Application to the South Dakota Public Utilities Commission for a Facility Permit

Bitter Root 345 kV Transmission Line and New Substation Project

Deuel County, South Dakota

September 27, 2018

Flying Cow Wind, LLC

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1.0 Introduction

1.1 Applicant and Project Description

Flying Cow Wind, LLC

Flying Cow Wind, LLC (Applicant or FCW) is a wholly-owned subsidiary of Roaring Fork Wind, LLC, the joint venture formed by subsidiaries of its affiliate Renewable Energy Systems Americas Inc. (RES) and Vestas Wind Systems A/S (Vestas).

FCW is proposing to construct the Collection Lines, Project Substation, and Transmission Line (each as defined below; and collectively, the Project) in support of the Bitter Root Wind Project (Bitter Root Wind Project or the Wind Project). FCW was formed for the purpose of developing and operating the Project and the Bitter Root Wind Project. FCW is an independent power producer (IPP) and is qualified to do business in South Dakota.

Renewable Energy Systems Americas, Inc.

RES, through its affiliates, develops renewable energy projects throughout the United States and Canada. RES is one of the top renewable energy companies in North America. Since 1981, RES has constructed more than 160 renewable energy projects, with a global portfolio that exceeds 16 gigawatts. RES has been active in North America since 1997 and has a renewable energy construction portfolio that exceeds 10,000 MW and the construction of more than 1,000 miles of overhead transmission lines.

In addition, RES is a leader in the development of wind, solar, and energy storage projects across North America, and the company currently operates more than 250 MW of renewable energy and energy storage projects. RES designs, constructs, and operates its facilities in an environmentally-sound and responsible manner. RES developed and constructed the 200-MW Pleasant Valley Wind Farm in Dodge and Mower Counties, Minnesota, which was commissioned in 2015.

The Bitter Root Transmission Line and Substation Project

The Project consists of an underground electric collection cabling system with six circuits of approximately 200 linear feet each[1] (Collection Lines), a substation with a 34.5 kilovolt (kV) to 345 kV step-up transformer (Project Substation), and approximately 10.42 miles of 345 kV overhead transmission line (Transmission Line) that will connect the Wind Project to the planned point of interconnection (POI) located at a planned Otter Tail Power substation to be built in Deuel County, South Dakota (Exhibit 1). FCW respectfully submits this Facility Permit Application (Application) to the South Dakota Public Utilities Commission (SD PUC or Commission) for a Facility Permit for the Project.

FCW will develop, design, permit, and construct the Project, anticipating the commencement of construction in the second quarter of 2020, with an anticipated in-service and commercial operation date in the third quarter of 2020, pending related permitting and approvals. The POI will

[1] Measured from the South Dakota/Minnesota border to the Project Substation.

be at the Astoria Substation, a substation to be built in Deuel County, SD in connection with the Astoria Station, a proposed gas generation plant to be located approximately 1.5 miles northwest of Astoria, SD. Both the Astoria Station and associated Astoria Substation are projects of Otter Tail Power. The Astoria Station is anticipated to be built from spring 2019 through early 2021, and operational by the spring of 2021 (see docket EL17-042 at https://puc.sd.gov/Dockets/Electric/2017/el17-042.aspx) with the interconnection facilities associated with the Astoria Substation anticipated to be completed in 2020 (Exhibits 1 and 2).

Otter Tail Power is also in the process of obtaining the necessary permits and approvals for the four-ring bus at the Astoria Substation that will allow the Project to be interconnected to the Astoria Substation. Interconnection at the Astoria Substation will allow FCW to inject energy from the Wind Project to the existing, newly-constructed Big Stone South to Brookings County (BSSBC) 345 kV high voltage transmission line, which was placed into service in September 2017.

The Bitter Root Wind Project entered the Midcontinent Independent System Operator, Inc. (MISO) interconnection queue in February 2016 and has a queue number of J493. MISO has selected the POI for the Project/Bitter Root Wind Project, balancing the needs of the interconnection system as a whole and other applicants, including Otter Tail Power. Additional interconnection details will be determined as a part of the final interconnection agreement with MISO, as well as agreements with and between the Applicant, MISO and Otter Tail Power, the transmission owner.

The Bitter Root Wind Project

As indicated above, the Project will support the Bitter Root Wind Project by providing the electric transmission connection between the Wind Project and the bulk electric grid. The Wind Project is a proposed Large Wind Energy Conversion System (LWECS)[2] of up to 152 megawatts (MW) with all proposed wind turbines and associated facilities to be located in Yellow Medicine County, Minnesota, east of the Project.

The Bitter Root Wind Project is currently in the Minnesota certificate of need and site permitting processes, pursuant to applicable Minnesota statutes and rules and under the authority of the Minnesota Public Utilities Commission (MPUC). The Applicant submitted an Application for a Certificate of Need (CON) for a LWECS for the Wind Project to the MPUC in October 2017 (see *MPUC Docket No. IP6984/CN-17-676*). The Applicant submitted a Site Permit Application (SPA) to the MPUC in November 2017 (see *MPUC Docket No. IP6984/WS-17-749*). The MPUC is expected to issue decisions on the requested CON and SPA by the end of 2018.

The Applicant will develop, design, permit, and construct both this Project and the Wind Project. The Applicant acquired the Bitter Root Wind Project in 2016 and reinitiated landowner agreements, environmental studies, and other development activities. While initially anticipated to achieve commercial operation in 2019, based on the projected timing of completion of the Astoria Station and Astoria Substation, FCW now anticipates beginning construction in the second quarter

[2] As defined in the Wind Siting Act, Minn. Stat. Ch. 216F.

of 2020, with an anticipated in-service and commercial operation date (COD) in third quarter of 2020, pending related approvals.

1.2 Facility Permit Application

In accordance with South Dakota Codified Law (SDCL) 49-41B and Administrative Rules of South Dakota (ARSD) 20:10:22, FCW is providing information regarding itself, the proposed Project and associated facilities, routing and siting of Project facilities, existing environment, potential Project impacts and proposed mitigation as indicated in Commission filing requirements.

This Application provides analysis of the Proposed Route and buffer area (Study Area) that is comprised of approximately 6,090 acres, as shown in Exhibit 3[3]. The Study Area includes 0.5 miles on either side of the Proposed Route in South Dakota, for a total corridor width of 1 mile (Exhibit 1).

The Application also provides analysis of the Project impacts on the permanent easement area (Permanent Easement Area), detailed below, for the proposed transmission line as well as additional areas needed for construction (Construction Disturbance Areas) outside the Permanent Easement Area. The Permanent Easement Area is defined as a 200-foot wide corridor (100 feet on either side of centerline) plus a 300-foot radius around each pole, within participating property. The Construction Disturbance Area is defined as the Permanent Easement Area plus those few locations where additional temporary work access and work areas are needed for pulling/stringing at corners, etc. For the most part, construction will occur within the Permanent Easement Area and any work conducted outside of the Permanent Easement Area would only involve temporary impacts to applicable resources, if present.

Per SDCL §49-41B-22 and the Applicant's burden of proof, the information provided in this Application establishes that:

1. the proposed facility will comply with all applicable laws and rules;
2. the facility will not pose a threat of serious injury to the environment, nor to the social and economic condition of inhabitants or expected inhabitants in the siting area;
3. the facility will not substantially impair the health, safety or welfare of the inhabitants; and
4. the facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.

[3] To comply with ARSD 20:10:22:01, subparts (1) and (5), the Applicant analyzed the Study Area to assess the "Affected area" (that area which may be affected environmentally, socially, or economically by the location of a facility at a proposed site) and the "Transmission site" (that affected area on either side of and adjacent to a proposed transmission facility or associated facility). The buffered Study Area was established by the Applicant in the event that the Proposed Route or related Project facilities are later altered subsequent to filing this Application and will provide assessment of potential impacts which will not need to be completed later, if changes to the proposed Project occur.

1.3 Completeness Check

Consistent with the provisions set forth in the aforementioned SDCL and ARSD, Table 1 details the Commission filing requirements, and identifies the corresponding section of the Application in which each requirement is addressed.

Table 1 Completeness Checklist

SDCL	ARSD	Required Information	Application Section
49-41B-11(1)	20:10:22:06	**Names of participants required.** The application shall contain the name, address, and telephone number of all persons participating in the proposed facility at the time of filing, as well as the names of any individuals authorized to receive communications relating to the application on behalf of those persons.	2.0
49-41B-11(7)	20:10:22:07	**Name of owner and manager.** The application shall contain a complete description of the current and proposed rights of ownership of the proposed facility. It shall also contain the name of the project manager of the proposed facility.	2.0
49-41B-11 (8)	20:10:22:08	**Purpose of facility.** The applicant shall describe the purpose of the proposed facility.	3.0
49-41B-11(12)	20:10:22:09	**Estimated cost of facility.**	4.0
49-41B-11(9)	20:10:22:10	**Demand for facility.** The applicant shall provide a description of present and estimated consumer demand and estimated future energy needs of those customers to be directly served by the proposed facility. The applicant shall also provide data, data sources, assumptions, forecast methods or models, or other reasoning upon which the description is based. This statement shall also include information on the relative contribution to any power or energy distribution network or pool that the proposed facility is projected to supply and a statement on the consequences of delay or termination of the construction of the facility.	5.0
49-41B-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.	6.0
49-41B-11(6); 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;	7.0

SDCL	ARSD	Required Information	Application Section
		(3) An evaluation of the proposed plant, wind energy, or transmission site and its advantages over the other alternative sites considered by the applicant, including a discussion of the extent to which reliance upon eminent domain powers could be reduced by use of an alternative site, alternative generation method, or alternative waste handling method.	
49-41B-11(11); 49-41 B-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 effect on the environment as a result of their construction or operation in the transmission site, wind energy site, or siting area.	8.0
49-41B-11(11); 49-41 B-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 transmission 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 plant, wind energy, 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 plant, wind energy, or transmission site; (5) A description of the soil type at the plant, wind energy, or transmission site; (6) An analysis of potential erosion or sedimentation which may re sult 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 plant, wind energy, 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.	9.0
49-41B-11 (11); 49-41B-22(2)	20:10:22:15	**Hydrology.** The applicant shall provide information concerning the hydrology in the area of the proposed plant, wind energy, or transmission site and the effect of the proposed site on surface and groundwater. The information shall include:	10.0

SDCL	ARSD	Required Information	Application Section
		(1) A map drawn to scale of the plant, wind energy, 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; and (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.	
49-41B-11 (11); 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, wind energy 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.	11.0
49-41B-11 (11); 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, wind energy 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.	12.0
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 plant, wind energy, or transmission site identifying existing land use according to the following classification system: (a) Land used primarily for row and non-row crops in rotation; (b) Irrigated lands;	13.0

SDCL	ARSD	Required Information	Application Section
		(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 systems; 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.	
49-41B-11; 49-418-28	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.	14.0
49-41B-11 (2, 11); 49-41B-22	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.	15.0
49-41B-11; 49-418-22	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.	16.0
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.	17.0
49-41B-11(11); 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:	18.0

SDCL	ARSD	Required Information	Application Section
		(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.	
49-41B-11(4)	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.	19.0
49-418-11(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.	20.0
49-41B-11(2)(11); 49-41B-35(2)	20:10:22:33	**Information concerning wind energy facilities.** If a wind energy facility is proposed, the applicant shall provide the following information: (1) Configuration of the wind turbines, including the distance measured from ground level to the blade extended at its highest point, distance between the wind turbines, type of material, and color; (2) The number of wind turbines, including the number of anticipated additions of wind turbines in each of the next five years; (3) Any warning lighting requirements for the wind turbines; (4) Setback distances from off-site buildings, right-of-ways of public roads, and property lines;	NA (see Sections 21 and 22 for collection line & transmission facility layout and construction)

SDCL	ARSD	Required Information	Application Section
		(5) Anticipated noise levels during construction and operation; (6) Anticipated electromagnetic interference during operation of the facilities; (7) The proposed wind energy site and major alternatives as depicted on overhead photographs and land use culture maps; (8) Reliability and safety; (9) Right-of-way or condemnation requirements; (10) Necessary clearing activities; (11) Configuration of towers and poles for any electric interconnection facilities, including material, overall height, and width; (12) Conductor configuration and size, length of span between structures, and number of circuits per pole or tower for any electric interconnection facilities; and (13) If any electric interconnection facilities are placed underground, the depth of burial, distance between access points, conductor configuration and size, and number of circuits.	
49-41B-11(2)(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.	21.0
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: (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.	22.0
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.	23.0

SDCL	ARSD	Required Information	Application Section
49-41B-11	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.	23.4
49-41B-11	20:10:22:39	**Testimony and exhibits.** Upon the filing of an application pursuant to SDCL 49-41B-11, an applicant shall also file all data, exhibits, and related testimony which the applicant intends to submit in support of its application. The application shall specifically show the witnesses supporting the information contained in the application.	24.0

2.0 Name of Participants (ARSD § 20:10:22:06)/Name of Owner and Manager (ARSD § 20:10:22:07)

The Applicant, Flying Cow Wind, LLC, (Applicant or FCW), is an affiliate of RES. The owner and manager of the Project is the Applicant, Flying Cow Wind, LLC.

Persons participating in the proposed Project relating to the Application and that are authorized to receive communications relating to the Application on behalf of the owner, manager and Applicant include the following:

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

The purpose of the proposed Project is to connect the planned Bitter Root Wind Project to the high-voltage bulk electric transmission grid at the POI at the Astoria Substation (Exhibits 1 and 2).

The Project will transmit 34.5 kV electricity produced from the Bitter Root Wind Project turbines via underground electrical collection lines to the Project Substation which is anticipated to be located in Deuel County, SD. The Project Substation will step up the electricity from 34.5 kV to 345 kV and then carry electricity via the proposed 345 kV overhead transmission line to the POI at the Astoria Substation. The Project will interconnect at a dedicated breaker position at the Astoria Substation. The owner of the Astoria Substation, Otter Tail Power, will be responsible for permitting and constructing the necessary interconnection facilities at the POI. As indicated above, the Applicant has been working through the interconnection process with MISO, and MISO has selected the POI near the Astoria Station for the Project (queue position J493). The Project will interconnect to the grid on the recently-constructed and now operational BSSBC 345 kV transmission line (Exhibit 2), which is a Multi-Value Project (MVP) previously approved for construction and operation by the SD PUC (see SD PUC Docket EL13-020).

The Project will enable transmission of clean, renewable wind-energy generated electricity to the grid and assist in meeting applicable renewable portfolio standards (RPSs) in South Dakota, Minnesota and the surrounding area. As described further in this Application, the Project will also provide significant local and regional benefits by reducing overall electric transmission costs, creating construction and maintenance jobs, generating construction spending, providing property taxes, and paying landowners for transmission line easement rights.

4.0 Estimated Cost of the Facility (ARSD § 20:10:22:09)

The Applicant estimates the construction costs for the Project will be $19.85 million. This includes the construction costs for the Collection Lines, Project Substation, and Transmission Line ($15 million). Additionally, the Applicant is responsible for a portion of the costs to construct the

Astoria Substation because of the additional equipment to facilitate interconnection of the Project. The Applicant's portion of the construction costs for the Astoria Substation will be approximately $4.85 million. Accordingly, the total construction costs associated with the Project will be $19.85 million.

5.0 Demand for Transmission Facility (ARSD § 20:10:22:10)

The Project will provide transmission facilities to deliver to the grid the energy from an up to 152 MW of nameplate capacity wind facility. The Applicant has executed a Power Purchase Agreement (PPA) for the sale of the renewable energy generated by the Wind Project. Without the construction and operation of the Project, there is not a transmission line or substation to deliver power from the Wind Project to the transmission grid on the MISO system in South Dakota via the BSSBC 345 kV transmission line.

5.1 Present and Projected Future Demand and Energy Needs

The Wind Project and this Project, collectively, are necessary to address the growing demand for additional renewable generation resources needed to meet renewable energy requirements and other clean energy requirements.

As indicated in Section 3, the Project would interconnect to the grid via the BSSBC 345 kV transmission line, which is a MISO-approved MVP project (MISO Project 2221) that was designed to reduce the wholesale cost of energy delivery for consumers across MISO by enabling delivery of low-cost generation to load, reducing congestion costs, and increasing system reliability, regardless of the future generation mix[4]. MISO selected the BSSBC based upon significant research and analysis summarized in the MISO Transmission Expansion Plan 2011 (MTEP11). In MTEP11 MISO indicates that the recent adoption of RPSs across the MISO footprint has driven the need for a more regional and robust transmission system to deliver renewable resources from often remote renewable energy generators to load centers.

The BSSBC project creates a new 345 kV path on the border of South Dakota and Minnesota by connecting Xcel Energy's Brookings County and Otter Tail Power's Big Stone substations (approximately 69 miles of new 345 kV transmission line was installed). MISO indicates this new 345 kV outlet from Big Stone removes overloads and reliably moves mandated renewable energy from the Dakotas to major 345 kV transmission hubs and load centers. In summary, the new BSSBC 345 kV transmission line was determined by MISO to be an effective solution to increase system reliability and provide low-cost delivery of state-mandated renewable energy, and the Project is designed to cost-effectively interconnect the Bitter Root Wind Project to the grid.

