources could spur energy development in the area, resulting in additional economic gains to the area. For further information on benefits of the South Dakota Facility, refer to Section 4.0.

Construction and operation of the South Dakota Facility is not anticipated to affect the local distribution of jobs or occupations in the community. The South Dakota Facility is not anticipated to have significant short- or long-term effects on commercial and industrial sectors, housing, land values, labor markets, health facilities, sewer or water treatment facilities, solid waste management facilities, fire or police facilities, schools, recreational facilities, and other government facilities or services. Therefore, no mitigation is proposed. The Applicants do not expect a permanent impact on the population, income, occupation distribution, or integration or cohesion of communities.

The South Dakota Facility will be offset from road ROW and section lines; the transmission structures and South Dakota Facility ROW are not expected to be located within the road ROW. The final engineering design will take into account planned or programmed future improvements to area roadways to ensure sufficient road ROW is maintained for future roadway widening.

No adverse impacts are anticipated to other major industrial facilities as a result of the construction or operation of the South Dakota Facility.

19.2 Agriculture

19.2.1 *Existing Environment*

According to the U.S. Census Bureau, Brown County has a total land area of 1,731 square miles, with 1,713 square miles of land and 18 square miles of water (rounded to the nearest whole number) (United States Census Bureau, 2013). According to the Census of Agriculture for 2007 (the most recent year that data is available), approximately 1,695 square miles (97 percent) of the county were used for agricultural purposes. The number of full-time farms decreased by 10.3 percent from 2002 to 2007, and the number of land acres used for farming decreased by 6.1 percent. The average farm size also grew by 4.7 percent. Sales of farm goods (including grain, crops, and livestock) in 2007 totaled $248,765,000, an increase of 47 percent from 2002. Crop sales were primarily soybeans, corn, and wheat, while cattle and hogs comprised the majority of livestock sales (United States Census Bureau, 2007).

Day County has a total land area of 1,028 square miles, with 965 square miles of land and 63 square miles of water (rounded to the nearest whole number) (United States Census Bureau, 2013). According to the Census of Agriculture, approximately 886 square miles (81 percent) of the county were used for agricultural purposes. The number of full-time farms decreased by 4.2 percent from 2002 to 2007, and the number of land acres used for farming increased by 6.8 percent. The average farm size also grew by 11.4 percent. Sales of farm goods increased 72 percent from 2002 to 2007, and totaled $97,814,000 in 2007. Livestock sales consisted primarily of cattle and hogs, while soybeans, corn, and wheat comprised the majority of crop sales (United States Census Bureau, 2007).

Grant County has a total land area of 681 square miles, with 676 square miles of land and 5 square miles of water (rounded to the nearest whole number) (United States Census Bureau, 2013). According to the Census of Agriculture for 2007, approximately 568 square miles (82 percent) of the county were used for agricultural purposes. The number of full-time farms increased by 1.2 percent from 2002 to 2007, and the number of land acres used for farming increased by 3.8 percent. The average farm size also grew by 2.5 percent. Sales of farm goods totaled $133,526,000 in 2007, an increase of 62 percent from 2002. Crop sales were primarily soybeans, corn, and wheat, while cattle and hogs comprised the majority of livestock sales (United States Census Bureau, 2007).

19.2.2 *Agriculture Impacts and Mitigation*

The South Dakota Facility will create temporary and permanent impacts to farmland along the South Dakota Facility; however, no impacts are anticipated to livestock operations. Permanent impacts to agricultural lands are primarily the result of structure installation along the South Dakota Facility. Construction of the South Dakota Facility is anticipated to result in a permanent loss of approximately 4.6 acres of agricultural land (3.3 acres from structures in cropland, 0.6 acres from structures in non-cropland, and 0.7 acres from fiber optic regeneration station and associated access road). The permanent impacts associated with each structure in non-cropland were calculated by assuming a five-foot radius (approximately 78.5 square feet) of permanent impact. The permanent impacts to crop production associated with each structure in cropland were calculated by assuming a ten-foot radius (approximately 314 square feet), which includes an additional five-foot radius (total of

ten-foot radius) around the structure foundation since landowners may not wish to cultivate the land any closer than five feet from the structure base. At the time of this Application the exact locations of the fiber optic stations and their associated access roads are not known. Construction of the South Dakota Facility will result in an estimated 986 acres of temporary impacts to farmland due to the preparation of structure foundations, laydown areas, structure assembly areas, wire stringing areas, and travel paths. This impact is estimated based on the NLCD land cover breakdown of the ROW, the 1,000-foot average span for the South Dakota Facility, the temporary use of a 30-foot-wide travel path within the South Dakota Facility ROW, installation of pole structures and stringing of conductors.

Areas disturbed during construction will be repaired and restored to preconstruction contours to the extent practicable so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural re-vegetation, provide for proper drainage, and prevent erosion. Construction laydown areas and temporary transmission line travel paths will be restored per the landowner agreement. Drain tile lines may be present along the South Dakota Facility. The Applicants will work with the landowners to identify and mark drain tile lines to avoid damage during construction. Where locations are known, temporary travel paths will avoid drain tiles where they can and when they are unavoidable, matting may be required. If drain tile lines are inadvertently damaged by construction of the South Dakota Facility, the Applicants will repair the tile lines. Landowners will be compensated for any crop damage that occurs during construction.

There are several locations where the South Dakota Facility crosses the edge of fields with center pivot irrigation. Coordination with the landowners will be conducted to identify potential impacts to these systems; however, it is anticipated that given the 1,000-foot-wide span of the structures, they can be placed so that minimal effects to the pivot will occur.

19.3 Transportation

19.3.1 *Existing Environment*

Much of the South Dakota Facility is within 500 feet of existing surface transportation routes, including county roads and township streets. The transportation network that will be used during construction and for maintenance during operation is comprised largely of rural or section line roadways. The South Dakota Facility crosses active railroads in four locations (T124N R62W, T123N R60W, T120N R50W, T121N R48W) and inactive railroad lines in two locations (T124N R63W, T120N R57W). In addition, the closest registered airport facility is about 2.5 miles from the South Dakota Facility. There is one private landing strip located about 0.9 miles south of the South Dakota Facility. Based on a preliminary glide slope review no impacts to the landing strip are anticipated. No impacts to registered commercial facilities are expected.

19.3.2 *Transportation Impacts and Mitigation*

The South Dakota Facility will not result in any permanent impacts to the area's transportation resources. Therefore, no mitigation is proposed. There may be some temporary impacts to local roads during construction phases of the South Dakota Facility. The Applicants will work with state and local highway departments regarding applicable permitting requirements. The Applicants will also coordinate with the railroads to span the active and inactive lines and to ensure construction and operation of the South Dakota

Facility will not affect the use of the railroad lines. There will be no anticipated impacts to registered commercial aviation facilities. The South Dakota Facility may alter the approach to landing strips by causing aircraft to fly over the South Dakota Facility during take-off and landing. The Applicants will work with owners of the landing strip to address concerns.

19.4 Cultural Resources

This section presents the results of a records search and literature review of previously recorded cultural resources. In September 2012, the Applicants requested information for the initial records search from the South Dakota Archaeological Research Center (SDARC). This data request included an approximate 13- to 22-mile-wide study corridor since the South Dakota Facility had not yet been determined.

On September 19, 2012, the SDARC provided cultural resources data including GIS data that document the location of all previous cultural surveys, previously identified archaeological sites, miscellaneous site files, and recorded architectural properties within the provided study corridor. As Project plans progressed, the study corridor was evaluated through a desktop review, taking into account the data received from SDARC, and the South Dakota Facility was selected.

Additional background research included online research of the National Park Service's National Register of Historic Places (NRHP), online research of historical General Land Office (GLO) plat maps, and a review of the South Dakota State Historic Preservation Office (SDSHPO) planning document, "*Guidelines for Cultural Resource Surveys and Survey Reports for Review and Compliance*" (SDSHPO 2005).

A Level I Records Search was completed for the South Dakota Facility area and was submitted to the SDSHPO on July 24, 2013 for review and comment. Information provided in the Level I Records Search is considered confidential and was filed with requested confidential treatment pursuant ARSD 20:10:01:41 with this Application (Appendix G). The findings presented below represent a summary of that information. Specific locational information has been removed.

19.4.1 *Existing Environment*

The Records Search of one mile on either side of the South Dakota Facility documented 24 previously recorded archaeological sites, 12 miscellaneous files, 182 previously recorded standing structures, 26 previously recorded historic bridges, and three previously recorded cemeteries. Miscellaneous files are not considered sites. They are usually based on archival information and have not been field-verified. Consequently, they have not been assigned official state site numbers or other individualized numbers for identification purposes.

Nine NRHP-listed properties have been identified within the one-mile buffer of the South Dakota Facility.

19.4.1.1 Previously Identified Archaeological Sites

Three of the 24 previously recorded archaeological sites intersect the South Dakota Facility. Sites include two Native American artifact scatters (39BN0062 and 39BN0063) and one railroad (39GT2007). The 24 archaeological sites include 16 precontact sites, five historic sites, one multicomponent site, and two sites with unknown cultural affiliation (Appendix G, Table 1).

Precontact sites include 14 artifact scatters, one occupation, and one isolated find. Of the 16 previously recorded precontact sites, 15 have not been evaluated and one site, the precontact isolated find (39BN0093), is not eligible for the NRHP.

The five historic sites include one Euro-American artifact scatter (39GT0031), one farmstead (39GT0034), and three railroads (39DA2007, 39GT2007, and 39GT2042). The artifact scatter is not eligible, the farmstead is unevaluated, and the three railroads are eligible for the NRHP.

The multicomponent site includes one precontact occupation and Euro-American artifact scatter (39GT0024). The site has not been evaluated for listing on the NRHP.

The two previously recorded sites with unknown cultural affiliation include two cairns (39DA0074 and 39DA0081). Site 39DA0074 is recorded as an unknown cairn with a well-sodded base, topped with barbed wire. Site 39DA0081 is recorded as a stone pile with a well-sodded base and several large stones placed on top. These two sites have not been evaluated for the NRHP.

19.4.1.2 Miscellaneous Files

Two of the 12 previously recorded miscellaneous files transect the South Dakota Facility; both files are railroad grades. The remaining 10 miscellaneous files are situated outside the South Dakota Facility ROW. These include seven mounds/mound groups, two cemeteries, and one trail (Appendix G, Table 2).

19.4.1.3 Previously Identified Standing Structures

Within the one-mile buffer of the South Dakota Facility, 182 previously recorded standing structures have been identified (Appendix G, Table 3). Structures include homes, agricultural buildings, farmsteads, churches, schools, and commercial buildings. One standing structure was identified within the South Dakota Facility ROW (GT00000392). The standing structure consists of a farm.

Of the 182 previously recorded standing structures, 11 are eligible, 40 have not been evaluated, and 131 are not eligible for the NRHP. Eligible structures include the Welsh Presbyterian Church (BN00000264), the Plana School (BN00000268), the Oneota Township Hall (BN00000594), the Andover Waldorf Hotel (DA00000020), the Eddie Hinze House (DA00000195), and an unnamed school (DA00000513). Remaining NRHP-eligible structures are included in the Charles Russman Farm and have been recorded as a district. Structures include the house (GT00000456), the barn (GT00001175), the silo (GT00001177), the granary (GT00001178), and the shed (GT00001179).

19.4.1.4 Previously Identified Historic Bridges

Twenty-six previously recorded historic bridges have been identified within the one-mile buffer of the South Dakota Facility (Appendix G, Table 4). Four of the bridges intersect the South Dakota Facility ROW. The bridges include BN00001302, DA00000954, DA00000956, and GT00001090. Of the 26 previously recorded historic bridges, six are eligible, 19 are not eligible, and one has not been evaluated for the NRHP. Eligible bridges include BN00000010, BN00000011, BN00000166, BN00000170, DA00000006, and GT00000507.