5.2 Consequences of Delay or Termination of the Construction of the Facility

A delay or termination of constructing the Project would result in the delay or termination of supply of renewable electricity from the Wind Project. Specifically, delay or termination of construction of the Project could delay or even terminate the MISO interconnection process, require a new route

[4] See page 22 of the following: file:///C:/Users/SedJG0911/Documents/RES%20Americas/Bitter%20Root%20Wind%20Project/Project%20Files/MISO%20Info%20re%20HVTL/MISO_TransmissionExpansionPlan_11_MTEP11_Draft_Report_Dec2011.pdf.

and the acquisition of land rights, and impede the ability to deliver needed renewable energy to the grid. First, delay or termination could jeopardize the ongoing MISO interconnection process. As indicated above, the Applicant has been working with MISO since the Applicant entered the queue in February 2016 and is in the midst of completing the MISO interconnection studies. A Phase 3 System Impact Analysis and the Interconnection Facilities Study are complete; a Network Upgrade Facilities Study is ongoing, and an interconnection agreement is anticipated to be finalized in January 2019. The schedule for finalizing the interconnection agreement between FCW and MISO to interconnect the Project and the Wind Project to the grid could be delayed, and it is possible the MISO interconnection process will need to be restarted altogether, which could result in MISO selecting a different POI depending on impacts to FCW's queue position.

Second, delay or termination could result in the need to re-route the Project and identify new willing participants. The Applicant has been diligently working to appropriately route the transmission line (Proposed Route; Exhibits 1 and 2) from the Project Substation to the POI. FCW has invested significantly in both the MISO interconnection process and efforts to secure appropriate land rights and easements for the Proposed Route. Delay of the Project could result in MISO identifying a different POI for the Project, which would require FCW to conduct a new routing process, including identifying new, willing participants to secure the necessary land rights and easements for the Project. If that occurs, the Applicant would likely need to restart the process of routing the transmission line and acquiring the associated land rights and easements.

Ultimately, delay or termination of the Project may also impact the delivery of renewable energy from the Bitter Root Wind Project to the grid and the off-taker under the PPA. Delay of the Project and the Bitter Root Wind Project could constitute a breach of agreement terms between that of FCW and the power purchaser under the PPA, thereby exposing FWC to contractual risks. By delaying the delivery of renewable energy from the Wind Project, the power purchaser under the PPA may also fall out of compliance with applicable renewable energy procurement requirements. This could also impact the value of the renewable energy and the rate that FCW receives for the renewable energy from the power purchaser under the PPA. If delay or termination were to occur, the financial viability of the Project and the Bitter Root Wind Project could be materially impacted.

6.0 General Route and Site Description (ARSD § 20:10:22:11)

6.1 General Route Description

The Project is located entirely within Deuel County, South Dakota (Exhibit 1). The overall Proposed Route is approximately 10.42 miles. The Collection Lines, Project Substation and approximately 0.97 miles of the proposed transmission line are located in Norden Township, and the remaining approximately 9.45 miles of transmission line are located Scandinavia Township. The Project crosses predominately agricultural land with some crossed portions that are undeveloped. One church, one residence and two business/farmsteads are located within 500 feet of the Proposed Route but outside of the Construction Disturbance Area.

Table 2 indicates the townships, ranges and sections intersected by the Study Area (see Section 13).

Table 2 Townships, Ranges and Sections Intersected by the Study Area

County	Township	Range	Sections
Deuel	113N	47W	3-10
	113N	48W	10-12, 14-15, 21-23
	114N	47W	27-28, 33-34

Exhibit 2 depicts a detailed map of the Proposed Route, Project facilities, and surroundings, including cities, lakes and creeks, rivers, cemeteries, places of historical significance, transportation facilities, other transmission lines, pipelines, county wells, communications towers, roads, conservation easements and other noteworthy features adjacent to or abutting the Project facilities.

The Proposed Route is described as follows:

> From the Project Substation at the north end of the Project, the Proposed Route heads south along the west side of 488th Avenue for approximately 0.97 miles, crosses 190th Street and continues south across farm fields for approximately one mile. It then crosses County Road 517 (191st Street) and turns west on the south side of County Road 517. The Project heads west and crosses Fish Lake Drive, parallel to County Road 517 for approximately 1.4 miles, where it turns northwest/west route around a residence approximately 0.43 miles. The Project continues to the west on the south side of County Road 517 for approximately 1.6 miles and crosses 485th and 484th Avenues. The Proposed Route turns south and parallels the west side of 484th Avenue for approximately 0.5 miles where it turns west and follows a section line in an agricultural field, crossing 483rd Avenue, for approximately 1.98 miles until reaching 482nd Avenue. The Project then turns south on the east side of 482nd Avenue for approximately 0.4 miles and crosses to the west side of 482nd Avenue. It then continues south approximately 1.01 miles, crossing 192nd Street, to the north side of 193rd Street. At this point, the Proposed Route turns west and follows the north side of 193rd Street for approximately 0.26 miles, where it turns south, crosses 193rd Street and continues for approximately 0.45 miles. The Proposed Route turns west and continue for approximately 0.33 miles where it terminates at the POI.

Additional details concerning the proposed transmission line are included in Sections 21 to 23.

6.2 General Project Substation Site Description

The Project will commence at the South Dakota and Minnesota border with the construction of a Project Substation on approximately 2.83 acres within an approximately 6.5-acre parcel at the southwest corner of the intersection of 488th Avenue and 189th Street, approximately 8.5 miles east/southeast of the town of Brandt, South Dakota. Underground electrical collector lines will pass into Deuel County from the Wind Project in Yellow County, Minnesota. The Project Substation site contains a forested windbreak and the Applicant attempted to minimize tree removal to the greatest extent possible. Additional details concerning the Project Substation are included in Section 23.1.

7.0 Alternative Sites (ARSD § 20:10:22:12)

7.1 General Criteria to Select the POI, Project Substation Site and the Proposed Route

The Applicant applied a multi-layered selection process to identify the Proposed Route, as well as the Project Substation site. The Applicant has applied the following criteria to address MISO interconnection requirements and connection point, the Project Substation site and routing of the Proposed Route. Criteria considered in the overall siting and routing selection process included:

- land availability;
- minimize length of route;
- landowner concerns and comments;
- existing land uses;
- applicable rules, regulations and requirements (local, South Dakota and federal);
- environmental and natural resources;
- stakeholder responses (see Appendix A for request for comments/responses);
- MISO interconnection options, costs, constructability issues; and
- engineering/design considerations.

As introduced in Section 1, the Applicant has been working with MISO to locate the POI for the Project (the Project queue position with MISO is J493). Initially, MISO indicated two different POIs for the Project – one located in Yellow Medicine County, MN northeast of the proposed Bitter Root Wind Project footprint, northeast of Canby, MN, and the other in Deuel County, SD which is included in this Application (Exhibits 1 and 2). During the interconnection study process, the decision was made to eliminate the possible POI in Yellow Medicine County, MN due to the prohibitive estimated cost of network upgrades on the existing 115kV network, in addition to upgrades on the 345kV network. MISO eliminated the POI in Minnesota and is now focused on the current POI in Deuel County, which is the Otter Tail Power Astoria Substation.

With the POI location set through the MISO interconnection process, the Applicant then reviewed options to site the Project Substation, the other endpoint of the planned transmission line (Exhibit 2). The proposed Project Substation location was selected based on a number of factors, including: the location of the Wind Project; the location of the POI; willingness of the landowner; and constructability and environmental reviews. Section 7.3 below provides information on the evaluation of the Proposed Route.

The Applicant identified a landowner with a parcel of land located at the southwest corner of the intersection of 189th Street and 488th Avenue (Exhibit 3).[5] The Applicant initially requested a parcel of land free of trees in this location from the landowner. However, after further discussion, the landowner preferred the Applicant to use the forested portion of the parcel to the extent practicable to avoid and minimize impacts to active cropland south of the treeline. While this

[5] Note that 488th Avenue is a gravel road and the segment of 189th Street bearing west from 488th Avenue is a two-track farm field accessway for about half of a section, where it turns into a gravel road continuing to bear west and where it intersects with a farmstead driveway.

requires removal of some trees, the Applicant has designed the Project Substation parcel according to Deuel County setback requirements and this landowner request.

Based upon these two endpoints, the Applicant then identified and reviewed various Transmission Line route options to connect the endpoints.

7.2 Evaluation of Alternative Routes and Sites Considered

With the two endpoints of the planned transmission line established, the Applicant's next step was to identify potential route options from the Project Substation/collection lines from the proposed Bitter Root Wind Project to the POI location within the defined Study Area. Various transmission line routes between the endpoints were possible following existing linear infrastructure or across greenfield areas. Analysis of potential routes and alternate route segments involved review of existing land, natural resources, existing land uses, regulations, and applicable Geographic Information System (GIS) data.

The Applicant evaluated sensitive areas and other constraints to exclude certain route and route segment options. Sensitive areas and constraints included residential, farmstead and other areas occupied by humans (e.g., mainly agricultural land uses and farmsteads in the vicinity of the overall Study Area), public lands and easements, environmental and other natural resources, cultural resources, etc. The Applicant then assessed various routes and route segment options along existing roads, farm access roads, section lines, field lines, and utilities (i.e., existing electric transmission and distribution lines, pipelines, communication lines, etc.) where the planned transmission line could be co-located or placed adjacent to existing features. These linear infrastructure features relative to a proposed transmission line route were considered better opportunities for the Project because this could minimize or avoid certain impacts and concentrate similar uses along the same corridor.

The Applicant, as a private independent power producer (IPP), does not have eminent domain authority and will therefore site the Project entirely on private land where voluntary easement agreements have been obtained from the landowners. In addition to identifying landowners willing to participate, and the above factors, the Applicant also discussed route options with participating landowners to identify concerns and preferences, routing the proposed transmission line accordingly. In addition to all of the routing and siting factors listed above, FCW wanted to ensure landowner support for the Project and attempted to minimize impacts to cultivated fields and field access.

Once these route options were identified, FCW compared each to factors with the goal of avoiding or minimizing impacts, which also address SD PUC permitting criteria under SDCL Chapter 49-41B (Energy Conversion and Transmission Facilities) and ARSD Chapter 20:11:22 (Energy Facility Siting Rules). These factors included:

- humans, human settlements and community impact (socio-economic, displacement, noise, aesthetics, cultural values, recreation, public services, health, safety and welfare);
- physical environment (e.g., regional land forms, topography, geology, economic deposits, soils, erosion/sedimentation, hydrology, water quality, air quality, seismic risks, subsidence, slope instability, constraints due to geological characteristics);
- land use and local land use controls;

- right-of-way (ROW) (roads, utilities, etc.) and/or close to property/section lines;
- archaeological and historic resources;
- rare or endangered species and unique natural resources;
- design options to maximize energy efficiencies, mitigate adverse environmental effects and accommodate expansion of transmission or generating capacity;
- total length of the proposed transmission line;
- airports or other land use conflicts;
- compliance with all applicable laws and rules; and
- orderly development of the region and views of the government bodies of the local affected units of government.

The Applicant also contacted additional stakeholders (e.g., local government, regulatory agencies, etc.) to introduce the Project and request information regarding the Study Area and potential impacts (Appendix A). Based upon these discussions and outreach, the Applicant identified a Proposed Route (Exhibits 1 and 2). As of the date of this Application, the Applicant has lease agreements/option agreements in place for approximately 60% of land parcels along the route. Discussions with landowners and applicable stakeholders is ongoing where agreement has not been reached for the Proposed Route, but all landowners along the route have indicated support for the Project.

7.3 Evaluation of the Proposed Route and Project Substation Site

Per discussions with the Deuel County Highway Superintendent and township officials in August 2018, it was determined that the transmission line structures must be located outside of the township road rights-of-way (33 feet on either side of centerline) and county road right-of-way for County Road 517 (50 feet on either side of centerline).

In addition to the above analysis and evaluations and the local setback requirements, the Applicant evaluated the Proposed Route and Project Substation site using its internal siting standards and setbacks. Additional setbacks the Applicant applied include:

- at least 100 feet from occupied buildings, wells, and underground utilities;
- at least 300 feet from communication towers and meteorological towers;
- at least 660 feet from any raptor nests; and
- routing/siting to avoid any direct impacts to U.S. Fish and Wildlife Service (USFWS) grassland or wetland easement areas.

Detailed maps of the Proposed Route are included in Exhibit 2. The Proposed Route parallels roadways/section lines for approximately 63% of the route, section lines only for approximately 10% of the route, and greenfield/agricultural land approximately 27% of the route.

To further minimize impacts to agricultural land, the Applicant's preliminary design places the transmission pole foundations approximately 40 feet from the road centerline adjacent to field edges, with the exception of that portion of the Proposed Route along County Road 517. Poles along County Road 517 are placed approximately 57 feet from the road centerline due to the wider county right-of-way. For poles not located at a turning point, the structures may be placed 3-4 feet closer to the road.

8.0 Environmental Information (ARSD § 20:10:22:13)

Sections 9 through 16 describe the existing environment within the Study Area at the time of submission of the Application. These sections also estimate anticipated temporary and permanent impacts to the existing environment from construction and operation of the proposed transmission line and associated facilities, identify permanent impacts that are anticipated to remain beyond the operating lifetime of Project facilities within Permanent Easement Areas and the Project Substation site, and identify mitigative measures the Applicant proposes to implement.

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

9.1 Existing Physical Environment

9.1.1 Description of Regional Landforms

The Project is located within the Coteau des Prairies physiographic region, which is the predominant landform of eastern South Dakota (Malo, 1997). The Coteau des Prairies is derived of the melting of stagnant glacial ice beneath a sediment layer. The tightly undulating, hummocky landscape has no patterned drainage system and it is perforated with closely spaced semi-permanent and seasonal wetlands. The Coteau des Prairies has a chain of larger lakes that were formed where episodes of ice shear occurred, and higher precipitation levels that allow for the establishment of widespread burr oak woodlands near wetland areas (Bryce et al, 1996). Elevations in the Project area range from 1,688 feet above sea level (asl) at the northern extent of the Study Area to 1,860 feet asl at the southern extents. Project topography is depicted in Exhibit 3.

9.1.2 Geology

Surficial Geology

The flatiron-shaped Coteau des Prairies plateau was named by early French explorers from Quebec. The general term "coteau", which is a French-Canadian term for "hill", has been adopted into English to describe any upland dividing ridge. Repeated glaciations have created the thick glacial deposits which compose the plateau; the composite thickness of the coteau deposit is approximately 900 feet (275 meters).

The Project lies within the Northern Glaciated Plains ecoregion and the Prairie Coteau ecoregion section (Exhibit 4). Historically the regional landscape was comprised of grassland which has since primarily been converted to farmland. Drift plains, large glacial lake basins, and shallow river valleys, with level to undulating surfaces and deep soils, provide the basis for crop agriculture. This relatively recent geologic surface has an immature drainage system and the ecoregion is dotted with numerous wetland depressions, ranging in both size and permanence. There are sub-regional concentrations of glacially derived permanent lakes. Primary land cover for the ecoregion is a mosaic of agriculture, grasslands, wetlands, and water (Exhibit 5). Minor regional land covers include forest, development, and mining (Auch 2016).

Bedrock Geology

The glacial deposits of the Coteau des Prairies plateau are underlain by a small ridge of resistant Cretaceous shale. During the last Ice Age (Pleistocene), the Laurentian continental glacier

separated in to the James and Des Moines lobes. The James lobe on the west and the Des Moines lobe on the east, parted around the pre-existing plateau and further deepened the lowlands flanking the plateau. The underlying bedrock formation in the Study Area is the Pierre Shale (Exhibit 6). This stratum was deposited during the Upper Cretaceous geologic epoch, between 100.5 and 87 million years ago. It is a dark-gray fossiliferous shale with veins and seams of gypsum, and concretions of iron oxide. The Pierre Shale is approximately 700 feet (210 meters) thick and overlies the Niobrara division, a chalk geologic formation which was deposited between 87 and 82 million years ago (MacLachlan 1976).

9.1.3 Economic Deposits

Economic deposits are earth materials that can be used for economic and/or industrial purposes. These materials include precious and base metals, nonmetallic minerals, construction-grade stone, petroleum minerals, and coal. Four gravel pits appear on two topographic maps (USGS 7.5' Canby NW Quad, 1969 and USGS 7.5' Astoria Quad, 1972) within the Study Area (Exhibit 3); however, review of current aerial photography indicates they are no longer active.

Many aquifers used as sources of drinking water and for irrigation by South Dakota farmers are within the glacial sand and gravel deposits of the Coteau des Prairie. These deposits are also a source of coarse aggregate. Additionally, the sources of water for some of the wetlands on the Coteau des Prairie are aquifers within sand and gravel deposits that are present within this coteau.

9.1.4 Soils

The Natural Conservation Resource Service's (NRCS) soil surveys describe the kinds of soils that exist in an area. Soils are described in terms of their location on the landscape, profile characteristics, relationships to one another, suitability for various uses, and needs for particular types of management. Soils are then grouped into map units for display purposes as indicated in Exhibit 7 (Brewer 2011).