19.4.1.5 Previously Identified Historic Cemeteries

Three previously recorded cemeteries have been identified within the one-mile buffer of the South Dakota Facility (Appendix G, Table 5). None of the cemeteries intersect the South Dakota Facility ROW. The three historic cemeteries are not eligible for the NRHP.

19.4.1.6 Previously Identified NRHP-Listed Properties

Nine NRHP-listed properties have been identified within the one-mile buffer of the South Dakota Facility (Appendix G, Table 6). They include the Welsh Presbyterian Church (BN00000264), the Plana School (BN00000268), the Oneota Township Hall (BN00000594), the Andover Waldorf Hotel (DA00000020) and the Charles Russman Farm district. Structures within the district include the house (GT00000456), the barn (GT00001175), the silo (GT00001177), the granary (GT00001178), and the shed (GT00001179). None of the NRHP-listed properties intersect the South Dakota Facility ROW.

19.4.1.7 General Land Office Review

A review of GLO maps reveal that from 1865-1883, twenty-three townships contained evidence of Euro-American settlement. Euro-American settlement was first identified in Brown County in 1879, in Day County in 1875, and in Grant County in 1865 (United States Department of the Interior 1865-83). Most evidence of settlement includes named and unnamed residences or structures scattered across the landscape, along with roads and railroads.

The Chicago, Milwaukee, St. Paul and Pacific Railroad (the "Milwaukee Road"), which is within two miles of the South Dakota Facility, was first identified in 1865. In many cases, the current track remains in the same position today as it did then. There was also evidence of several schools in Grant County by 1883, and an Old Military Camp with Entrenchments [sic] in Day County by 1878. Also present by 1865 were the Sisseton and Wahpeton Sioux Reservation boundaries in Grant and Day counties.

The densest concentration of Euro-American settlement was identified west of Big Stone City in Township 121N, Ranges 46W, 47W, and 48W. Many named residences, roads, railroads, and agricultural fields were present in the area by 1883. A complete description of identified GLO features can be found in Appendix G, Table 7.

19.4.2 *Potential Impacts*

Construction activities for the South Dakota Facility may occur in the vicinity of previously identified archaeological and historic resources, some of which have been evaluated for listing on the NRHP and determined ineligible, and others that have not been evaluated for listing. Potential impacts include direct physical effects, indirect effects through long-term continuing operation and maintenance activities, and visual effects attributable to the intrusion of the South Dakota Facility on the setting of properties whose integrity of setting contributes to their significance.

Potential effects to archaeological sites and miscellaneous files (suspected sites that have not been formally recorded) may occur within the South Dakota Facility ROW as a result of direct construction impacts. Therefore, the survey strategy for archaeological sites will be limited to the South Dakota Facility ROW and any other areas where direct construction

impacts are likely to occur. These additional areas may include travel paths, laydown areas, and other areas necessary for construction outside of the South Dakota Facility ROW.

Potential effects to architectural properties may include visual impacts. Therefore, a 0.5-mile-wide visual impacts area of potential effects (APE) will be established to evaluate architectural properties. The purpose of the 0.5-mile-wide visual impacts APE is to account for the diminishment of integrity of setting for standing architectural properties for which setting contributes to their significance.

19.4.2.1 Level III Survey

As a part of Project planning, the Applicants are in discussions with SDSHPO and the Tribal Historic Preservation Offices (THPOs) to develop a Level III survey approach to locate and direct the identification of important cultural resources that may be vulnerable to the effects of South Dakota Facility construction and operation or to visual effects. This survey strategy will focus on locating properties that may qualify for listing on the NRHP.

Potential conditions that merit a Level III survey include properties listed on the NRHP, previously recorded properties determined eligible or unevaluated, undisturbed areas including rangelands and grasslands, proximity to certain environmental and/or physical features, and portions of the South Dakota Facility identified by the tribes as sensitive areas.

Potential conditions that may not merit survey include areas of recent industrial development and disturbance, cultivated lands, inundated areas, and areas that exhibit a slope of greater than 20 percent.

The survey approach is anticipated to include three components: a component focused on locating traditional cultural properties important for tribal associations with historic events or cultural beliefs and their contributions to the continuation of traditional communities' sense of identity; a component for locating and evaluating archaeological properties that may retain important information; and a component for locating important historic architectural or engineering properties. The review and consideration of effects to important cultural resources in those portions of the South Dakota Facility that are subject to a federal permit or approval will be reviewed in accordance with Section 106 of the National Historic Preservation Act (NHPA) and the National Environmental Policy Act (NEPA), as determined by the responsible federal agencies.

The Applicants will also design a discovery plan to be implemented during construction to account for the possibility of encountering previously unknown archaeological resources or human remains. This plan will specify procedures for handling such discoveries in an efficient and expeditious manner. The discovery plan will include the following topics: monitoring methods, construction contractor training, identification of resources in the field, contact information, procedures for avoidance, and associated tasks in the event of work stoppage.

If human remains are discovered during construction, work will cease on the site and appropriate authorities will be contacted in accordance with state law (SDCL Chapter 34-27).

19.4.4 *Mitigation*

The Level I Records Search identified three previously recorded archaeological sites, one previously recorded architectural property, four bridges, and two miscellaneous site files which intersect the South Dakota Facility ROW. One of the three archaeological sites (39GT2007), a railroad, is considered eligible for the NRHP. The two remaining archaeological sites (39BN0062 and 39BN0063) and the two miscellaneous site files have not been evaluated for the NRHP. The one architectural property (GT00001090) and the four historic bridges (BN00001302, DA00000954, DA0000956, and GT00001090) are not eligible for the NRHP.

Following the completion of a Level III survey, the Applicants will seek to avoid impacts to NRHP-eligible cultural resources and properties of traditional cultural importance. Avoidance measures may include placing poles so that sites are avoided by spanning, the use of fencing for site protection during construction, and burial of the resource under a protective buffer.

In addition, potential visual impacts to architectural properties or traditional cultural properties will be considered. Mitigation measures may include vegetative screening, additional documentation and research, or other mitigation measures deemed appropriate through SDSHPO and THPO consultation. The Applicants will consult with the SDSHPO as the mitigation measures are further developed.

If avoidance of a NRHP-listed or eligible archaeological site or architectural property is not feasible, the Applicants will consult further with the SDSHPO to determine an appropriate course of action prior to plan implementation.

Applicants do not expect any risk of accidental release of contaminants once the South Dakota Facility is complete. Any risk of release of contaminants during construction will be managed through use of BMPs and no impacts to landmarks and cultural resources of historic, religious, archaeological, scenic, natural, or other cultural significance are anticipated.

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20.0 Employment Estimates (ARSD 20:10:22:24)

The Project is expected to employ between 75 and 150 workers to support construction. The positions created during construction of the South Dakota Facility are expected to include the following categories of employment:

- Land rights
- Survey
- Structure foundations
- Structure assembly
- Wire stringing

The majority of the positions may require specialized skills and expertise. It is possible that positions will be filled by qualified individuals from South Dakota as part of the Project. The contractor, who will be responsible for determining employment needs for the construction, will determine the estimated annual employment expenditures during the construction phase of the South Dakota Facility, the plans for utilizing and training the existing South Dakota labor market for the specialized positions, the adequacy of the local manpower to meet the temporary labor positions arising from construction of the South Dakota Facility, and the percentage of temporary employees who will remain in the county and township after the construction of the South Dakota Facility.

No permanent or long-term employees are expected to be hired in South Dakota. In the South Dakota Facility area, the population and the types and number of jobs are not expected to change in the long term as a result of construction, maintenance and operation of the South Dakota Facility. It is not anticipated that the South Dakota Facility will create new permanent jobs, but it will create temporary construction jobs that will provide a one-time influx of income to the area.

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21.0 Future Additions and Modifications (ARSD 20:10:22:25)

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

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22.0 Transmission Facility Layout and Construction (ARSD 20:10:22:34)

22.1 Route Clearing

During the land rights process, individual property owners will be advised as to the construction schedule, needed access to the South Dakota Facility ROW, and any vegetation clearing required for the South Dakota Facility. To maintain NERC reliability standards, the South Dakota Facility ROW will be cleared of vegetation as necessary to construct, operate, and maintain the South Dakota Facility. Clear cutting (the removal of all trees, brush and other low-growing vegetation) will occur within the South Dakota Facility ROW, along construction and maintenance travel paths, and at structure erection sites. Trees that could present a danger to the safe operation of the South Dakota Facility ("Danger trees") will also be removed or pruned to ensure safety. Danger trees include trees outside of the South Dakota Facility ROW that could hit the transmission line should they fall. Disposal of timber, tree tops, limbs, and slash will comply with state and local ordinances. Wood from the clearing operation will be offered to the landowner or removed from the site.

22.2 Transmission Construction Procedures

Construction will begin after federal, state, and local approvals are obtained and land rights determined for the area to be constructed. The precise timing of construction will consider various requirements that may be in place due to permit conditions, prudent construction timing, and available workforce. Once access to the South Dakota Facility ROW has been granted and the necessary permits are received, site preparation activities could begin. These activities include clearing the South Dakota Facility ROW of vegetation that will interfere with construction or the safe operation of the transmission line. All materials resulting from the clearing operations will either be chipped on site or stacked in the South Dakota Facility ROW, per landowner agreement. If temporary removal or relocation of fences is necessary, installation of temporary or permanent gates will be coordinated with the landowner. The Applicants anticipate working with landowners to minimize disruptions.

Transmission line structure sites are typically selected in areas that would require minimal grading. Therefore, structure sites with slopes of 10 percent or less would typically not be graded or leveled, unless it is necessary to provide a reasonably level area for construction access and activities. At sites with more than 10 percent slope, working areas may require grading or fill to develop a suitable work area. If the landowner permits, leveled areas and working pads will remain in place for use in future maintenance activities.

Typical construction equipment 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 trucks, pickup trucks, concrete trucks, helicopters, and various construction trailers. Many types of excavation equipment are set on wheel or track-driven vehicles. Structures are transported on tractor-trailer trucks, usually in three sections.

The Applicants employ standard construction and mitigation practices that have been developed from experience as well as industry-specific BMPs. These BMPs are described further in Section 22.3.

For structures that require concrete foundations, concrete will be delivered to the structure site by concrete truck. Foundations are typically allowed to cure for approximately three weeks prior to attaching the structures. Any excess soil from the excavation will be offered to the landowner or removed from the site.

From the construction staging areas, the steel structures and components are transported to the structure assembly areas by truck. The structure assembly areas are typically located within the South Dakota Facility ROW immediately adjacent to the structure site. At each structure assembly area, the steel structure sections are connected, the davit arms are attached, and insulators and other hardware are attached while the steel structure is on the ground. The structure is then lifted and placed into the excavation (direct embedded) or set on top of the concrete foundation. Any temporary laydown areas that are outside of the South Dakota Facility ROW will be obtained from affected landowners through rental agreements.

After the structures have been erected, conductors are installed by establishing stringing setup areas. These stringing setup areas are typically located every two to five miles along the South Dakota Facility and usually occupy approximately 1,600 square feet of land. Conductor stringing operations require access to each structure to secure the conductor wire to the insulators or to install shield wire clamps once final sag is established. Temporary guard or clearance structures are installed as needed over existing distribution or communication lines, roads and highways, railways or other obstructions to ensure that construction operations would not obstruct traffic and to prevent the conductors from contacting existing energized conductors or other cables.

22.2.1 *Best Management Practices During Construction*

The Applicants employ standard construction and mitigation practices that have been developed from experience with past practices as well as industry-specific BMPs. These BMPs address ROW clearance, erecting transmission line structures, stringing transmission lines, and minimizing environmental impacts. BMPs for each specific construction task are based on the proposed schedules for activities, permit requirements, terrain and land use characteristics, maintenance guidelines, inspection procedures and other practices.