Soil Survey Geographic (SSURGO) GIS data available from the NRCS was analyzed using ESRI's ArcMap 10.5 to determine soil associations for the Study Area. A total of 46 soil associations were identified. Descriptions of these soil associations are provided below in Table 3.

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Table 3 Soil Associations within the Study Area

Soil Association Name	
Arvilla-Sioux complex, 6 to 15 percent slopes	Lamoure-Rauville silty clay loams, channeled
Barnes-Buse loams, 15 to 25 percent slopes	Lowe loam
Barnes-Buse loams, 2 to 6 percent slopes	Moritz-Lamoure complex
Barnes-Buse loams, 6 to 9 percent slopes	Nutley-Sinai silty clays, 6 to 12 percent slopes
Barnes-Buse-Svea loams, 2 to 15 percent slopes	Oldham silty clay loam
Barnes-Svea loams, 0 to 2 percent slopes	Orthents, gravelly
Barnes-Svea loams, 1 to 6 percent slopes	Parnell silty clay loam
Barnes-Svea-Buse loams, 2 to 9 percent slopes	Parnell-Vallers complex
Buse loam, 20 to 40 percent slopes	Poinsett-Waubay silty clay loams, 0 to 2 percent slopes
Buse-Barnes loams, 9 to 40 percent slopes, very stony	Poinsett-Waubay silty clay loams, 1 to 6 percent slopes
Buse-Lamoure, channeled, complex, 0 to 40 percent slopes	Rauville silty clay loam, coteau, 0 to 1 percent slopes, frequently flooded
Darnen loam, 0 to 2 percent slopes	Renshaw loam, coteau, 0 to 2 percent slopes
Darnen loam, 2 to 6 percent slopes	Renshaw-Fordville loams, coteau, 2 to 6 percent slopes
Divide loam	Renshaw-Sioux complex, coteau, 2 to 6 percent slopes
Egeland-Embden complex, 0 to 2 percent slopes	Sinai silty clay, 0 to 2 percent slopes
Egeland-Embden complex, 2 to 6 percent slopes	Sinai silty clay, 2 to 6 percent slopes
Fordville loam, coteau, 0 to 2 percent slopes	Singsaas-Waubay silty clay loams, 0 to 2 percent slopes
Fossum sandy loam	Singsaas-Waubay silty clay loams, 1 to 6 percent slopes
Fulda silty clay loam	Southam silty clay loam, 0 to 1 percent slopes
Hamerly-Badger complex	Swenoda sandy loam, 2 to 6 percent slopes
Hegne-Fulda silty clay loams	Vallers loam
La Prairie loam	Water
Lamoure silty clay loam, coteau, 0 to 1 percent slopes, occasionally flooded	

9.1.5 Prime Farmland

According to the NRCS, prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to

acceptable farming methods, including water management (NRCS 2000). Table 4 presents the acreages and percentages of farmland classifications within the Study Area.

Table 4 Farmland Types within the Study Area

Farmland Type	Acreage	Percentage of Area
All areas are prime farmland	2,832	47
Farmland of statewide importance	564	9
Not prime farmland	1,100	18
Prime farmland if drained	1,485	24
Prime farmland if irrigated	110	2
Total	**6,090**	**100**

9.1.6 Erosion or Sedimentation

In areas where land slope is relatively flat, the soil erosion potential is low and in general, the Study Area consists of nearly flat terrain. Where steep slopes (i.e., greater than 6%) are present, the potential for soil erosion increases significantly. Soils information for the Project indicate nine associations having slope greater than 6% (Arvilla-Sioux complex, 6 to 15 percent slopes; Barnes-Buse loams, 15 to 25 percent slopes; Barnes-Buse loams, 6 to 9 percent slopes; Barnes-Buse-Svea loams, 2 to 15 percent slopes; Barnes-Svea-Buse loams, 2 to 9 percent slopes; Buse loam, 20 to 40 percent slopes; Buse-Barnes loams, 9 to 40 percent slopes, very stony; Buse-Lamoure, channeled, complex, 0 to 40 percent slopes; and Nutley-Sinai silty clays, 6 to 12 percent slopes); however, the majority of the soils vary between 0 and 6 percent slope (Table 3).

9.1.7 Seismic Risks and Subsidence Potential

A total of 87 earthquakes have been recorded with epicenters originating in South Dakota between 1872 and March 2012 (South Dakota Geological Survey) [SDGS] 2013). None of these earthquake epicenters were located in Deuel County. Subsidence or slope instability is not considered to be a risk within the Study Area.

9.2 Impacts and Mitigation

Geologic analysis indicates that the Project will not substantially affect bedrock geology and seismic activity is not expected to be a risk to the operation of the Project Substation or the proposed Transmission Line and related facilities. The placement of pole foundations in the ground will have a minor impact to the underlying geologic conditions. Except as described in this Application, the Applicant is not aware of any additional constraints that may be imposed by geological characteristics on the design, construction, or operation of the Project.

During construction, there is a risk of erosion of disturbed soils from wind and water; thus, activities such as site-clearing, installation of pole foundations, construction access to pole

locations, and site preparation and grading at the Project Substation site have the potential to cause soil erosion. Permanent impacts to soil include pole foundation areas and the Project Substation site development. Temporary impact to soil will occur along gravel access drive paths to the foundation locations and at intersections where temporary staging and pulling/stringing areas will be required when installing the conductor (Exhibit 7).

To mitigate potential adverse effects to and from soils, the Applicant will develop and implement a Storm Water Pollution Prevention Plan (SWPPP) and use Best Management Practices (BMPs) during construction to protect topsoil and adjacent wetland resources and minimize soil erosion. To the extent possible for safe construction of the Project, the Applicant will use the shortest available access route and minimal width necessary to install foundations and poles and string conductors. The Applicant will use the Permanent Easement Area for construction access to pole locations and other additional area as needed outside the Permanent Easement Areas with the permission of affected landowners (Exhibit 7). Temporarily disturbed soil will be restored to pre-construction condition.

10.0 Hydrology (ARSD § 20:10:22:15)

10.1 Existing Hydrology

Water in Deuel County is present in streams, lakes, ponds, and reservoirs and in the interconnected pore space of unconsolidated surficial deposits and of bedrock strata (Exhibit 8). Most of the surface water and groundwater in surficial deposits comes from precipitation within the County and adjacent areas. Drainage in the region is largely internal, with only about 2.6 percent of the precipitation becoming streamflow or aquifer outflow, and about 95 percent of the water in the region being returned to the atmosphere by evaporation and transpiration (Kume, 1985). Consistent with the Coteau des Prairies physiographic region in general, the area surrounding the Project area is marked by several pothole wetlands with a few well-defined stream channels.

10.1.1 Surface Waters

The USGS, in cooperation with various federal and state agencies, has mapped the hydrologic boundaries of water-resources, in order of descending scale, into regions, subregions, basins, subbasins, watersheds, and subwatersheds. A detailed map of surface waters, wetlands and watershed districts and associated existing water drainage areas is included in Exhibit 8. The Project area is within the Upper Mississippi River Region, the Minnesota River Subregion, Minnesota River Basin, and the Lac qui Parle River Subbasin. The Project area crosses three separate watersheds: Headwaters Lac Qui Parle River, Lazarus Creek, and Florida Creek. In the Headwaters Lac Qui Parle River watershed, the Project area crosses the Fish Lake and Twin Lake subwatersheds. In the Lazarus Creek watershed, the Upper Lazarus Creek and Canby Creek subwatersheds are crossed, and the Town of Brandt-Cobb Creek subwatershed of the Florida Creek watershed is crossed.

Drainage in the region tends to be primarily internal, with runoff from land flowing to sloughs, lakes or ponds, and either evaporating to the atmosphere or infiltrating to aquifers. The area of internal drainage varies greatly from year to year depending on the quantity and temporal distribution of precipitation. Most streams in the region have periods of no flow (Kume, 1985).

Named streams present in the Study Area include Lazarus Creek and Cobb Creek, with Cobb Creek also crossing the Construction Disturbance Area and Permanent Easement. The outlet to Fish Lake is an unnamed stream but has perennial flow. Twenty-six unnamed intermittent streams are present within the Study Area. Fish Lake is the only named waterbody in the Study Area.

10.1.1.1 Lac Qui Parle Subbasin

Outflow from the Study Area is via Lazarus and Cobb Creek, as well as via unnamed tributaries of Florida Creek and the Lac Qui Parle River. Lazarus Creek is located in the northeast corner of the Study Area and flows northeast across the Study Area for approximately 1 mile before leaving the Study Area in route to its confluence with the Lac Qui Parle River approximately 18.5-miles northeast of the Study Area. Cobb Creek is located in the northwest corner of the Study Area and flows east and north across a portion of the Study Area approximately 4 miles in length before leaving the Study Area in route to intersect the South Dakota – Minnesota border approximately 6.1 miles north of the Study Area.

Fish Lake is the only named waterbody within the Study Area (Exhibit 8b). Fish Lake is classified by the South Dakota Legislature for the following beneficial uses[6]:

- Warmwater marginal fish life propagation;
- Immersion recreation;
- Limited contact recreation; and
- Fish and wildlife propagation, recreation, and stock watering (SDLRC, 2018).

Five unnamed intermittent streams flow generally east across the Study Area into Fish Lake. The outlet to Fish Lake is an unnamed stream located on the northeast corner of the lake that flows east and north to its confluence with the Lac Qui Parle River approximately 8.6 miles northeast of the lake.

10.1.2 Wetlands

The USFWS National Wetlands Inventory (NWI) was reviewed to assess the presence of wetlands within the Study Area (Exhibit 8). Table 5 summarizes NWI wetlands within the Study Area, Permanent Easement Area and the Construction Disturbance Area.

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[6] See ARSD Chapter 74:51:02, sections 01 to 04.

Table 5 NWI Mapped Wetlands in the Project Study, Construction Disturbance, and Permanent Easement Areas

NWI Type[1]		NWI Mapped Wetland Areas Within Study Area (Acres)[2]	NWI Mapped Wetland Areas Within Construction Disturbance Area (temporary impacts - Acres)[2]	NWI Mapped Wetland Areas Within Permanent Easement Area (permanent impacts - Acres)[2]
Palustrine Freshwater Emergent (PEM)	PEM1A PEM1/ABF PEM1/ABFD PEM1AD PEM1AF PEM1AH	375.88	2.16	0.002
	PEM1B	14.56	0.00	0.000
	PEM1C PEM1CD PEM1CX	257.87	2.40	0.005
	PEM1F PEM1FH	4.43	0.0	0.000
	Subtotal	**652.75**	**4.56**	**0.008**
Palustrine Forested Wetland (PFO)	PFOA PFO1A PFO1AD	13.87	0.23	0.000
	PFO1B	0.88	0.00	0.000
	PFOC PFO1C PFOCD PFOCX	3.03	0.00	0.000
	Subtotal	**17.78**	**0.23**	**0.000**
Palustrine Scrub-shrub Wetland (PSS)	PSS1A	0.87	0.00	0.000
	Subtotal	**0.87**	**0.00**	**0.000**
Freshwater Lake/Pond/ Riverine	PABFX	3.70		0.000
	PUBF PUBFH PUBFX	13.45	0.14	0.000
	PUBH	0.01	0.00	0.000
	R4SBC	16.03	0.06	0.000
	R5UBH	0.27	0.00	0.000
	L2UBH	86.73	0.00	0.000
	Subtotal	**120.19**	**0.19**	**0.000**
Wetland Total		**791.59**	**4.99**	**0.008**

[1] Cowardin, et al. 1979.
[2] Totals may not add up due to rounding.

The USFWS Madison Wetland Management District (WMD) manages the Wetland Easement Program (WEP). A USFWS wetland easement is an agreement between landowners and the federal government through the USFWS that stipulates that applicable wetlands cannot be drained, filled, leveled, or burned. The WEP was established to maximize the benefits that wetlands provide, including erosion control, flood prevention, groundwater recharge, and wildlife habitat (USFWS, 2010). Based on a review of USFWS-provided data and publicly available information (U.S. Geological Survey [USGS] Protected Areas Database, 2018) and confirmation from the USFWS Madison WMD in March 2018, there are no USFWS wetland easements within the Study Area.

A USFWS grassland easement is a legal agreement signed with the federal government that pays landowners to permanently keep lands in grass to help reduce soil erosion, protect water supplies, recharge water supplies, and provide wildlife habitat, among other benefits. Based on a review of USFWS-provided data and USGS Protected Areas Database (2018) and confirmation from the USFWS Madison WMD in March 2018, there are two USFWS grassland easements within the Study Area (Exhibit 9 and Appendix A).

The Applicant continues to review land title records of participating properties to identify conservation easements that are not recorded in other public databases on properties within the Study Area. As of this date, no other easements have been identified.

10.1.3 Groundwater

Groundwater resources in Deuel County include three major aquifers in glacial drift (Big Sioux, Prairie Coteau and Altamont), one major aquifer in bedrock (Dakota Formation), and several minor aquifers in glacial drift and alluvium (Kume, 1985). Within the Study Area, well completion reports indicate water located within the Altamont aquifer at a depth of 678 feet below surface in the southwest corner of the Project area near the city of Toronto, and literature indicates that water can be present in the Altamont at a shallower depth of 459 feet below surface in the northeast corner of the Study Area (Kume, 1976). Average well depth in the Altamont aquifer is 472 feet. Water quality in the Altamont aquifer generally is not suitable to use for irrigation, although it may be acceptable in some places. Elsewhere the water ranges from marginally acceptable to unsatisfactory for use as a domestic or public supply. Although little used for livestock supplies, the water is acceptable for such use and is a major potential source of stock water (Kume, 1985). Approximately 49 percent of the Project area, including the Project Substation, is located over a shallow outwash aquifer with a first occurrence generally at land surface or at least less than 50 feet below land surface (Jensen, 2001).

A local glacial aquifer of mainly local hilly deposits of outwash sand and gravel underlies the Study Area. Average well depth in the surface outwash areas is 34 feet (Kume, 1985). Water associated with these surficial outwash aquifers is generally good to excellent for livestock and irrigation, and good quality for domestic water supplies. Lithologic logs indicate well depths within and immediately adjacent to the Study Area ranging from 25 to 65 feet, with an average depth of 40 feet (South Dakota Department of Environment and Natural Resources [SD DENR] 2018b); water well completion reports range from 80 to 678 feet (SD DENR, 2018c). The

Brookings-Deuel Rural Water System provides water to rural and municipal users within the Study Area, excluding those with private wells.

10.1.4 Floodplains

The Federal Emergency Management Agency (FEMA) maintains information developed to support flood hazard mapping for the National Flood Insurance Program (NFIP). Flood hazard mapping provides States, local communities, and Tribes with flood risk information and tools that they can use to increase their resilience to flooding and better protect people and property through collaboration with State and local entities. FEMA has not completed a study to determine flood hazard for the Study Area; therefore, a FEMA flood map has not been published at this time.

10.1.5 National Park Service Nationwide Rivers Inventory (NRI)

The NRI is a listing of more than 3,200 free-flowing river segments in the United States that possess one or more "outstandingly remarkable" natural or cultural values considered to be at least regionally significant. Under the Wild and Scenic Rivers Act, federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI segments (National Park Service [NPS], 2009). There are no NRI-listed rivers within the Study Area. The nearest NRI-listed river to the Study Area is the South Fork Yellow Bank River located approximately 25 miles north/northwest of the Study Area along the Grant/Deuel county line in Grant County, South Dakota. This segment is described as a cool water stream with pools and riffles that sustains introduced brook trout populations.

10.1.6 Impaired Waters

The Clean Water Act (CWA) is the primary federal statute regulating the nation's water, and it aims to prevent, reduce, and eliminate pollution in the nation's water in order to 'restore and maintain the chemical, physical, and biological integrity of the Nation's waters' (United States Environmental Protection Agency [USEPA], 2018). Section 303(d) of the CWA requires that states, territories and authorized tribes (collectively referred to as "states") develop lists of impaired waters, or waters that do not meet the water quality standards established by the states. States are required to establish priority rankings for waters the 303(d) list and develop Total Maximum Daily Loads (TMDLs) for these waters. A TMDL includes a calculation of the maximum amount of a pollutant that can be present in a waterbody and still meet water quality standards (USEPA, 2018[b]).

A review of the 2018 South Dakota Integrated Report for Surface Water Quality Assessment (South Dakota Department of Environment & Natural Resources [SD DENR], 2018) indicates that while no 303(d)-listed waterbodies are located within the Permanent Easement Area or Construction Disturbance Area, the Study Area encompasses a part of Fish Lake, which has been included on the State 303(d) list for not meeting water quality standards. The Phase I Watershed Assessment and TMDL Final Report for Fish Lake was completed as a portion of a larger assessment in Deuel County as a result of the inclusion of Fish Lake on the State 303(d) list in 1998 for a Trophic State Index (TSI) impairment (Kruger and Kniss, 2004). The TMDL was approved in 2004, and Fish Lake is now listed in the 2018 Integrated Report as fully supporting all uses (SD DENR, 2018).