In areas where construction occurs close to waterways, BMPs will be employed to help prevent soil erosion and siltation of waterways. Should vehicle fueling be required within the South Dakota Facility ROW, BMPs will be employed to ensure that equipment fueling and lubricating occur at a distance from waterways.

22.3 Restoration Procedures

During construction, ground disturbance at the structure sites and structure assembly areas may occur. Following the completion of construction, disturbed areas including staging areas, structure assembly areas, and stringing areas will be restored according to the agreement negotiated with the landowner.

Unless otherwise agreed to by the landowner, all construction materials and debris will be removed from the site once construction is complete. Post-construction reclamation activities also include dismantling all temporary facilities (including staging areas), employing appropriate erosion control measures, and reseeding areas disturbed by construction activities unless directed by the landowner. Seed mixes will be determined in consultation

with the regulatory agencies or landowner. Native grasses that will not interfere with the safe operation of the transmission line facility will be allowed to reestablish in the South Dakota Facility ROW. The Applicants will work to ensure that restoration activities are completed to the satisfaction of the affected landowners.

22.4 Maintenance Procedures

Access to the South Dakota Facility ROW once it is completed is required periodically to perform inspections, conduct maintenance, and repair damage. Regular maintenance and inspections will be performed during the life of the South Dakota Facility to ensure its continued integrity. Generally, the Applicants inspect the transmission lines at least once per year. Inspections are typically limited to the immediate South Dakota Facility ROW and travel paths. If problems are found during inspections, repairs will be performed and the landowners and agencies will be notified if appropriate.

The South Dakota Facility ROW will be managed to remove trees and vegetation that interfere with the operation and maintenance of the transmission line. ROW clearing practices include a combination of mechanical and hand clearing, and may include application of herbicides, where allowed, to remove or control vegetation and weed growth.

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23.0 Information Concerning Transmission Facilities (ARSD 20:10:22:35)

A high-voltage transmission line (HVTL) consists of three phases, each at the end of a separate insulator string, all physically supported by structures. Each phase consists of one or more conductors. When more than one conductor is used to make up a phase, the term "bundled" conductors is used. Conductors are metal cables consisting of multiple strands of steel and aluminum wire wound together. There are also two shield wires strung above the electrical phases to prevent damage from lightning strikes that may also include a fiber optic communication cable. The conductors will be approximately one to two inches in diameter. Transmission lines are constructed on a ROW, the width of which is primarily dependent on structure design, span length, and electrical safety requirements associated with the transmission line's voltage. The South Dakota Facility ROW typically will be 150 feet wide.

23.1 Configuration of Towers

The Applicants propose to use single pole steel single-circuit structures for the South Dakota Facility, unless engineering or environmental conditions require the use of steel H-frame or guyed mono-pole structures. Public input was a consideration in the selection of the structure type. Single steel pole structures are typically placed on concrete foundations measuring about 6 to 11 feet in diameter. Specialty structures, including dead-end structures, H-frame structures, or guyed mono-pole structures, may be used in certain circumstances. Typically, H-frame structures consist of two steel poles with cross bracing. A guyed mono-pole structure is a mono-pole with guy wires that extend diagonally out to the ground. Concrete pier foundations may be used for angle structures or if soil conditions are poor. As engineering continues, it will be determined if and where specialty structures may be used. Table 21 shows a summary of the configuration of the structures that are under consideration for the South Dakota Facility.

The South Dakota Facility will be designed to meet or surpass all relevant local and state codes, National Electric Safety Code (NESC) requirements and APLIC and Applicant standards. Appropriate standards will be met for construction and installation and all applicable safety procedures will be followed during and after installation.

Table 21. Structure Design/Configuration Summary

Structure Type	Structure Material	ROW Width (feet)	Approx. Structure Height (feet)	Approx. Structure Base Diameter (feet)	Approx. Foundation Diameter (feet)	Average Span Between Structures (feet)	Pole to Pole Span on Single H-Frame Structure (feet)
Single Pole Davit Arm (majority of route)	Steel	150	125-155	3-4 (tangent structures) 4-6 (angle structures)	6-11	1,000 (range of 700 – 1200)	N/A

Structure Type	Structure Material	ROW Width (feet)	Approx. Structure Height (feet)	Approx. Structure Base Diameter (feet)	Approx. Foundation Diameter (feet)	Average Span Between Structures (feet)	Pole to Pole Span on Single H-Frame Structure (feet)
Guyed Mono-Pole	Steel	150	125-155	3-4 (tangent structures) 4-6 (angle structures)	3-5	1,000 (range of 700 – 1200)	N/A
H-Frame (if necessary)	Steel	150	100-130	3-4 (tangent structures)	3-5	1,000 (range of 700 – 1200)	30

23.2 Conductor Configuration

It is anticipated that each phase will consist of two conductor bundled (2x), TP (twisted pair) 477 kcmil (thousand circular mils), 26/7, Hawk, aluminum conductor steel reinforced (ACSR) or conductors of comparable capacity.

23.3 Proposed Transmission Site and Major Alternatives

The site of the South Dakota Facility is described in Sections 2.1 and 7.0, Appendix A, and shown on Exhibit 2. Section 8.0 outlines the route identification and selection process.

23.4 Reliability and Safety

23.4.1 *Transmission Line Reliability*

In general, 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*

The South Dakota Facility 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 ROW widths. Construction crews will comply with local, state, NESC and the Applicants' standards regarding installation of facilities and standard construction practices. The Applicants' and industry safety procedures will be followed during and after installation of the transmission line.

The South Dakota Facility will be equipped with protective devices to safeguard the public from the transmission line if an accident occurs and a structure or conductor falls to the ground. 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. The costs associated with these measures have not been tabulated separately from the overall facility costs since 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). See

Table 23, below, for more information.

23.4.3.1 Electric Fields

The electric field from a transmission line can couple with a conductive object, such as a vehicle or a metal fence, which is in close proximity to the line. This will induce a voltage on the object, and the magnitude of this 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 ROW. If the object is insulated or semi-insulated from the ground and a person touches it, a small current could 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.

To ensure that any discharge does not reach unsafe levels, the NESC requires that any discharge be less than 5 milliamperes (mA). Based on the Applicants' transmission line operating experience, the discharge from any large mobile object—such as a bus, truck, or farm machinery—parked under or adjacent to the line would be unlikely to reach levels considered to be an annoyance, and will be less than the 5 mA NESC limit. The Applicants will also ensure that any fixed object, such as a fence or other large permanent conductive object close to or parallel to the line, will be grounded such that any discharge would be less than the 5 mA NESC limit.

Currently, there are no state regulations within South Dakota for maximum electric field limits for transmission line siting. The facilities will comply with the recommended NESC standards.

23.4.3.2 Magnetic Fields

Current passing through any conductor, including a wire, produces a magnetic field in the area around the wire. The magnetic field associated with an HVTL surrounds the conductor

and decreases rapidly with increasing distance from the conductor. Considerable research has been conducted to determine whether exposure to power-frequency (60 hertz) magnetic fields causes biological responses and health effects.

EMF research expert Dr. Peter A. Valberg provided testimony in 2010 (Valberg, 2010) on EMF calculation and potential health effects, and the conclusions of his 2009 literature review (Valberg, 2009) of the status of scientific research on potential health effects. He summarized scientific research on HVTLs and MFs as:

> [T]hese studies do not change the factual conclusion that power-line MF exposure is not an established cause of health effects, as has been detailed throughout this report. As has been noted, the overall weight of evidence, combing the epidemiology with laboratory-animal and mechanistic research, fails to support a role for power-line MF in disease risk... [overall] the scientific research literature to date remains an insufficient basis for assigning any actual health risk to power-line MF exposure levels.

23.4.3.3 Recent Research on EMF Exposure and Human Health

Many organizations have conducted recent research on EMFs from extremely low frequency (ELF) source to study their potential effects on human health and safety as a follow-up to studies conducted primarily in the 1980s and 1990s which correlated EMFs and adverse health risks.

In 2007, the World Health Organization (WHO, 2007) made the following statement regarding effects of EMFs on health:

> Given both the weakness of the evidence for a link between exposure to ELF magnetic fields and childhood leukemia, and the limited impact on public health if there is a link, the benefits of exposure reduction on health are unclear. Thus, the costs of precautionary measure should be very low.

The 2009 President's Cancer Panel heard testimony concerning ELF, radio frequency (RF), and MFs and discussed that prior to 1996, the epidemiologic studies shared weaknesses that once recognized and accounted for, along with the testimony heard, "U.S. environmental organizations... generally conclude that the link between ELF-MF and cancer is controversial or weak." (Reuben, 2010).

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) reviewed scientific studies performed since its last published guidelines in 1998 that established exposure limitations to EMFs and published their recommendations in 2010 (ICNIRP, 2010), concluding:

> [S]cientific data available so far do not indicate that low frequency electric and/or magnetic fields affect the neuroendocrine system in a way that these would have an adverse impact on human health. There is no substantial evidence for an association between ELF exposure and diseases such as Parkinson's disease, multiple sclerosis, and cardiovascular diseases. The evidence for an association between low frequency exposure and Alzheimer's disease and amyotrophic lateral sclerosis is inconclusive. The evidence for an

association between low frequency exposure and developmental and reproductive effects is very weak.

In addition, the 2010 ICNIRP recommendations stated "evidence that prolonged exposure to ELF-MF is causally related with an increased risk of childhood leukemia is too weak to form the basis for exposure guidelines."

There is no federal standard for transmission line electric fields, nor state standards in South Dakota. EMF levels for the Project and how the calculated levels at any location within the ROW are below the ICNIRP guidelines (2,000 mG and 4.2 kV/m) for public exposure to EMF. Table 22 shows the calculated EMF levels for the Project. The H-frame structure produced the highest levels of electric and magnetic fields.

Table 23 shows the calculated EMF levels for the H-frame structure on ROW and at the ROW edge. Computations were performed using Bonneville Power Administration's Corona and Field Effects Program CORONAII version 3.0 (U.S. Department of Energy, undated).

Table 22. Calculated EMF Levels for the Project

Project Load Condition	Electric Field (kV/m)[1]		Magnetic Field (mG)	
	H-Frame Structure	Mono-pole Structure	H-Frame Structure	Mono-pole Structure
Normal Operating Condition[1]	6.7	5.8	55.7	39.3
Maximum Operating Condition[2]	6.7	5.8	267.3	188.6

[1] *Normal Operating Condition value is for predicted flow of 140 megawatt (MW) (~250 Amps).*

[2] *Maximum Operating Condition value is based on 1200 Amps (line rating).*

Source: Bonneville Power Administration's Corona and Field Effects Program CORONAII version 3.0

Table 23. Calculated EMF Levels for the H-Frame Structure

Project Load Condition	Electric Field (kV/m)[1]		Magnetic Field (mG)	
	On ROW	Edge ROW	On ROW	Edge
Normal Operating Condition[2]	6.7	1.9	55.7	15.3
Maximum Operating Condition[3]	6.7	1.9	267.3	73.6

[1] *This value depends on voltage and is expected to be relatively constant (will vary slightly if the operating voltage changes). Results are calculated at the operating voltage of 1.05 per unit*

[2] *Normal Operating Condition value is for predicted flow of 140 megawatt (MW) (~250 Amps).*

[3] *Maximum Operating Condition value is based on 1200 Amps (line rating).*

Source: Bonneville Power Administration's Corona and Field Effects Program CORONAII version 3.0

To date, the most exhaustive research done on HVTL and cancer was conducted over a 35-year span with one of the largest study groups of persons near HVTLs ever used for EMF research in March of 2013 (Shaddick et al., 2013). Their case-controlled study investigating cancer risks and ELF-MF from high-voltage lines concluded that their "results do not

support an epidemiologic association of adult cancers with residential magnetic fields in proximity to high-voltage overhead power lines."