10.1.7 Water Use Plans

The Applicant analyzed the current and planned water uses by nearby communities, agriculture, recreation, fish, and wildlife to determine their potential to be affected by the location of the proposed Project.

The 1972 South Dakota State Legislature established the State Water Plan (SWP) to ensure the optimum overall benefits of the state's water resources for the general health, welfare, safety, and economic well-being of South Dakota residents through the conservation, development, management, and use of those resources (SDCL 46A-1-2). The SWP consists of two components: the State Water Facilities Plan; and the State Water Resources Management System. According to the 2018 SWP, no State Water Facilities Plan or State Water Resources Management System projects are located within the Study Area (South Dakota Board of Water and Natural Resources [SD BWNR], 2018). The nearest project under the SWP is a State Water Facilities Plan funded project located 1 mile south of the Study Area in Astoria which consists of a wastewater treatment facility expansion and diversion channel rehabilitation project. The Astoria wastewater project will not be impacted by the Project.

Surface water appropriation, permanent dewatering, deep well injection, and water storage, reprocessing, or cooling will not be required for construction or operation of the Project. Temporary water use during construction of the Project will be required to produce concrete at a temporary mobile batch plant onsite which is anticipated to be located in Minnesota within the Wind Project footprint. Applicable water appropriation permits will be obtained by the batch plant operator if necessary. This water source is located outside of the Study Area, and no water sources within the Study Area will be utilized for the Project; accordingly, no map of known surface or groundwater supplies to be used as a water source for the Project is provided.

10.2 Impacts and Mitigation

Field surveys for wetlands and waterbodies will be conducted during the last two weeks of October 2018. A copy of the wetland/waterbody field survey report will be filed as a supplement to this Application upon completion of the survey and with other applicable regulatory personnel. An assessment of the temporary and permanent impacts to wetlands and waterbodies, both in area and type, based on these wetland/waterbody field surveys will also be provided to the PUC and applicable regulatory personnel within the field survey report.

Potential impacts to rivers, streams, wetlands and floodplains are expected to be avoided and minimized to the greatest extent possible by spanning these resources. In cases in which complete avoidance is not possible due to landowner preferences, constructability issues, or other constraints, the Applicant will make every effort to minimize its footprint within these resources, including the use of construction matting for equipment, following recommended construction timing windows to reduce impacts to wildlife, and the use of BMPs, among other measures.

Potential impacts to surface waters due to Project construction include transport of sediment and nutrients into receiving waters due to excavation and the exposure of soils. The Applicant will apply erosion control measures in accordance with the South Dakota Department of Environment and Natural Resources (SD DENR) General Permit Authorizing Stormwater Discharges Associated with Construction Activities Under the South Dakota Surface Water Discharge System.

BMPs will be used during construction and operation of the Project to protect topsoil and adjacent resources and to minimize soil erosion. BMPs employed will focus on the containment of excavated material, protection of exposed soil, and stabilization of restored material.

A SWPPP will be developed prior to construction that will include BMPs such as silt fence, revegetation plans, and management of exposed soils to prevent erosion. Following completion of construction, all impacted property not required for continuing operations of the Project facilities will be restored to a reasonably similar condition to its original condition. Reclamation efforts will include restoration actions to eliminate areas of soil compaction and to replace removed topsoil to its original location.

Increase in impervious surfaces from development of the Project Substation (approximately 2.83 acres) and pole foundations (approximately 0.04 acres) will be dispersed throughout the Project area and will constitute approximately 2.87 acres, representing less than 0.047 percent of the total Study Area.

Because of the small increase and distribution of impervious surface relative to the overall surface area of the Study Area, and because of the mitigative measures that will be employed by the Applicant, the Project is not expected to create issues with sedimentation or nutrient loading into area surface waters, and is not expected to cause significant changes to existing hydrology or stormwater runoff, and therefore will not impacts surface waters, wetlands, groundwater, floodplains, impaired waters, or local water use. Water drainage patterns at and in the vicinity of the Project Substation site and pole foundation locations are anticipated to be similar to pre-construction water drainage patterns (Exhibit 8).

10.2.1 Temporary Groundwater Dewatering

Temporary dewatering may be required during construction of the Project Substation and transmission line poles. The potential drawdown effects of any dewatering activities will be local and temporary; permanent impacts to groundwater are not expected.

The Project Substation and transmission line poles are typically located at higher elevations where water tables are usually at greater depths below ground surface. Groundwater dewatering, if necessary, will be temporary and minimized to the greatest extent practicable. Authorization to Discharge under the Surface Water Discharge System (Permit No.: SDG0700000) will be obtained from the SD DENR prior to commencing construction, BMPs will be used, and the Applicant will be adhered to the terms set forth in the permit.

The Applicant staked potential pole locations in the field several times and reviewed this with landowners to gain their feedback on their preference of the pole location relative to proximity to structures and farmland. Domestic wells will not be impacted by construction dewatering due to a minimum setback of at least 142 feet from participating and non-participating residences and businesses (a church is the closest facility to the Proposed Route at approximately 142 feet; the closest business/farmstead is approximately 248 feet and the closest residence is approximately 361 feet). If water supply wells are located near potential construction dewatering locations, provisions would be made to ensure that an adequate supply of water is provided until construction dewatering activities have ceased. These impacts are expected to be minor and temporary. Surface

water availability for communities, schools, agriculture, recreation, fish, or wildlife will not be impacted.

10.2.2 Deterioration of Water Quality

Excavation and exposure of soils during construction can cause an increase in stormwater runoff and sedimentation in receiving waters during storm events. Coverage under the General Permit for Stormwater Discharges Associated with Construction Activities, administered by the SD DENR, will be required for the Project. A SWPPP will be developed and implemented for the Project that identifies potential sources of stormwater pollution at the construction site and specifies the structural and non-structural controls, or BMPs, that are to be used to minimize the negative impacts to receiving waters caused by stormwater discharges associated with the construction activities. The BMPs may include silt fence, straw wattles, erosion control blankets, project staging, and other methods to control erosion and sedimentation. The erosion and sediment controls that will be implemented during Project construction and operation are expected to prevent adverse impacts to water quality.

10.2.3 Impacts to Drainage Patterns

The dispersed nature of the transmission line facility would not provide enough of a concentration of increased impervious surfaces to change drainage patterns. With Project Substation, POI, and overhead feeder line poles generally being located at higher elevations, impacts to streams and drainage ways are not anticipated. The overhead feeder line will be designed to span larger wetlands or other water features where practicable.

10.2.4 Impacts to Flood Storage Areas

Floodplains mapping has not been completed by FEMA for the Project area. Although the federal government has not officially mapped floodplains in the County, it is unlikely the Project would impact floodplains. The Project Substation, POI, and overhead feeder line poles will be located at higher elevations. Any potential impacts to floodplains would be temporary in nature, and existing contours and elevations would be restored to preexisting conditions upon completion of construction activities.

10.2.5 Increased Runoff

The creation of impervious surfaces reduces the ability of soils to infiltrate precipitation to groundwater, potentially increasing the volume and rates of stormwater runoff. The Project Substation and transmission line poles will create up to 2.87 acres of impervious surfaces. While the Project Substation will manly consist of a graveled surface area, infiltration will be inhibited within the newly created impervious surfaces, and incremental increases in stormwater runoff may be exhibited immediately adjacent to these surfaces. The increase in impervious surfaces represents less than 0.047 percent of the Study Area, and the implementation of stormwater BMPs is anticipated to adequately mitigate any increases in runoff as a result of construction. As such, the Project is not anticipated to cause significant changes in runoff patterns or volume.

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

11.1 Existing Terrestrial Ecosystems

The Project is within the Prairie Coteau Level IV subregion of the Northern Glaciated Plains Level III Ecoregion (USEPA 2013). The Prairie Coteau ecoregion was formed due to glacial drift and has a tightly undulating, hummocky landscape with no drainage pattern and thus closely spaced semi-permanent and seasonal wetlands (Bryce et al. 1998). The Northern Glaciated Plains serves as the transition between tallgrass and shortgrass prairie communities and has been largely converted to agricultural use (Bryce et al. 1998). The Prairie Coteau specifically was historically dominated by prairie communities; currently it is used for pastureland in rolling areas and has been tilled for small grains, corn, and soybeans in flatter areas (Bryce et al. 1998).

Terrestrial ecosystems in the Study Area were analyzed using a combination of available digital ecological data and onsite investigation. Digital data included the USGS National Land Cover Database (Homer et al. 2015) and potentially undisturbed lands data from South Dakota State University (Bauman et al. 2016) (Exhibit 5). Field investigations within the Study Area were completed by qualified field biologists from Western EcoSystems Technology, Inc. (WEST) including raptor nest and native grassland assessments. WEST has completed several studies for the associated Wind Project which is adjacent to the northeast corner of the proposed Project, with data informative to the Study Area. These studies include raptor nest, avian use, grassland bird, general bat acoustic surveys, focused northern long-eared bat surveys, and grassland quality/prairie butterfly assessments.

11.1.1 Flora

According to the USGS National Land Cover Database (NLCD), the Study Area consists of two primary land cover types, including cultivated crops (52.7 percent) and grassland/herbaceous (29.3 percent) (Table 6; Figure 1; Exhibits 2 and 5) (Homer et al. 2015). Temporary impacts within the Construction Disturbance Area of 62.0 acres is comprised of 36.2 percent cultivated crops, 28.7 percent developed, open space, and 27.6 percent grassland/herbaceous, as well as small acreages of pasture/hay, herbaceous wetlands, and deciduous woods. Permanent impacts within the Permanent Easement Area of a total 2.87 acres includes 66.2 percent cultivated crops, 32.8 percent deciduous forest and very small amounts of what is classified as developed, open space, herbaceous wetlands, grassland/herbaceous, and pasture/hay (Table 6; Figures 1-3, Exhibits 2 and 5) (Homer et al. 2015).

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Table 6 Land Cover within the Study Area, Construction Disturbance Area and Permanent Easement Area

	Study Area		Construction Disturbance Area (temporary impacts)		Permanent Easement Area (permanent impacts)	
Land Cover	**Total Area (Acres)**	**% of Total Area**	**Total Area (Acres)**	**% of Total Area**	**Total Area (Acres)**	**% of Total Area**
Cultivated Crops	3,207.8	52.7%	22.5	36.2%	1.90	66.2%
Deciduous Forest	68.1	1.1%	0.9	1.5%	0.94	32.8%
Developed, Low Intensity	1.4	0.02%	-	-	-	-
Developed, Open Space	226.8	3.7%	17.8	28.7%	0.02	0.70%
Emergent Herbaceous Wetlands	203.3	3.3%	0.8	1.3%	0.0007	0.02%
Grassland/Herbaceous	1,784.1	29.3%	17.1	27.6%	0.0096	0.33%
Open Water	101.5	1.7%	-	-	-	-
Pasture/Hay	497.0	8.2%	2.8	4.6%	0.003	0.10%
Total	**6,090.0**	**100%**	**62.0**	**100%**	**2.87**	**100%**

Bauman et al. (2016) conducted GIS analysis to quantify undisturbed lands in eastern South Dakota that are most likely to retain native prairie, which would be the most likely areas to support prairie obligate sensitive species. According to this data, the Study Area may contain approximately 758.4 total acres of native prairie habitat (Exhibit 5), which is approximately 12.5 percent of the Study Area.

These areas roughly overlap with the NLCD cover types "grassland/herbaceous" and/or "pasture/hay" within the Study Area (Exhibit 5). Within the Construction Disturbance Area there are approximately 4.4 acres (approximately 0.07 percent of the Study Area) that may be native prairie habitat, with 13 discrete tracts ranging from 0.000002 to 1.0 acres, with an average size of 0.3 acres. Within the Permanent Easement Area there are approximately 0.005 acres that are native prairie. These remnant native areas are distributed along the portion of the Proposed Route from the Project Substation to Fish Lake, with additional areas on the southwest end of the Proposed Route (Exhibit 5). The undisturbed, presumably native grassland areas appear to be associated with drainages that have not been tilled for agriculture (Exhibit 2; Figures 2 and 3). A field review of potential native prairie habitat in August 2018 revealed that these parcels had evidence of cultivation or previous disturbance; the planned structure sites included robust growth of invasive grasses and forbs such as brome, Kentucky bluegrass, and reed canarygrass (Appendix B).

Figure 1 Representative Land Cover within Study Area.
Photo shows cropland, grassland in road ditches, lawns, and planted deciduous tree rows.

Figure 2 Example Area Classified as Potentially Native Prairie.
Grassland comprised of introduced species and cattail slough near MN SD border. Transmission line designed to traverse left side of picture headed south. Habitat for grassland birds and some waterfowl. Abundant blackbirds.

Figure 3 Drainage and Area Classified as Potentially Native Prairie.
Wood, brush, and grassland margins along the drainage to Fish Lake.

11.1.2 Fauna

Wildlife species in the Study Area are typical of those found in the region and typical of prairie/grassland ecosystems under agricultural use. Wildlife within the vicinity of the Project include white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and other small mammals. Bird studies conducted within and adjacent to the northern portion of the Study Area included a raptor survey which documented bald eagle (*Haliaeetus leucocephalus*), red-tailed hawk (*Buteo jamaicensis*), great-horned owl (*Bubo virginianus*), and American crow (*Corvus brachyrhynchos*) (Exhibit 10) (Foo et al. 2018, Appendix C; WEST 2017). Fixed-point bird use surveys identified ninety-six species of birds (Simon et al. 2017) and grassland bird surveys identified fifty-two unique species, of which the most common were red-winged blackbird (*Agelaius phoeniceus*), bobolink (*Dolichonyx oryzivorus*), cliff swallow (*Petrochelidon pyrrhonota*), grasshopper sparrow (*Ammodramus savannarum*), and western meadowlark (*Sturnella neglecta*) (Stucker et al. 2016).

11.1.3 Listed and Sensitive Animal Species

The USFWS South Dakota Ecological Services Field Office last published a list of threatened and endangered species (animal and plant) known or presumed to occur within counties in South Dakota in 2014 (USFWS 2014a). Currently, the USFWS IPac Web Application can be used to identify resources under USFWS jurisdiction with the potential to occur within a proposed project area (USFWS 2018a). The South Dakota Game Fish and Parks (SD GFP) maintains a list of state and federal threatened, endangered, and candidate species (animal and plant; SDCL Chapter 34A-8 and 34A-8A) and provides recorded observations by county (SD GFP 2016). The USFWS South Dakota Ecological Services Field Office and SD GFP have provided Project-specific data as part

of ongoing coordination with the Applicant (USFWS 2018b, SD GFP 2018). Species listed for Deuel County and within the Study Area are shown below in Table 7.

Occurrence information for these species includes data from the USFWS and SD GFP, in addition to observations during adjacent field surveys (Kreger et al. 2016; Simon et al. 2017; Stucker et al. 2016; WEST 2017), and surveys within the Study Area (Appendix B and Appendix C), as summarized in Table 7. Habitat within the Study Area is characteristic of a highly utilized agricultural landscape with cultivated agricultural lands, hayfields/pastures, roadside ditches, small wooded tracts, farm outbuildings, and grassy swales present within the Study Area (Figures 1-3). Habitat suitability for each listed and sensitive species is discussed in Section 11.2.3, Impacts.

Table 7 State and Federal Listed and Sensitive Terrestrial Species Potentially Present within the Study Area

Common Name	Scientific Name	Status[1]	Global Rank[2]	State Rank[2]	Occurrence Records	
					USFWS/ SD GFP	Site Studies
Mammals						
Northern long-eared bat	*Myotis septentrionalis*	FT	G4	S3	Summer resident, seasonal migrant in South Dakota, known winter resident in Black Hills. Possible in Deuel County	Not detected adjacent to Study Area in MN July 2016 acoustic bat surveys.
Birds						
Rufa red knot	*Calidris canutus rufa*	FT	G4T2	SNRN	Rare seasonal migrant in South Dakota. Possible in Deuel County	Not detected adjacent to Study Area in 2016-2017 migratory bird surveys.

Common Name	Scientific Name	Status[1]	Global Rank[2]	State Rank[2]	Occurrence Records	
					USFWS/ SD GFP	Site Studies
Bald eagle	*Haliaeetus leucocephalus*	BGEPA	G4	S1B, S2N	Recorded in Deuel County	One occupied and active nest 0.87 mile to the southeast of Proposed Route, per raptor surveys conducted in 2017 and 2018.
Golden eagle	*Aquila chrysaetos*	BGEPA	G5	S3S4B, S3N	Potentially present in Deuel County	Not detected in raptor nest surveys in 2017 and 2018, or in avian use surveys conducted for the Wind Project adjacent to Study Area.
Black-crowned night heron	*Nycticorax*	State Rare	G5	S3S4B, SZN	Recorded in area of Fish Lake	No evidence of large waterbird colony per 2018 raptor nest survey; no observation of species by WEST in June 2018; limited nesting habitat in corridor.
Green heron	*Butorides virescens*	State Rare	G5	S2S3B, SZN	Recorded in area of Fish Lake	No evidence of large waterbird colony per 2018 raptor nest survey; no observation of species by WEST in June 2018; limited nesting habitat in corridor.

Common Name	Scientific Name	Status[1]	Global Rank[2]	State Rank[2]	Occurrence Records	
					USFWS/ SD GFP	Site Studies
Insects						
Dakota skipper	*Hesperia dacotae*	FT	G2G3	S2	Resident in native prairie, northeastern SD. Recorded in Deuel County	Less than 5 acres potential native prairie in Construction Disturbance Area; August 2018 field review found no suitable habitat.
Poweshiek skipperling	*Oarisma poweshiek*	FE	G2	S2	Potential resident in native prairie, northeastern SD. Recorded in Deuel County	Less than 5 acres potential native prairie in Construction Disturbance Area. August 2018 field review found no suitable habitat.

[1] FT-federally threatened, FE-federally endangered, ST-state threatened, SE-state endangered, BGEPA-protected by Bald and Golden Eagle Protection Act.
[2]Global/State Rank Definition (applied range wide for global rank and statewide for state rank).
GI/SI - 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.
G4/S4 - Apparently secure, though it may be quite rare in parts of its range, especially at the periphery. Cause for long term concern.
G5/S5 - Demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery.
SZ - No definable occurrences for conservation purposes, usually assigned to migrants.
SR - Element reported for the state but no persuasive documentation.
Bird species may have two state ranks, one for breeding (S#B) and one for nonbreeding seasons (S#N). Example: ferruginous hawk (S38,SZN) indicates an S3 rank in breeding season and SZ in nonbreeding season.

11.1.4 Listed and Sensitive Plant Species

According to the USFWS and SD GFP sources described above in Section 11.1.3, which include both animal and plant species, there are no state or federally listed terrestrial plant species in Deuel County and no associated records of listed plant species.

11.1.5 Species Management Areas and Conservation Easements

Digital data from the USFWS, State of South Dakota, and NRCS were reviewed for special management areas and easements. The USFWS Madison Wetland Management District (WMD) and SD GFP have provided Project-specific data as part of ongoing coordination for the Project (USFWS 2018c, SD GFP 2018). Within the Study Area there are two USFWS Grassland Easements (Deuel 105C; Deuel 195G-1) (Exhibit 9).

11.2 Impacts and Mitigation

11.2.1 Flora

The Project is not anticipated to result in sizable permanent impacts to existing natural and undisturbed areas due to a limited footprint of ground-disturbing activities and the general lack of these resources in a predominately agricultural setting. Woody vegetation and trees that could interfere with safe operation of the transmission line will be permanently removed within the Permanent Easement Area, including each pole location, and the area proposed for construction of the Project Substation. Temporary disturbance/clearing may occur for a 20-foot access drive path and construction surrounding each pole. Vegetation removal will affect primarily cultivated agricultural lands, hayfields/pastures, and roadside ditches (Table 6, Section 11.1.1 above).

The Project design and construction planning are being developed to minimize these impacts to the greatest extent practicable. As much as possible, construction of the Project and construction access will occur within the Permanent Easement Area and Construction Disturbance Area. Native prairie has been avoided to the extent possible during the planning of locations for permanent pole placement and construction work areas (Exhibit 5). The Construction Disturbance Area would be limited to 4.4 acres of undisturbed, potentially native prairie, and the Permanent Easement Area is limited to 0.005 acres (218 square feet) of potentially native prairie. Field evaluation of these tracts was completed in August 2018; the tracts had evidence of prior disturbance and each contained low quality, heavily invaded grassland (Appendix B). Where temporary impacts occur, erosion and stormwater control BMPs will be followed according to the SWPPP and Construction Stormwater Permit to avoid and minimize sedimentation and vegetation disturbance. After construction, the land will be returned to pre-construction conditions. In areas that are currently naturally vegetated (i.e., non-cropland), native vegetation seed mixes will be used to revegetate disturbed ground where feasible and pending landowner preferences.

11.2.2 Fauna

Construction of the Project will potentially result in temporary impacts to terrestrial fauna within the Study Area from human presence, construction of transmission line poles, Project Substation and associated facilities, and access to the construction areas. Noise and construction activities created by vehicles and equipment used to grade and construct the facilities may temporarily displace species when construction activities take place. Vehicle traffic will slightly increase along county roads in the area of the Project during construction.

The clearing of trees, brush, and grassland to accommodate the new facilities will remove potential nesting and foraging habitat that could be used by avian, mammal, and invertebrate species. Vegetation removal will affect primarily cultivated agricultural lands, hayfields/pastures, and roadside ditches (Table 6). Overhead powerlines can potentially cause mortality to birds from

electrocution or line strikes, particularly near wetlands near the Proposed Route and the large water body of Fish Lake located approximately 1,025 feet south of the Proposed Route within the Study Area (Exhibit 1) (USFWS 2018b, SD GFP 2018).

The Project design and construction planning are being developed to minimize these impacts to the greatest extent practicable. Construction activities will be temporary and primarily only occur during daylight hours. Once the transmission line is in operation, potential displacement due to noise and human presence will be minimal, occurring only during occasional scheduled maintenance activities.

Native prairie and other grasslands have been avoided to the extent possible during the design of locations for permanent pole placement and construction work areas to minimize impacts to grassland-dependent species. The proposed transmission line will span these areas to the extent feasible. Field review of grassland parcels indicated they had evidence of previous disturbance and contained primarily invasive species (Appendix B). After construction, non-cropland areas will be re-vegetated as close as possible to pre-construction conditions in coordination with the landowner and per applicable permit conditions and requirements.

Throughout the design and development process, the Applicant has taken steps to minimize impacts to birds, bats, and other natural resources following the USFWS's *Land-based Wind Energy Guidelines* (USFWS 2012), *Eagle Conservation Plan Guidance* (USFWS 2013b), eagle take permit of 2009 (amended 2016) (USFWS 2016), *National Bald Eagle Management Guidelines* (USFWS 2007), *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC 2006), *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (APLIC 2012), and state guidance received during the permit process.

Avian electrocution is not likely to occur at the Project. Electrification of birds is generally a problem that occurs on lower voltage lines when the spacing of the conductors is smaller than the wing span of the birds. In order for a bird to get electrocuted, the tip of one wing has to touch the energized conductor and the other wing tip would have to touch the steel pole. Due to the voltage of this line (345 kV), the insulators hold the conductors about 12.5 feet from the steel pole. This would mean that only birds with wing-spans greater than 12.5 feet would have the potential of being electrocuted. In South Dakota and Minnesota, there are no birds with a wing span large enough to be electrified on the proposed transmission line.

Project-specific mitigation requested by SD GFP includes marking the transmission line along Fish Lake with bird diverters on overhead shield wires and spaced at a maximum distance of 50 feet to reduce the potential for large bird collisions (Appendix A).

11.2.3 Sensitive Terrestrial Species

Dakota Skipper and Poweshiek Skipperling

The Dakota skipper is a small butterfly found in the tallgrass and mixed-grass prairies of the Northern Great Plains. It is federally listed as a threatened species with designated critical habitat. Dakota skippers have a single flight per year occurring from the middle of June through the end of July (Dana 1991). Eggs hatch after incubating for 7–20 days; larvae shelter and forage at the

bases of grass plants, overwintering at or below the ground surface (Dana 1991). Current data suggests that dispersal of Dakota skipper is very limited (USFWS 2014b, 79 FR 63672), and individuals may be incapable of moving greater than one kilometer (0.6 miles) between patches of prairie habitat separated by structurally similar habitats (Cochrane and Delphey 2002). Roads and crop fields have been suspected to impede movements between patches, and movements are more likely along ridges than across valleys (Dana 1991). The Dakota skipper requires native prairie habitat for reproduction, foraging, and overwintering at or below ground, and do not typically move great distances between native prairie areas.

The Poweshiek skipperling is a small butterfly that requires high quality tallgrass prairie in both upland, dry areas as well as low, moist areas. It is federally-listed as an endangered species with designated critical habitat. Similar to the Dakota skipper, the Poweshiek skipperling larvae (caterpillars) hibernate during winter on the ground; they resume activity in spring and continue developing until they pupate and emerge as adult butterflies, which have a short lifespan of only one to two weeks between mid-June and mid-July. Adult butterflies feed on nectar from prairie flowers such as purple coneflower, blackeyed susan and palespike lobelia (USFWS 2014c). The species are vulnerable to impacts within larval habitat year-round and adult habitat during the flight season (approximately June 15 to July 20, weather dependent).

There are no records for the Dakota skipper or Poweshiek skipperling in the USFWS database within the Study Area (USFWS 2018a). There is no designated critical habitat within the Study Area for either species. The closest designated critical habitat for both species is located approximately 4.1 miles from the Study Area boundary to the south in Brookings County, South Dakota and 4.6 miles north in Deuel County, South Dakota (Exhibit 10) (USFWS 2018d).

Potentially suitable Dakota skipper and Powesheik skipperling habitat has been reviewed through desktop data and an August 2018 field review (Appendix B). Of the approximately 4.4 acres of untilled grassland habitat within the Construction Disturbance Area, no parcels provide native prairie habitat capable of supporting these species (Appendix B). The grassland parcels reviewed in the field are pasture, hayfields, or have evidence of previous surface disturbance that have been invaded by brome, Kentucky bluegrass, or reed canarygrass and do not provide suitable habitat for these species (Figures 2 and 3). Therefore, no adverse effects would occur to either butterfly species or their habitat as a result of the Project.

Native prairie and grassland has been avoided to the extent possible during the planning of locations for permanent pole placement, Project Substation site and construction access and work areas. Disturbed, non-cropland areas will be re-vegetated as close as possible to preconstruction conditions in coordination with the landowner and per applicable permit conditions and requirements.

Northern Long-Eared Bat

The northern long-eared bat (NLEB), also known as the Northern Myotis, is widely distributed in Canada and throughout the eastern half of the United States, extending west through the western borders of the Dakotas. In South Dakota, NLEB populations are found more commonly in the Black Hills but are otherwise uncommon in the rest of the state (USFWS 2013a). South Dakota contains seven known NLEB hibernacula, the largest of which is an abandoned mine near Hill City, South Dakota (USFWS 2013a). There are no documented NLEB hibernacula within the Study Area and none in northeastern South Dakota. Summer habitat for the NLEB consists of forested areas with trees greater than 3 inches in diameter at breast height (USFWS 2015). NLEB roost in live trees and/or snags that have exfoliating bark, cracks, crevices, and/or cavities (USFWS 2015). The species typically forages in forest interiors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure (USFWS 2015). NLEBs also may roost in human-made structures such as buildings, barns, bridges, and bat houses (USFWS 2015).

The USFWS lists the NLEB as possibly present in Deuel County, however, there are no USFWS occurrence records of the species in the County, according to correspondence with the USFWS and their published data (Table 7). The nearest counties to the Study Area with NLEB occurrence records published by USFWS are Brookings County located south of the Project and Roberts County to the north (USFWS 2015). Acoustic surveys conducted within the adjacent Bitter Root Wind Project area in 2016 resulted in no detections of NLEB during 8 detector nights at two survey sites in the most likely NLEB roosting/foraging habitat, meeting USFWS acoustic survey requirements for that area (Kreger et al. 2016).

Limited potentially suitable foraging and roosting habitat exists in the Study Area, with deciduous forest comprising about 1.1 percent of the Study Area (Table 6). Based on the desktop and field reconnaissance completed by WEST, no wooded/forest patches are within the Construction Disturbance Area or Permanent Easement Area that are large enough to support summer roosting habitat for NLEB (Table 6). Therefore, the limited tree removal required for the Project would have no adverse effects to this species.

Rufa Red Knot

The rufa red knot makes one of the longest annual migrations of any bird, traveling up to 18,000 miles between Arctic breeding grounds in northern latitudes to nonbreeding areas in South America (USFWS 2014d, 79 FR 73706). Migratory pathways typically follow coastlines, but rufa red knots have been documented to use the Mid-Continent Flyway, using various sites in the Northern Great Plains (including South Dakota) as stopover habitat, primarily from May through August. However, the red knot has also been documented to avoid the Northern Great Plains during some migrations. The red knot is considered to be a rare transient through South Dakota during the spring and fall migrations, with few confirmed reports in the state (Newstead et al. 2013). Due to minimal migration through South Dakota, there is limited potential for collision with power lines and structures such as those in the proposed Project.

Impacts will be avoided and minimized as described in Section 12.2.2. for avian species in general.

Bald and Golden Eagles

Bald eagles typically occupy habitat near large rivers, lakes, and marshes with available food sources (USFWS 2007). According to the USFWS, the bald eagle has been recorded in Deuel County and the golden eagle *(Aquila chrysaetos)* is listed as potentially present but has not been recorded (Table 7). The golden eagle nests primarily west of the Missouri River in South Dakota, usually on cliffs, rocky outcrops, and in large trees (Pulkrabek and O'Brien 1974), a considerable distance from the Project.

Eagle use and nest surveys conducted within the adjacent Bitter Root Wind Project in April 2017 detected occupied and active eagle nests within a five-mile radius of the transmission line Study Area (WEST 2017). Surveys in May and June 2018 were within a two-mile buffer from the proposed transmission line route and the Wind Project area boundary. Three occupied active bald eagle nests were documented, and two unoccupied and inactive nests of unknown species which appeared consistent in size and shape with bald eagle nests were documented (Exhibit 10; Appendix C). Of these, the nearest occupied nests to the Project Route centerline are 0.87 miles southeast of the southeast corner of the route (Nest #1746) and 2.3 miles northwest of the Project Substation (Nest #1620). Golden eagles have not been observed during either of these surveys. Potential impacts to eagles, if flying across the Proposed Route, include the possibility for collisions with power lines.

Impacts to bald and golden eagles will be avoided to the extent practicable through Project design and BMPs. Throughout the design and development process, the Applicant has taken steps to minimize impacts to birds following the USFWS's *Land-based Wind Energy Guidelines* (USFWS 2012), *Eagle Conservation Plan Guidance* (USFWS 2013b), eagle take permit of 2009 (amended 2016) (USFWS 2016), *National Bald Eagle Management Guidelines* (USFWS 2007), *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC 2006), *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (APLIC 2012), and state guidance received during the permit process.

Avian electrocution is not likely to occur at the Project. Electrification of birds is generally a problem that occurs on lower voltage lines when the spacing of the conductors is smaller than the wing span of the birds. In order for a bird to get electrocuted, the tip of one wing has to touch the energized conductor and the other wing tip would have to touch the steel pole. Due to the voltage of this line (345 kV), the insulators hold the conductors about 12.5 feet from the steel pole. This would mean that only birds with wing-spans greater than 12.5 feet would have the potential of being electrocuted. In South Dakota and Minnesota, there are no birds with a wing span large enough to be electrified on the proposed transmission line.

Project-specific mitigation requested by SD GFP includes marking the transmission line along Fish Lake with bird diverters on overhead shield wires and spaced at a maximum distance of 50 feet to reduce the potential for large bird collisions (Appendix A).

11.2.4 Sensitive Plant Species

No listed or sensitive plant species are known within the Study Area and none were observed during native prairie site reconnaissance of the area. A limited area of potentially native prairie is within the Study Area, with only 4.4 acres in the Construction Disturbance Area and 0.005 acres in the Permanent Easement Area. Additionally, a field review of potential native prairie habitat in August 2018 revealed that these parcels are invaded by brome, Kentucky bluegrass, or reed canary grass and do not retain rare or sensitive native species (Appendix B). Therefore, the Project is not expected to have any impact on any threatened or endangered plant species or rare native flora.

11.2.5 Species Management Areas and Conservation Easements

No direct impacts will occur to special management or conservation areas. The proposed Project Substation and north portion of the transmission line is located south of USFWS grassland easement 105C/210X and Project facilities will not impact this area.

USFWS grassland easement 195X-1/195G-1 will be crossed by the Proposed Route, although impacts will be avoided by spanning the transmission line conductors across the tract, with pole placement outside of the grassland easement acreage (Exhibits 2 and 9). Appropriate construction Stormwater BMPs will also be employed during construction of the Project in the vicinity of the USFWS grassland easement areas. The Applicant has been coordinating with the USFWS regarding crossing this grassland easement and will continue to do so as final design plans are prepared (Appendix A). USFWS Madison WMD concerns have been considered in the design and construction of the Project at and in the vicinity of the USFWS grassland easements. The WMD has reviewed the pole placement and concurs that the current design will avoid impacts to this grassland easement (Appendix A).

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

12.1 Existing Aquatic Ecosystems

The Study Area is within the Upper Mississippi Hydrologic Region and within the Minnesota River Basin, Lac Qui Parle sub-basin (USGS 2013). Aquatic habitat in the Study Area includes several unnamed streams, wetlands, Lazarus Creek, Cobb Creek, and Fish Lake (USGS 2013, USFWS 2017) (Exhibit 8). Some habitat has been altered by cultivation or channelization. The smaller streams and ditches support aquatic biota, including aquatic insects, crustaceans, and mollusks. These streams may have small fish. There are wetlands in and adjacent to the Study Area that provide habitat for birds, waterfowl, amphibians, reptiles, and small mammals.