While the general scientific consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields potentially can cause biological responses or even health effects continues to be the subject of research and debate despite current scientific evidence showing no correlation with distance to HVTL and adverse health effects. In addressing this issue, the Applicants provide information on EMF to the public, interested customers and employees to assist them in making an informed decision on EMF. The Applicants will provide measurements for landowners, customers, and employees who request them. In addition, the Applicants have followed the "prudent avoidance" guidance suggested by most public agencies. This includes using structure designs that minimize magnetic field levels and attempting to site facilities in locations with lower residential densities.

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. 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. 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 stray voltage concerns on a case-by-case basis.

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

All current farming operations in the area are compatible with the construction and operation of the South Dakota Facility.

Insulated electric fences used in livestock operations can pick up an induced charge from transmission lines. Shocks can be caused when a charger is disconnected. This can be prevented by either shortening an insulator with a wire or installing an electric filter.

Farm equipment, passenger vehicles, and trucks may be safely used under and near power lines. The power lines will be designed to meet or exceed minimum clearance requirements over roads, driveways, cultivated fields, and grazing lands as specified by the NESC. Recommended clearances within the NESC are designed to accommodate a relative vehicle height of 14 feet.

There is a potential for vehicles under HVTLs to build up an electric charge. If this occurs, the vehicle can be grounded by attaching a grounding strap to the vehicle long enough to touch the earth. The Applicants do not recommend refueling vehicles directly under or within 100 feet of a power line 200 kV or greater.

Buildings are permitted near transmission lines but are generally prohibited within the ROW. Any person with questions about new or existing metal structures near the ROW may contact the Applicants for further information about proper grounding requirements.

23.4.6 *Right-of-Way or Condemnation Requirements*

The schedule for contacting landowners will be developed by the Applicants and formal option easement negotiations began in the summer of 2013. The Project will require the acquisition of easements to cross private property and the coordination with appropriate agencies where the line shares ROW with other public utilities or public roads. The majority of affected landowners are aware of the South Dakota Facility. Land rights agents will continue to work with the landowners to answer questions about the South Dakota Facility and to obtain permission for route surveys, environmental surveys, and soil investigations to occur prior to construction. As the design of the transmission line is further developed, contacts with the owners of affected properties will continue.

In the event soil investigation is required to assist with the design of the foundations, the Applicants will inform the landowners at the initial survey consultation that soil borings or environmental surveys may occur. An independent geotechnical testing company will take and analyze these borings. Survey crews will also work with local utilities to identify underground utilities along the South Dakota Facility. This minimizes conflicts or impacts to existing utilities. Environmental crews will gather specific information such as wetland boundaries and cultural resource site boundaries.

Where possible, staging and laydown areas will be limited to previously disturbed or developed areas. When additional property is temporarily required for construction, temporary limited easements may be obtained from landowners for the duration of construction. Temporary limited easements will be limited to special construction access needs or additional staging or laydown areas required outside of the transmission line ROW.

The width of the South Dakota Facility ROW will generally be 150 feet throughout the length of the transmission line, depending on final route, ROW acquisition and final design. Appendix H contains diagrams of the proposed structures. In the event that negotiations with landowners to acquire ROW are unsuccessful, as the last resort, the condemnation procedures in SDCL 21-35 et seq. would be utilized.

23.4.7 *Necessary Clearing Activities*

The Applicants do not anticipate that the South Dakota Facility will require extensive tree clearing. Trees will need to be removed pursuant to easement requirements. Wood from the clearing operation will be offered to the landowner or removed from the site, dependent upon the preference of the landowner. General easement clearing and maintenance is described in Section 23.1.

23.4.8 *Underground Transmission*

No portion of the South Dakota Facility will require underground transmission. While it is common for lower voltage lines to be buried, it is rare for high voltage transmission lines to be constructed underground. Transmission lines can be placed underground but the cost to construct underground can be in the range of 15-20 times the cost of overhead construction. Because of the significantly greater expense associated with underground transmission construction, the use of underground technology is limited to locations where the impacts of overhead construction are completely unacceptable or where physical circumstances allow for no other option. The Applicants concluded that the environmental and land use setting did not warrant underground construction on any portion of the route.

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24.0 List of Potential Permits (ARSD 20:10:22:05)

The Applicants need to obtain approvals from a variety of applicable federal, state, and local agencies prior to constructing the South Dakota Facility in a specific permit-required area. Agencies with primary approval/permitting authority include USFWS, USACE, and the Commission. Table 24 identifies permits, approvals, and other coordination that may be needed with federal agencies, State of South Dakota, and counties. This listing of regulatory requirements is subject to change as South Dakota Facility development continues.

Table 24. Potential Required Permits and Approvals

Agency	Type of Permit, Regulatory Compliance, or Coordination	Status[1]	Need
Federal			
U.S. Fish and Wildlife Service	Section 7 of the Endangered Species Act, Migratory Bird Treaty Act	3	Section 7 Consultation under NEPA required for USFWS Permit, USACE Section 10 Permit, and NRCS easement modification
	Special Use Permit or Right-of-Way Permit	3	If construction in wetlands within wetland easements or in grassland easements, then compatibility analysis is required. Special Use Permit or a Right-of-Way Permit may be needed for disturbance to land subject to a grassland easement or wetland subject to a wetland easement.
U.S. Army Corps of Engineers	Section 10 of the Rivers and Harbors Act of 1899	2	Section 10 Permit - Required for the James River crossing.
	Section 404 of the Clean Water Act	3	Nationwide Permit 12 required for dredging or fill in jurisdictional waters of the United States for utility line projects.
U.S. Department of Agriculture - Natural Resources Conservation Service	Easement Modifications	3	Easement modification needed to span two easements

Agency	Type of Permit, Regulatory Compliance, or Coordination	Status[1]	Need
Federal Aviation Administration	FAA Form 7460-1, Notice of Proposed Construction or Alteration	3	The Federal Aviation Administration (FAA) issues determination that construction of the South Dakota Facility does not constitute a hazard to air navigation.
	FAA Form 7460-2 - Notice of Actual Construction or Alteration	3	Notifies FAA of actual constructed or altered structures.
	FAA Form 7461-1, Notice of Proposed Construction Hazard Determination	3	Notifies FAA of structures that might affect navigable airspace. Form requires proposed markings and lighting. FAA must review possible impacts to air safety and navigation, as well as the potential for adverse effects on radar systems.
State of South Dakota			
Public Utilities Commission	Facility Permit	1	Included herein.
Department of Environment & Natural Resources	Section 401 Water Quality Certification	3	Required for fill in jurisdictional waters of the United States.
	NPDES Permit: General Permit for Storm Water Discharges Associated with Construction Activities	2	Required for disturbance of over one acre of land. Must prepare a SWPPP.
	Temporary water use permit for construction activities	3	Compliance with the Water Pollution Control Act. Temporary permits for the use of public water for construction, testing, or drilling purposes; issuance of a temporary permit is not a grant of a water right. Contractors will obtain as necessary.
	General Permit for Temporary Dewatering	3	Compliance with the Water Pollution Control Act. Temporary permit for the discharge of water for construction dewatering. Contractors will obtain as necessary.
Aeronautics Commission	Aeronautical Hazard Permit	3	Permit lighting plan determined with FAA coordination, if required.
State Historic Preservation Office	Section 106 of the National Historic Preservation Act Coordination	3	Compliance with SDCL 1-19A-11.1 and consultation under Section 106 of the NHPA is required for federal permits (USFWS and USACE).

Agency	Type of Permit, Regulatory Compliance, or Coordination	Status[1]	Need
Department of Transportation	Oversize/Overweight Permit	2	Permit required for heavy hauling construction equipment and materials on state highways. Contractors will obtain as necessary.
	Highway Access Permit	2	Permit required for construction of access roads from state highways.
	Utility Permit	2	Permit required for utility crossings on state highway ROW.
Local			
Grant County	Conditional Use Permit	2	Permit may be required
Day County	Conditional Use Permit	2	Permit may be required
	County Road Right of Way Permit	2	Permits may be required for utility poles installed along county highways if within 50 feet of the ROW.
Brown County	Special Exception	2	Required for high voltage transmission line located in applicable zoning districts.

[1] *Status Explanation:*

1: Applied – decision pending

2: Will apply once Facility Permit is received

3: Final layout will determine whether the permit/approval is needed, or final layout is needed for permit application or pre-construction notification

24.1 Local Permits and Approvals

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

24.1.1 *Road Crossing/Right-of-Way Permits*

These permits are required to cross or occupy county road ROW.

24.1.2 *Land Use Permits*

These permits may be required to occupy county or township lands administered by these entities. A Conditional Use Permit may be required in Day and Grant counties and a Special Exception Permit may be required in Brown County.

24.1.3 *Building Permits*

These permits may be required by the local jurisdiction for construction of fiber optic regeneration stations, and may be required for other buildings and structures, and their attachments, located in Brown County and Day County.

24.1.4 *Over-Width/Load Permits*

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

24.1.5 *Approach/Access Permits*

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

25.0 Additional Information in Application (ARSD 20:10:22:36)

The Applicants believe that this Application, including appendices, contains all the information required to meet Applicants' burden of proof specified in SDCL 49-41B-22. The Applicants have provided correspondence and meeting notes pertinent to the South Dakota Facility in Appendix C, which outline the coordination efforts taken with the State of South Dakota and federal agencies to date.

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26.0 Testimony and Exhibits (ARSD 20:10:22:39)

The testimony and exhibits in support of the Application will depend on the issues that are disputed. The Applicants are filing with this application a motion for scheduling order to request a prehearing conference to set a schedule for the filing of prefiled testimony and exhibits after the disputed issues are determined. However, the Applicants will at a minimum have individuals from the following entities available to testify in support of the Application:

Montana-Dakota Utilities Co.
400 North 4th Street
Bismarck, North Dakota 58501-4092
701-222-7944

Otter Tail Power Company
P.O. Box 496
Fergus Falls, Minnesota 56538-0496
218-739-8947

HDR Engineering, Inc.
701 Xenia Avenue South, Suite 600
Minneapolis, Minnesota 55416
763-591-5400

POWER Engineers, Inc.
401 South Mechanic Street
Jackson, Michigan 49201
501-789-7367

Kadrmas, Lee and Jackson, Inc.
3203 32nd Avenue South, Suite 201
Fargo, North Dakota 58103-6242
701-232-5353

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27.0 Applicants' Verification

VERIFIED APPLICANT'S SIGNAURE

STATE OF NORTH DAKOTA)
) :SS
COUNTY OF BURLIEGH)

Garret Senger, being duly sworn, deposes and says that he is the authorized agent of Montana-Dakota Utilities Co.

He states that he does not have personal knowledge of all 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 Big Stone South to Ellendale Project; and that the information in the application is verified by him as being true and correct on behalf of Big Stone South to Ellendale Project.

Dated this 14th day of August, 2013. Garret Senger

Garret Senger
Vice President – Regulatory Affairs and Chief Accounting Officer
Montana-Dakota Utilities Co.

Subscribed and sworn to before me this
14th day of August, 2013.

Denys Schwartz
Notary Public
My Commission Expires:

DENYS SCHWARTZ
Notary Public
State of North Dakota
My Commission Expires December 31, 2018

VERIFIED APPLICANT'S SIGNAURE

STATE OF MINNESOTA)
) SS
COUNTY OF OTTER TAIL)

Tim Rogelstad, being duly sworn, deposes and says that he is the authorized agent of Otter Tail Power Company.

He states that he does not have personal knowledge of all the facts recited in the foregoing application dated August 14, 2013, but the information in the application has been gathered by and from employees, contractors of the owners of Big Stone South to Ellendale Project; and that the information in the application dated August 14, 2013 is verified by him as being true and correct on behalf of Big Stone South to Ellendale Project.

Dated this 15 day of August, 2013.

Tim Rogelstad
Vice President – Asset Management
Otter Tail Power Company

Subscribed and sworn to before me this
15 day of August, 2013.

Notary Public
My Commission Expires:

DAVID EDWIN KANTRUD
Notary Public
Minnesota
My Commission Expires January 31, 2015

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