According to USFWS National Wetlands Inventory (NWI) data, there are 677 wetlands within the Study Area totaling 791.6 acres. Wetlands are classified as freshwater emergent, freshwater forested/shrub, freshwater pond, lake, and riverine (Table 5). The Applicant will conduct field wetland and waterway delineations following U.S. Army Corps of Engineers (USACE) requirements (USACE 1987, USACE 2012) of the Permanent Easement Area and Construction Disturbance Area in October of 2018 to determine locations and types of wetlands and waterways and to collect more specific data regarding these features. See also Section 10.1, Existing Hydrology.

12.1.1 Sensitive Aquatic Species

Using USFWS (USFWS 2014, USFWS 2018a, 2018b) and SD GFP (SD GFP 2016, 2018) data sources and project-specific correspondence as described in Section 11.1.3, the state and federal aquatic species listed for Deuel County and the Study Area are summarized below in Table 8. According to these sources, there are no records of state or federally listed aquatic plant species in Deuel County.

Table 8 State and Federal Listed and Sensitive Aquatic Species Potentially Present within Deuel County and the Study Area

Common Name	Scientific Name	Status[1]	Occurrence Records	Global Rank[2]	State Rank[2]
Mammals					
Northern river otter	*Lontra canadensis*	ST	Recorded in Deuel County	G5	S2
Fish					
Topeka shiner	*Notropis topeka*	FE	Recorded in Deuel County	G3	S3
Northern redbelly dace	*Chrosomus eos*	ST	Recorded in Deuel County	G5	S2
Banded killifish	*Fundulus diaphanus*	SE	Recorded in Deuel County	G5	S1

[1] FT-federally threatened, FE-federally endangered, ST-state threatened, SE-state endangered
[2]Global/State Rank Definition (applied range wide for global rank and statewide for state rank)
GI/SI - 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.
G4/S4 - Apparently secure, though it may be quite rare in parts of its range, especially at the periphery. Cause for long term concern.
G5/S5 - Demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery.
SZ - No definable occurrences for conservation purposes, usually assigned to migrants.
SR - Element reported for the state but no persuasive documentation.

WEST biologists reviewed habitat suitability within the Study Area for the species listed above in Table 8. Habitat is characteristic of a highly utilized agricultural landscape with altered watercourses, cultivated wetland basins, and channelization of streams within the Study Area. Only a few small streams are crossed that potentially could provide habitat for the northern redbelly dace or banded killifish (e.g., small stream flowing into Fish Lake). Topeka shiner are only known from records from streams in the western part of Deuel County, so it is not expected to be encountered in the Study Area.

12.2 Impacts and Mitigation

Potential impacts to rivers, streams, and wetlands will be avoided as much as feasible by not installing poles within and spanning electric conductors over these resource areas. If avoidance is not feasible due to landowner preferences or other constraints, potential permanent and temporary impacts from pole installation will be restricted to below USACE Nationwide Permit (NWP) acreage thresholds. Construction of the Project Substation will not affect aquatic habitat (Exhibit 2a and 5).

Potential impacts to aquatic resources could occur from sediment deposition related to construction activities. During construction, sediment may reach surface waters as a result of temporary access drive paths along the transmission line construction corridor, site clearing and excavation grading of the Project Substation site, installing foundations for self-supported dead-end structures, and traffic within the Permanent Easement Area and Construction Disturbance Area. Temporary impacts will be minimized by using the Permanent Easement Area as much as possible during construction, minimizing the amount of additional workspace needed for the Construction Disturbance Area, and by using matting for construction equipment. Sedimentation and runoff will be avoided by implementation of the SWPPP and appropriate BMPs applied near streams, wetlands, and waterbodies to maintain water quality. Examples include construction of temporary sediment barriers, slope breakers, and mulching. Disturbed areas will be re-vegetated to as close to preconstruction conditions as possible in coordination with the landowner and per applicable permit conditions and requirements.

These efforts will minimize impacts to the northern river otter, Northern redbelly dace, banded killifish, and avian species that feed primarily on aquatic resources, if these species are present within the Permanent Easement Area and Construction Disturbance Area.

13.0 Land Use (ARSD § 20:10:22:18)

13.1 Existing Land Use

The proposed Project is located in unincorporated portions of Deuel County. It is situated in relatively simple terrain consisting of flat farm land and on privately-owned properties. Publicly owned land affected by the Project includes road ROW along county, state, and US roadways (Exhibits 2 and 3). The ground cover on and near the Project area is primarily composed of farm land and open fields (Exhibit 5). A total of 21 dwellings and businesses are interspersed throughout the Study Area (Exhibit 3).

The Study Area for the Proposed Route cross predominantly agricultural land consisting of cropland and grazing (Exhibits 2 and 5). Land within the Study Area is characterized by relatively level terrain across the Prairie Coteau region of northeastern South Dakota. Vegetation is primarily cropland and grassland with small patches of planted trees around farmsteads in the form of shelterbelts, and near natural waterbodies. Zoning classifications crossed by the Study Area are summarized below in Section 14.

Impacts and Mitigation

Existing land uses that will be affected by the Project are not expected to change as a result of construction and operation of the Project. In agricultural areas, much of the land crossed by the transmission line can still be used for agricultural purposes. Permanent modifications of the land will occur only in small, isolated areas where pole foundations are placed, trees cleared, and the Project Substation site constructed, and will have a limited footprint of ground-disturbing activities. Extensive efforts have been made during the early design phase of the Project to place the poles as close as possible to road rights-of-way and along section lines or edges of cropland to minimize impacts to farming, based on landowner feedback. The landowners where permanent impacts to land use will occur will be addressed via an easement with the Applicant for construction and operation of the Project, and the landowner will be compensated for such use by payment for the easement by the Applicant.

Additionally, temporary disturbance may be needed during construction, such as a 20-foot access drive path in the Construction Disturbance Area along the Proposed Route. Where these temporary modifications are required, the land will be returned to pre-construction conditions. Temporary impacts, such as noise and traffic from heavy construction equipment, may also occur but will return to pre-construction levels once construction is complete. The Applicant will enter into a temporary access agreement with affected landowners and pay a negotiated fee for temporary use of these areas.

13.2 Displacement

Displacement of people from businesses/farmsteads or homes can occur as a result of development projects. Displacement occurs when ROW acquisition of a property occupied by a business or residence is needed and the owner is no longer able to use the property. Businesses (i.e., farmsteads) and residences within the Study Area were identified through review of aerial photography. A total of 21 businesses/farmsteads, residences and one church are in the Study Area within varying distances of the Proposed Route (Table 9 and Exhibit 3).

Table 9 Businesses/Farmsteads, Church and Residences within Proximity of the Proposed Route

Proximity to Centerline (ft)	Construction Disturbance Area (Residences)	Construction Disturbance Area (Businesses/Farmsteads and Church)	Study Area (Residences)	Study Area (Businesses/Farmsteads and Church)
0-75	0	0	0	0
75-150	0	0	0	1
150-300	0	0	0	2
300-500	0	0	1	0
500+	0	0	8	9

No residences, businesses/farmsteads or religious facility will be displaced by the proposed Project. The closest the proposed transmission line will be to the one church identified in the Study Area is approximately 142 feet, 248 feet to a business/farmstead, and 361 feet to a residence. Structures at these sites include: a church and cemetery; farmstead homes, barns, outbuildings and

associated agriculture storage facilities; and rural residential homes, garages, outbuildings and associate storage facilities. While the land parcels of these 21 sites are within immediate proximity of the representative centerline of the Proposed Route and may be within the Permanent Easement Area, no structures are located within the Construction Disturbance Area. Thus, all structures at these sites will remain in place and use of these structures will not be changed by the Project. Impacts to non-residential structures will also be minimized during preparation of final engineering and design plans to the extent feasible.

Impacts and Mitigation

Certain clearance standards between transmission line facilities and structures for safe operation of a transmission line are required and are being included in design and engineering plans (Sections 21 and 22). The acquired Permanent Easement Area for the proposed transmission line will be sufficient to maintain these clearances. A total of 21 sites are located within the Study Area and no structures are located within the Construction Disturbance Area. Thus, no acquisition or removal of structures will be necessary to construct the Project. Therefore, no displacement will occur due to the proposed Project and no mitigation will be required.

13.3 Noise

Noise is defined as unwanted sound. Sound energy travels in waves and is measured in frequency and amplitude. Amplitude measures how forceful the wave is and it is measured in decibels or dB of sound pressure. 0 dB is the softest level that a human can hear; normal speaking voices are around 65 dB; a rock concert can be about 120 dB. Sounds that are 85 dB or above can permanently damage a person's ears. The greater sound-pressure a sound has, the less time it takes to cause damage. For example, a sound at 85 dB may take as long as 8 hours to cause permanent damage, while a sound at 100 dB can start to damage hearing after only 30 minutes.

Sound levels can be presented both in broadband (sound energy summed across the entire audible frequency spectrum) and in octave band spectra (audible frequency spectrum divided into bands). Frequency is measured by the Hertz (Hz) unit, which measures the number of sound vibrations in one second. The audible range of healthy human ears spans from 20 to 20,000 Hz.

The human ear does not perceive every frequency with equal loudness, thus spectrally varying sounds are often adjusted with a weighting filter. The A-weighting filter is applied to closely approximate the human ear's response to sound. This scale is commonly used in environmental and industrial sound. Sound expressed in the A-weighted scale is denoted dBA. Figure 4 below provides examples of sound pressure levels in relation to common indoor and outdoor noises (Minnesota Pollution Control Agency, 2015).

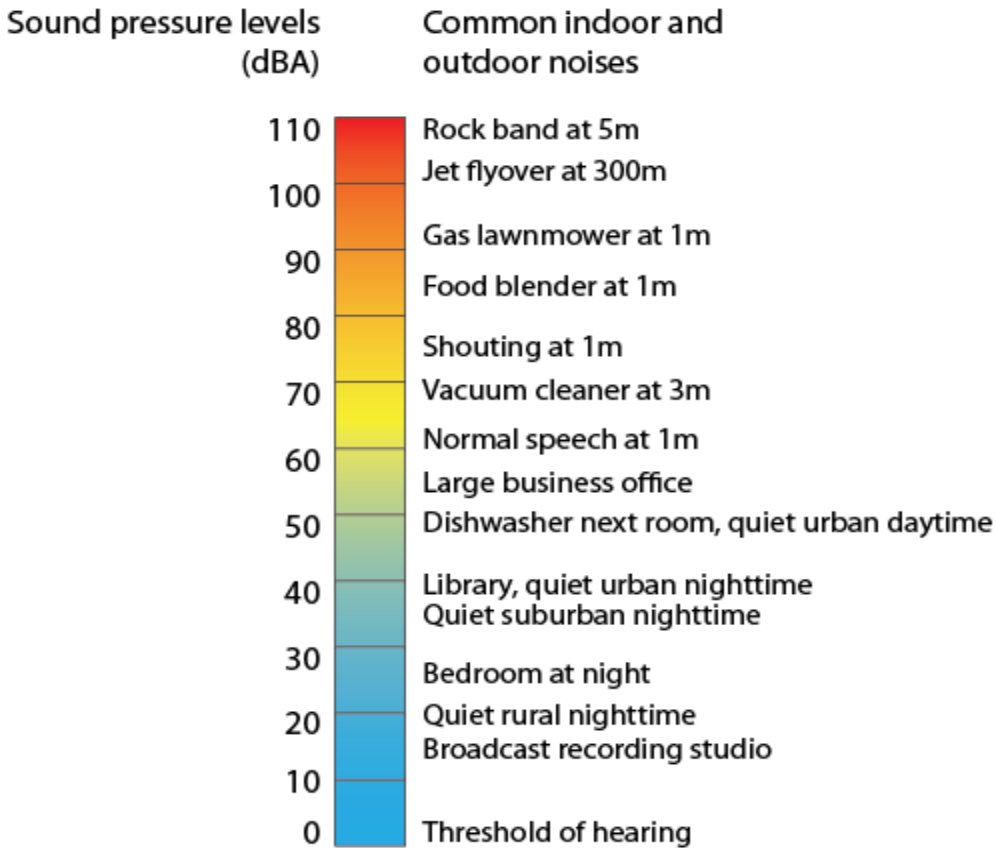

Figure 4 Sound Pressure Levels and Common Indoor and Outdoor Sounds

The Project area is predominately used for agricultural crops, rural residences and related uses. Noise generated in the Project area originates from movement of vegetation, farm equipment and associated vehicles, rural residential and farm traffic, and commercial service and delivery vehicles. Weather events (e.g., thunderstorms) and winds also generate noise in the Project area. These noise sources are intermittent and can be infrequent, depending on various factors.

Background noise levels in the Project area are expected to be in the range of 30 to 50 dBA, with higher levels of 50 to 60 dBA near roadways, urban areas, and commercial and industrial areas. Existing noise levels were measured at two locations near the Astoria Station project, which is in the vicinity of the Project POI.[7] In that project, noise was measured for approximately 24 hours at each location on July 5-6, 2017. The results indicated existing sound levels at ML1 location at 36 dBA (quietest nighttime hour) and 51 dBA (loudest daytime hour) and at ML2 location at 40 dBA (quietest nighttime hour) and 51 dBA (loudest daytime hour). The existing noise levels measured in the Astoria Station project generally conforms to expected background noise levels in the Project area.

[7] See SD PUC Docket No. EL17-042, Application, pages 25-29 and Appendix D.

Impacts and Mitigation

The Project will produce noise during construction and operation of the proposed facilities. The Applicant assessed noise that would be generated by the Project and compared that to applicable state and county noise regulations. There are no current state level noise regulations applicable to the Project. The State of South Dakota does not regulate coronal noise associated with transmission lines with measurable standards (South Dakota Legislative Research Council 2018 [SDCL Chapter 49-41B]).

Section 1215.03(13) of the Deuel County WES ordinance provides that "Noise level shall not exceed 45 dBA average A-Weighted Sound pressure at the perimeter of existing residences, for non-participating residences." Based upon these requirements, a limit of 45 dBA was applied to receptors in South Dakota regarding the sound assessment.

The Applicant completed a sound assessment of the proposed Bitter Root Wind Project, including the proposed transformer that would be installed at the Project Substation[8]. For the selected transformer (one 150 MVA, 345 kV utility scale transformer), a broadband sound power level of 112.0 dBA was estimated based on standard NEMA TR.1 Table 0-1 and IEEE standard C57.12.90-2006.[9] The typical transformer octave band distribution was estimated as indicated in Table 10 below, which includes a 5-dB penalty for tonality.

Table 10 Transformer Acoustic Emission Summary

Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	Broadband
Sound Power Level (dBA)	69.2	88.4	100.5	103.0	108.4	105.6	101.8	96.6	87.5	112.0

The transformer was modeled at a best practice height of 4.9 feet (1.5 m). The sound pressure level at each receptor for the aggregate of all wind turbine generators and the transformer associated with the Project were calculated using CadnaA 4.2 acoustic modeling software based on the ISO 9613-2 method[10]. The simulation was run for the wind speed corresponding with the maximum sound power level of the turbines and the transformer and using other factors and parameters to assess a worst-case condition. The highest modeled sound pressure level in South Dakota (which includes sound from the proposed wind turbines and the transformer) is 44.0 dBA at receptor point SD242 (a residence), which is located approximately 2,143 feet south of the proposed Project

[8] See MN PUC docket at https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={D02E7362-0000-CB15-A5F7-023620ECB937}&documentTitle=20183-141518-01

[9] See NEMA Standards Publication No. TR-1993 (R1000): Transformers, Regulators, and Reactors (2000) and C57.12.90-2006 IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers.

[10] See International Organization for Standardization. ISO 9613-2: Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation. December 15, 1996.

Substation site. This receptor is compliant with the Deuel County 45 dBA limit at the center of the dwelling and at the residence perimeter[11].

Transmission lines produce audible noise under certain operational conditions. Audible noise is emitted from high-voltage lines via discharge of energy that occurs when the electrical field strength on the conductor surface is greater than the field intensity necessary to start a flow of electric current of the air surrounding the conductor. The noise level (loudness) is a function of the condition of the conductors, voltage level, and weather. This discharge is also responsible for radio noise, a visible glow of light near the conductor, and is known as "corona" noise. It is heard as a crackling or hissing sound.

The degree or intensity of the corona discharge and the resulting audible noise are affected by the condition of the air; by humidity, air density, wind and water in the form of rain, drizzle and fog. Water increases the conductivity of the air and thus increases the intensity of the discharge. Irregularities on the conductor surface, such as nicks or sharp points and airborne contaminants, also can increase the corona noise. Transmission line noise occurs in heavy rain and wet conductor conditions. During foggy weather, snow, damp conditions, or lighter rain, a slight crackling sound is emitted by the transmission line conductors at levels similar to residential background levels. During heavy rains, the background noise level is typically greater than the transmission line noise.

Modern day transmission lines are designed, constructed, and maintained so that during dry conditions they will operate below the corona-inception voltage, thus the line will generate a minimum of corona-related noise. In inclement weather conditions corona discharges can be produced by water droplets, fog and snow; however, noise generated during these adverse weather conditions will still be typically lower than the normal sound level in a library (i.e. approximately 30 dBA; Table 14.3-1).[12]

Construction activities will take place during daylight hours to the extent possible and will generate short-term and intermittent noise that could affect nearby residences on a short-term basis. Construction vehicles and equipment will be equipped with properly functioning muffler systems to minimize construction noise. Construction of the Project Substation and transmission line include various stages that use differing vehicles and equipment, and noise from each activity will vary throughout the day along the Proposed Route and depending on the stage of construction. Therefore, construction activities will not have significant noise impacts on the surrounding area to the Proposed Route and it will be similar to existing types of noise in the Project area.

No further mitigation measures will be necessary, as noise impacts from the proposed Project are not expected to exceed the typical background noise levels, they will be minimal, and they will be infrequent or temporary.

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11 https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={D02E7362-0000-CB15-A5F7-023620ECB937}&documentTitle=20183-141518-01

12 See ATCO Electric. 2018. Will you hear the transmission line? Electronic document. http://www.atcoelectric.com/Projects/Documents/Project%20Fact%20Sheets/Noise_FINAL_May_21_2014.pdf. Accessed May 2018)

13.4 Aesthetics

The visual character of the Study Area is defined by open agricultural spaces broken by tree-lines and small lakes and waterbodies. Dispersed residential areas, as well as one church (the Woodlake Evangelical Lutheran Church) and associated cemetery, are also part of the landscape (Exhibit 2c). The Woodlake Evangelical Lutheran Church was constructed circa 1890 and has been designated as eligible for the NRHP as a good example of Midwestern architecture.

Additionally, several existing powerlines and poles are also present within the Study Area (Exhibit 2). Land use of the Study Area is dominated by agriculture; thus, the regional setting is characterized as mostly rural with dispersed population centers. Sensitive views along the Proposed and Alternate routes include existing residences having an unobstructed line of sight of the proposed transmission line, recreational use areas, and existing roadways.

Impacts and Mitigation

The Project will frequently be visible to landowners who live along or near the Project, or residents or visitors who travel on roads near the Project. It is possible that topography and/or naturally occurring features such as tree-lines may impede views of the Project. The Project will be within view of the Woodlake Evangelical Lutheran Church community while on the church property; however, it will not be observable from organized communities such as Astoria (to the south) or Brandt (to the northwest).

In addition to the poles, conductors and one self-supported pole associated with the transmission line, and installation of the Project Substation, visual impacts resulting from the limited permanent removal of trees and/or shrubs and other vegetation for construction purposes may also occur. Some trees and vegetation will be removed to construct the Project Substation, however some existing trees located at the north and west sides of this site will be left in place and will provide some visual screening of the substation and transmission line facilities. During vegetative clearing and construction activities, dust, increased traffic, and heavy construction machinery will create short-term, intermittent visual impacts, but conditions will return to pre-construction levels once complete. The Project Substation will not be lit during nighttime hours.

While visual impacts will occur by the introduction of the proposed transmission line and substation into the regional landscape, existing similar transmission lines and associated substation facilities are present in the Project area and already part of the viewshed. The degree to which the Project will be visible will vary based on location. Based on the above analysis, the transmission line and substation will be in permanent view of 21 sites that contain businesses/farmsteads, a church and residences. Further, no unique viewsheds or aesthetic resources have been identified that would be negatively impacted by the proposed Project and no other mitigation for aesthetics is proposed for the Project.

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

14.1 Existing Local Land Use Controls

According to the Official Zoning Map of Deuel County[13] and Deuel County Zoning Ordinance (Ordinance), the majority of the Project is located on land zoned Agricultural District (A) and Aquifer Protection Overlay – Zone B (AP). The underlying zoning district to the Aquifer Protection Overlay is the Agricultural District.

Within the Agricultural District, essential services (including overhead or underground electrical transmission or distribution systems and structures, including towers, poles, wires, conduits, etc.) are uses allowed as special exceptions (see Ordinance, Article XI, Section 1101.03(12)). The Project crosses parcels zoned as Agricultural District land on the northern quarter of the Proposed Route.

The remaining portion of the Proposed Route mainly crosses parcels zoned as Aquifer Protection Overlay – Zone B (aquifer secondary impact zones), with some parcels zoned as Agricultural District. The two Aquifer Protection Overlay zones in Deuel County were created to protect public health and safety by minimizing contamination of the shallow/surficial aquifers of Deuel County (see Ordinance, Section 1105.05). Zone B was mapped by the East Dakota Water Development District (EDWDD) with SDGS technical assistance using techniques outlined in the U.S. Environmental Protection Agency (EPA) publication "Guidelines for Delineation of Wellhead Protection Areas" (June, 1987).

Zone B mapped shallow/surficial aquifers are protected because: 1) the aquifer is a valuable natural resource for future development; 2) the aquifer provides drinking water supply for individual domestic users; 3) contamination is not justified because this area is not currently used for public water supply; and 4) contaminants from this area could eventually enter Zone A (see Ordinance, Section 1105.08). All special exceptions allowed in underlying districts (e.g., Agricultural District), with the exception of those expressly prohibited in Zone B, may be approved by the Deuel County Board of Adjustment provided they can meet Performance Standards outlined for the Aquifer Protection Overlay Zone. (Sections 1105.10 and 1105.12). Essential services are not prohibited in Zone B.

On August 14, 2018, FCW contacted the Deuel County Highway Superintendent regarding pole placement near County road rights-of-way. The Superintendent indicated that the County prefers transmission poles be placed outside of County road right-of-way (50 feet from centerline for County Road 517) and that the poles can be just outside of such right-of-way. In a meeting with the Deuel County zoning administrator on August 14, 2018, it was noted that the Project Substation must be at least 150 feet from road rights-of-way, because it is located along section lines, per the County zoning ordinance. FCW took this and other factors into account for routing of the Proposed Route and pole locations.

[13] See Deuel County Zoning Regulations, Ordinance B2004-01, Section 302 (adopted July 6, 2004) and Deuel County 2012 Official Zoning Map.

Impacts and Mitigation

Construction of the Project would occur on land zoned agricultural and may intersect the shallow/surficial aquifer within the Zone B Aquifer Protection Overlay areas of the Project. The Applicant will obtain all required permits and approvals from Deuel County before beginning construction, including securing a special exception permit and Deuel County approval for portions of the Project located within the Aquifer Protection Overlay Zone B.

Additionally, as discussed in other parts of this Application, the Applicant will appropriately address and manage construction stormwater runoff to further minimize potential impacts to the shallow/surficial aquifers (Sections 11.2.1, 11.2.5, 23.4 and Table 19).

The Applicant will also obtain the appropriate special exception permit from the County for construction and operation of the Project Substation, electrical cables (e.g., the Project underground collection lines), and feeder lines (e.g., the proposed Project overhead 345 kV transmission line), in accordance with Section 1215 of the Ordinance.

15.0 Water Quality (ARSD § 20:10:22:20)

15.1 Existing Water Resources

As covered in Section 11.1.6, Section 303(d) of the CWA requires states to develop a list of waterbodies that do not meet the water quality standards, and subsequently determine total maximum daily loads for these waters. Review of the 2018 South Dakota Integrated Report for Surface Water Quality Assessment indicates that while no 303(d)-listed waterbodies are located within the Construction Disturbance Area and Permanent Easement Area, the Study Area encompasses a part of Fish Lake, a waterbody listed on the 303(d) list as impaired, for which a TMDL was determined and approved by the USEPA in 2004, and which is now listed as fully supporting all uses (SD DENR, 2018).

Impacts and Mitigation

Project construction creates the potential for sediment from disturbed lands to reach receiving surface waters as a result of excavation, grading, construction traffic, and equipment operation, among others. Without mitigative action, or the use of Best Management Practices (BMPs), the quality of the receiving waters has the potential to be adversely impacted during storm events. BMPs will be used at the proposed 6.53-acre Project Substation site during construction of this facility. A permanent gravel area for the Project Substation will cover approximately 2.83 acres. Approximately 0.95 acres of trees and vegetation will be permanently removed for construction of the Project Substation. During construction, temporary impacts will occur on the remaining 3.7 acres, with approximately 2.32 acres of trees and vegetation that will be temporarily cleared for construction of the Project Substation which will be allowed to revegetate after completion. There will be relatively limited land disturbance along the Proposed Route since most poles will be directly embedded and a narrow temporary access way will be required during construction. Approximately 13.26 acres of trees and vegetation will be temporarily cleared for construction of the transmission line.

BMPs will be used during construction of the Project to protect topsoil and adjacent resources and to minimize soil erosion. BMPs employed will focus on the containment of excavated material, protection of exposed soil, and stabilization of restored material. A SWPPP will be developed prior to construction that will include BMPs such as silt fencing, revegetation plans, and management of exposed soils to prevent erosion. Permanent BMPs, such as grading to prevent concentrated water flows and revegetation will be designed and proactively implemented. The permanent and temporary erosion and sediment controls that will be implemented during Project construction are expected to prevent negative impacts to water quality and ensure compliance with water quality standards. In accordance with the SD DENR General Permit for Storm Water Discharges Associated with Construction Activities, all temporary erosion and sediment control measures will be removed upon full stabilization and revegetation of disturbed areas.

16.0 Air Quality (ARSD § 20:10:22:21)

16.1 Existing Air Quality

Under the Clean Air Act (CAA), the Environmental Protection Agency (EPA) is required to set National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants, including particulate matter, ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, and lead. The EPA designates areas as meeting NAAQS (attainment) or not meeting standards (nonattainment), while states are required to develop plans to attain and maintain standards, or to design specific plans to attain standards for designated nonattainment areas (USEPA, 2017b).

The South Dakota Department of Environment and Natural Resources (SD DENR) Ambient Air Quality Monitoring Section is responsible for compliance with NAAQS, and under a State Implementation Plan (SIP) with the EPA, has established an ambient air quality monitoring network of 13 monitoring stations distributed throughout the State. Under the SIP, SD DENR monitors current pollution levels for five of the criteria air pollutants, including particulate matter, ozone, sulfur dioxide, nitrogen dioxide, and carbon monoxide. South Dakota is exempt from monitoring for lead (the sixth criteria air pollutant), as there are no sources of lead air emissions with an annual emissions rate of 0.5 tons per year or greater in the State (SD DENR, 2017a).

The ambient air quality monitoring site located nearest the Project area is approximately 19 miles southwest near Brookings, Brookings County, South Dakota, where ozone and fine and coarse particulate matter are sampled on a continuous basis. The nearest monitoring site that samples for all five criteria air pollutants is in Sioux Falls, Minnehaha County, South Dakota, approximately 66 miles south of the Project area (SD DENR, 2017b). The entire State of South Dakota is in attainment for all NAAQS criteria pollutants (USEPA, 2017a). The primary emission sources that exist near the Project area include agriculture-related equipment and vehicles traveling along Interstate 29 and State Highway 28.

Impacts and Mitigation

Fugitive dust emissions will increase during Project construction as a result of increased truck and equipment traffic, as well as site clearing and excavation activities. Short-term emissions from diesel trucks and construction equipment can also be expected, particularly at the 6.5-acre Project Substation site, where a 2.83-acre gravel area will be installed, and approximately 2.32 acres of

trees and vegetation will be temporarily removed and 0.95 acres of trees and vegetation permanently removed. Impacts to air quality caused by dust and increased vehicle traffic and equipment would be short-term in nature, limited to the time of construction, and would not result in any violations to NAAQS standards for particulate matter.

Practices to reduce air quality impacts during construction would be proactive in nature, and include, but not limited to, the wet suppression (or watering down) of the Project Substation site and gravel drive paths and spoil piles, scheduling construction to minimize exposed areas by clearing only areas where phased construction will take place, stabilizing exposed soils using vegetation, mulching, spray-on amendments (calcium chloride, water, etc.), or gravel, maintaining existing vegetation as windbreaks where possible, directing construction traffic to stabilized areas within the Construction Disturbance Area, limiting construction traffic to low speed (typically 20 miles per hour) onsite, using temporary or permanent vegetation, mulching and sand fends in areas of occasional or little construction traffic, covering haul trucks transporting materials (if any), stabilizing construction access road entrances and staging areas, quickly cleaning of sediments deposited on paved roads, and other applicable measures. Potential complaints regarding fugitive dust emissions during construction would be addressed in a timely fashion. Upon completion of construction activities, Project operations would not produce air emissions that would impact the surrounding ambient air quality. Following construction, measures to permanently stabilize and revegetate disturbed areas would be taken promptly to minimize further dust emissions.

17.0 Time Schedule (ARSD § 20:10:22:22)

The Applicants expect to begin construction of the Project once all required permits or approvals are in place, all landowner agreements have been finalized, and final design has been completed. The Applicant anticipates commencement of construction in the second quarter of 2020, with an expected in-service date in the third quarter 2020, pending related permitting and approvals. The following Table 11 indicates a general permitting/approval and construction time schedule for the Project.

Table 11 Estimated Project Time Schedule

Project Activity	Anticipated Time Schedule
Landowner Easement Negotiations	On-going through end of 2018
SD PUC Facility Permit Review	3rd quarter 2018 to 2nd quarter 2019
Deuel County Permit Review	4th quarter 2018 to 1st quarter 2019
Detailed Project Design (Transmission Line, Project Substation, POI/Switching Area)	1st quarter 2019
Finalize Easement Acquisitions	2nd quarter 2019
Project Construction	2nd quarter 2020 to 3rd quarter 2020
In-Service	3rd quarter 2020

The estimated schedule is based upon currently known information and planning assumptions, and is subject to change as additional information is developed and understood. The Applicant will update the schedule as the permitting process becomes completed, other permits/approvals are acquired and landowner negotiations and easements become final.

18.0 Community Impact (ARSD § 20:10:22:23)

18.1 Existing Socioeconomic Conditions and Community Resources

18.1.1 Communities

The socioeconomics analysis area is Deuel County, South Dakota. Data for the surrounding communities of Astoria, Brandt, and Toronto, as well as the information pertaining to the State of South Dakota, is provided for comparison.

Table 12 below shows demographic data for Project area and surrounding region. The communities surrounding the Project area have no reported minority populations. Deuel County as a whole has a reported 0.3% minority population which is significantly lower than the 15.2% reported for the State of South Dakota. The poverty level in the surrounding communities is generally higher in comparison to both Deuel County and the state. The community of Brandt reports a lower poverty percentage, but this may be reflective of the smaller overall population of the community. The per capita income in the surrounding communities is consistently lower than that reported for Deuel County and the state.

Table 12 Project Area Demographic Data for Surrounding Region

Jurisdiction	Population	Percent Minority	Percent Below Poverty (people)	Per Capita Income
State of South Dakota	851,058	15.2%	14.0%	$ 27,516
Deuel County	4,309	0.3%	10.6%	$ 29, 953
Astoria	143	0.0%	17.9%	$ 20,744
Brandt	67	0.0%	7.5%	$ 21,885
Toronto	217	0.0%	24.0%	$ 19,388

As displayed in Table 13 below, the largest employment and labor market sector by occupation Deuel County, as a single unit, are manufacturing (18.5), agriculture (17.2%), education, health, and social services (15.6%), retail trade (10.1%), and construction (9.5%). The three largest employment and labor market sectors by occupation in the Town of Astoria are education, health, and social services (30.0%), retail trade (17.5%), and manufacturing (12.5%). The three largest employment and labor market sectors by occupation in the Town of Brandt are manufacturing (43.2%), education, health, and social services (27.0%), and construction (24.3%). The three largest employment and labor market sector by occupation in the Town of Toronto are education, health, and social services (23.6%), retail trade (15.3%), and construction (18.4%) (Source: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates). Smaller industries and labor markets with fewer employees include non-administrative services, wholesale trade,

transportation and warehousing, public administration, arts, professional services, and information services.

Table 13 Largest Employment and Labor Market Sector by Occupation

Market Sector	Jurisdiction				
	Astoria (80)	**Brandt (37)**	**Toronto (114)**	**Deuel Co. (2,327)**	**South Dakota (434,693)**
Education, Health, and Social Services	24 / 30.0%	10 / 27.0%	27 / 23.6%	364 / 15.6%	104,783 / 24.1%
Retail Trade	14 / 17.5%	None	22 / 15.3%	234 / 10.1%	49,369 / 11.4%
Manufacturing	10 / 12.5%	16 / 43.2%	12 / 10.5%	432 / 18.5%	43,188 / 9.9%
Other Services (non-administrative)	8 / 10.0%	None	2 / 1.7%	114 / 4.9%	19,662 / 4.5%
Wholesale Trade	7 / 8.7%	None	4 / 3.5%	73 / 3.1%	13,025 / 3.0%
Transportation and warehousing	5 / 6.2%	None	8 / 7.0%	111 / 4.7%	18,087 / 4.2%
Finance and Real Estate	4 / 5.0%	None	4 / 3.5%	114 / 4.9%	31,499 / 7.2%
Construction	3 / 3.8%	9 / 24.3%	21 / 18.4%	221 / 9.5%	30,720 / 7.1%
Public Administration	3 / 3.8%	None	1 / 0.8%	78 / 3.3%	20,754 / 4.8%
Agriculture	2 / 2.5%	None	1 / 0.8%	402 / 17.2%	30,060 / 6.9%
Arts	None	2 / 5.4%	2 / 1.7%	82 / 3.5%	39,807 / 9.2%
Professional	None	None	7 / 6.1%	47 / 2.0%	26,482 / 6.1%
Information	None	None	3 / 2.6%	55 / 2.3%	7,257 / 1.7%

The median household income totaled $54,781 for Deuel County which is slightly higher than the $52,078 value reported for the State of South Dakota. For the communities surrounding the Project area, the median household incomes are below the values reported for both the County and the state (Astoria = $38,125; Brandt = $24,444; Toronto = $31,429). This pattern is replicated in the distribution of per capita income values. The per capita income for Deuel County is reported at

$29,952 which is slightly higher than the $27,516 value reported for the State of South Dakota. For the communities surrounding the Project area, the per capita incomes are below the values reported for both the County and the state (Astoria = $20,744; Brandt = $21,885; Toronto = $19,388).

In 2016 the U.S. Census Bureau reported 2,205 housing units in Deuel County. This represents a 0.7% decrease in housing units compared with 2010 Census data. The communities surrounding the Project area exhibited a similar, and somewhat greater decrease in the number of housing units over the same period (Astoria = -5.6%; Brandt = -4.0%; Toronto = -13.9%). This trend is counter to that of the State of South Dakota which exhibited a 5.0% increase in number of reported housing units in the same period.

The 2016 median value of owner-occupied housing units in Deuel County was reported at $117,700 which was lower than the $148,700 reported for the state. Both Deuel County and the State of South Dakota exhibited an increase in median housing unit values between 2010 and 2016. Deuel County had a 34.9% increase while the state had a 21.6% increase. The communities surrounding the Project area exhibited a markedly different trend. The 2016 median housing unit value in the Town of Astoria was $63,300 which represented a 50% increase over the 2010 value. The 2016 median housing unit value in the Town of Brandt was $57,500 which represented a 5.4% decrease from the 2010 value. The 2016 median housing unit value in the Town of Toronto was $50,000 which represented a 37.5% decrease from the 2010 value.

Impacts and Mitigation

There will be short- and long-term benefits to those in the vicinity of the Project that include, but are not limited to, an increase to the counties' tax base as a result of the incremental increase in revenues from utility property taxes (based on the Project value). The chief economic effect of the Project will result from property taxes paid for ROW and improvements in Deuel County, from easement payments for necessary ROW for the Project from the Applicant to affected landowners, and from purchase of the proposed Project Substation site. The assessed value of the proposed ROW and improvements has not yet been determined; therefore, it is not currently possible to determine the amount of tax revenues that will accrue. Additional benefits will result from the Project's increase in the regional capability to transmit energy generated from renewable and other energy resources in support of additional economic development. Further information on benefits of the Project is presented in Sections 19.

The Applicant does not expect that the Project will have any long-term impacts to local or regional populations, income levels, community occupation or industry features, or community integrity. It is not anticipated that the construction and operation of the Project will affect the local distribution of jobs or occupations in the community. It is not anticipated that the Project will 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.

The Proposed Route will be offset from public and private roads, section lines, and property boundaries. The transmission structures and the Permanent Easement Area are not expected to be

located within the road ROW but may share common boundaries. The final engineering design will take into account future planned or programmed improvements to roadways proximal to the Proposed Route to ensure public ROW is sufficient to provide for maintenance and future improvements.

The Project will have a positive impact on the local economy through lodging and food sales and other indirect economic benefits associated with construction and maintenance staff. Employment estimates are described in Section 19.

The Project is expected to have a negligible effect, if any, on the assessed values of private property and, therefore, on property taxes (Hoen et al. 2013).

18.1.2 Commercial, Industrial, and Agricultural Sectors

18.1.2.1 Agriculture/Farming

Deuel County has a total land area of 637 square miles (1,650 square kilometers), with approximately 534 square miles of land (83% of the County land area) being in farms (United States Census Bureau 2013, Census of Agriculture for 2012). See Section 9.1.6 for a description of the designated Prime Farmland in the county. In 2012, there were a total of 664 farms, and the average-sized farm was 515 acres. Crop sales were primarily corn and soy beans and cattle comprised the majority of livestock sales (Census of Agriculture 2012). From 2007 to 2012, the number of full-time farms increased by 14 percent from 2007 to 2012. The acres used for farming increased by nearly 8 percent, and the average farm decreased in size by 5 percent. Sales of farm goods increased 69 percent from 2007 to 2012 and totaled $177,753,000 in 2012.

18.1.2.2 Forestry

There are no forested areas within the Study Area subject to harvest. Tree cover in the area is associated with either waterways or serving as windbreaks for homesteads. No economically significant forestry resources are located along the Proposed Route.

18.1.2.3 Mining

A review of publicly available data did not indicate the presence of commercial mining resources or facilities within the Study Area. As described in the Economic Deposits (Section 9.1.3) above, there are four gravel pits within the Study Area that appear inactive (Exhibit 3).

18.1.2.4 Tourism

Norden and Scandinavia Townships in Deuel County are predominantly agricultural areas. Primary tourism activities in the County include camping, golfing, hunting and recreational use of the regions water resources. See Section 10.1.1 for a description of the surface water resources in the Study Area. Regional tourist attractions and events include guided hunting lodges, vacation resorts and business retreats, and the annual Crystal Springs Rodeo in Clear Lake. None of the identified recreational or tourist facilities are located within the Study Area. Lake Cochrane, located approximately 4.3 miles north of the Project Substation, is a spring-fed lake used for boating and fishing, and includes a state-managed 88-acre campground and recreational facility.

Fish Lake is partially within the Study Area and is located approximately 1,025 feet south of the Proposed Route. It is an 800-acre lake that supports fishing.

Impacts and Mitigation

The Project is expected to have minimal effects on agriculture land use in the region, and no impacts to forestry, mining or tourism. The Proposed Route was designed with input from participating landowners and County officials. Field observations and review of aerial photography indicate that the majority of the agricultural lands located along and adjacent to the Proposed Route are cultivated fields with a small amount of pasture lands.

The Project will result in some temporary and minimal permanent impacts to farmland along the Proposed Route. There is limited livestock in the Study Area, and negligible impacts to livestock operations are anticipated. During construction, the Applicant will coordinate with landowners to ensure that livestock will be restricted from the Construction Disturbance Area. Once construction is complete, grazing in the Permanent Easement Area be permitted, as well as land use around each pole location.

Permanent impacts to agricultural lands primarily will result from installation of transmission structures within the Construction Disturbance Area and the Project Substation site. Construction of the poles is anticipated to result in a total permanent conversion of approximately 0.01 acres of agricultural land and approximately 0.6 acres of land for the Project Substation[14] (Table 14 below). The permanent impacts were calculated assuming a either a 5-, 3.5- or 1.75-foot radius (which equates to the 10, 7 or 3.5-foot diameter foundation sizes for the planned poles) for each proposed structure, and including Project Substation site grading and tree clearing areas.

At the time of this Application, preliminary locations of structures and associated features (e.g., access roads) have been designed, but not finalized. Construction of the Project will result in an estimated 21.4 acres of temporary impacts to farmland due to the preparation of structure foundations, laydown areas, structure assembly areas, wire stringing areas, and travel paths (Table 14). This impact is estimated based on the National Land Cover Database land cover breakdown of the Construction Disturbance Area, the temporary use of a 20-foot wide gravel travel path within the Construction Disturbance Area, installation of pole structures, and stringing of conductors.

[14] Note that the Project Substation is located adjacent to an agricultural field in a small forested windbreak area. To minimize impacts to agricultural land according to the wishes of the participating landowner, while maintaining a County setback of 150 feet from road rights-of-way along section lines, the Applicant has located the Project Substation parcel partially in this small wooded area.

Table 14 Temporary and Permanent Land Impacts from the Project

Landcover Type	Temporary Impacts (Acres)	Temporary Impacts (Percentage)	Permanent Impacts (Acres)	Permanent Impacts (Percentage)
Cultivated Crops	21.4	36.25%	0.61	22%
Deciduous Forest	0.1	0.20%	1.0	36%
Developed, Open Space	18.0	30.31%	0.1	2%
Emergent Herbaceous Wetlands	0.8	1.36%	0.0	0%
Grassland/Herbaceous	16.0	27.08%	1.1	40%
Pasture/Hay	2.8	4.80%	0.0	0%
Total	59.1	100.00%	2.8	100%

Areas disturbed during construction will be repaired and restored to preconstruction contours to the extent possible 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, temporary transmission line travel paths and the Construction Disturbance Area will be restored per landowner agreements.

Drain tile lines may be present along the Proposed Route; however, it is unlikely they will be impacted, as the poles will be installed at the edges of fields and parcel lines to avoid impacts to the interior of cropped fields. The Applicant will work with 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 possible. Where avoidance is not possible, matting may be required to prevent damage to them. If drain tile lines are inadvertently damaged by construction of the Project, the Applicants will repair tile lines. Additionally, affected landowners will be compensated for any crop damage that occurs during construction.

18.1.3 Transportation

The Project area and Proposed Route are readily accessible from existing roads which are in good condition. Interstate Highway 29, U.S. Highway 14 and State Highways 22 and 28 generally encircle the Project area and would be used for access to the Project, as well as County and township roads. Roads within the Study Area are predominately used by local residents for access to rural residences, farmsteads and agricultural fields, and allow access to community and Interstate 29. Several bridges are located at some of the above roads and routes which will also be taken into account in Project planning.

The following federal and state roads are located in the vicinity of the Project: Interstate Highway 29 is located approximately 9.4 miles west of Proposed Route; U.S. Highway 14 is located approximately 18.6 miles south of the Proposed Route; State Route 28 is located approximately 0.6 miles south of the Proposed Route, and State Route 22 is located approximately 5 miles north of the Proposed Route.

The Proposed Route and Study Area cross the following County and township roads (from the north end of the Project at the Project Substation to the south end of the Project at the POI): 488th

Avenue; County Road 517/191st Street; County Road 11/Fish Lake Drive; 485th Avenue; 484th Avenue; County Road 311/483rd Avenue; 192nd Street; and 193rd Street (Exhibit 2). The Proposed Route parallels all of the above roads except those that are just crossed over, which include: County Road 311/483rd Avenue; County Road 11/Fish Lake Drive; 485th Avenue; 189th Street and 190th Street. Surfaces of roads crossed by the Project are a mix of paved asphalt or concrete and gravel or oiled.

Transportation activities considered within the Study Area were reviewed for state and federal highways, Deuel County highways, local township roads, and roads on private lands. Review of available road maps indicate no federal interstate or highways, or state highways or routes are located within in the Study Area (Exhibits 1 and 3). The South Dakota Department of Transportation (SD DOT) 2017 South Dakota Traffic Flow Map indicates average daily traffic (ADT) for total traffic/truck volume on roads near the Project area as follows:

- State Route 22 east of State Route 15 – 994/184;
- State Route 15 north of State Route 28 – 1,389/217;
- State Route 28 east of State Route 15 east to Toronto – 1,019/135; and
- State Route 28 east of State Route 15 on west side of Toronto – 481/143.[15]

Additionally, the SD DOT interactive map viewer and data download for road data indicates the following traffic counts:

- 188th Street between 486th Avenue and 488 Avenue – 112;
- County Road 517 between 485th Avenue and 486th Avenue – 36; and
- 483rd Avenue between 193rd Street and State Route 28 – 227.[16]

The 2017 SD DOT Automatic Traffic Recorder Data collected at the closest monitoring station on Interstate 29 indicate annual traffic of northbound of 3,462 (west of Brandt) and of southbound of 3,434 (east of Brandt). According to the South Dakota Department of Transportation (SD DOT), 2017 rural state highway system miles by vehicles totaled 112,567 and vehicle miles traveled (VMT) totaled 96,214,155 in Deuel County (SD DOT, 2017). Rural total local highway system miles totaled 996,975 and VMT totaled 16,554,495 in Deuel County for 2017. SD DOT had no 2017 data for Deuel County for urban miles and VMT. Rural state highway system miles by trucks totaled 112,467 and VMT totaled 20,283,444 for Deuel County in 2017. Rural total local highway system miles by trucks totaled 996,975 and VMT totaled 1,851,653.

Impacts and Mitigation

Based upon the above information, and the relatively low traffic volumes on roadways in the Project area, the intermittent traffic generated during construction of the Project is not likely to impact existing traffic patterns or capacity. O&M visits to the Project facilities will have negligible impact on area traffic once the Project is operating.

[15] See http://www.sddot.com/transportation/highways/traffic/docs/TrafficFlowMap.pdf.

[16] See http://sdbit.maps.arcgis.com/apps/webappviewer/index.html?id=93bd565a70a94f138f90ceed29ce1b12.

During construction of the Project, various work crews are anticipated to access the Project work area from the Brookings and Watertown areas from nearby Interstate 29 and State Routes 22 and 28 and then via County and township roads. The number of workers will vary day to day depending upon the construction schedule and work phase of the Project (e.g., site clearing, grading and site preparation of the Project Substation will be contained to that site and will be phased over several weeks; transmission line construction will entail phases of types of work needed along the Proposed Route, starting with clearing, creating temporary construction access, preparing foundation areas and then installation of foundations (for self-supported structures only), followed by pole installation and stringing of conductors and related equipment). The number of construction workers will vary on any given day over the span of approximately six months, but is generally anticipated to range from 27 to 43 workers (Table 17).

The Applicant will further review bridge and/or road restrictions of applicable infrastructure as part of Project design, engineering and construction. The Applicant will coordinate with applicable road authorities concerning approval of a new driveway into the Project Substation site, temporary use of County and township road ROW and bridges during construction, haul road and restoration approvals (if needed), and use of overweight vehicles (if needed).

The Deuel County Highway Department (Highway Department) is in charge of constructing, maintaining and repairing county roads and bridges, whereas Norden and Scandinavia townships maintain township roads. The Highway Department reviews and processes applications for various uses of County roads including: driveway or approach; occupancy ROW of County roads; agreement for use and restoration of contractor's haul road; agreement for use and restoration of haul road release; haul road inspection report; and overweight vehicle permits. Depending upon the final route and design of the Project, the Applicant may need to secure one or more of the above County approvals. The Applicant with coordinate with Highway Department staff and apply for required permits as needed. The Applicant will also coordinate with representatives of Norden and Scandinavia township to determine if there are additional transportation or road requirements from the townships, and work with them to secure other required approvals (if any).

The proposed transmission line and Project Substation are not expected to cause permanent negative impacts to the transportation infrastructure in the Project area, particularly during operation of the Project. Temporary and intermittent traffic impacts will occur during construction of the Project, and the Applicant will work with applicable SD DOT, Deuel County Highway Department and applicable Norden and Scandinavia township officials to avoid or minimize any impacts from the Project.

18.1.4 Cultural Resources

The South Dakota Archaeological Research Center (SARC) was contacted in May 2018 to initiate a cultural resources background review for the Project. Wenck's cultural resource specialists conducted a literature review based on the Project area as of May 14, 2018.

Wenck collected data from the SARC on known cultural resources information derived from previous professional cultural resources surveys and previously documented archaeological sites and architectural structures located within 1-mile of the Proposed Route centerline. The collection of data within 1-mile is a convention applied in most cultural resource reviews to gather valuable

information regarding the location of previously identified cultural resources and cultural resources surveys. This information is then used to assess the potential for areas within the Project to contain cultural resources and the type of resources that may be encountered. Collected data includes archaeological site locations, architectural structure locations, bridge locations, and previous cultural resource surveys.

The literature review revealed the presence of seven previously reported archaeological sites within the 1-mile study area; one of these sites (39DE0047) intersects the proposed route (Table 15). Six of the seven sites have prehistoric cultural affiliations; the remaining site is Euro-American in affiliation. Of the six prehistoric sites, four are artifact scatters, one is an occupation site, and one is an isolated find. The Euro-American site is comprised of an historic farmstead with associated artifact scatter.

Three of the prehistoric sites (39DE0040, 39DE0047 and 39DE0122) have been recommended not eligible for the NRHP and the SHPO has agreed with the recommendations. The other (39DE0039) has been recommended not eligible; however, SHPO has not provided a determination on the recommendation. The remaining two prehistoric sites (39DE0002 and 39DE0041) have not been evaluated for the NRHP. The historic farmstead site (39DE0126) has been determined not eligible for the NRHP.

Table 15 Previously Reported Archaeological Sites within the 1-Mile Study Area

County	State Site Number	Description	NRHP Eligibility Recommendation
Deuel	39DE0002	Native American occupation	Unevaluated
Deuel	39DE0039	Native American artifact scatter	Recommended Not Eligible; No SHPO Determination
Deuel	39DE0040	Archaic artifact scatter	Not Eligible
Deuel	39DE0041	Native American artifact scatter	Unevaluated
Deuel	39DE0047	Native American artifact scatter	Not Eligible
Deuel	39DE0122	Native American isolated find	Not Eligible
Deuel	39DE0126	Farmstead; Euro-American artifact scatter	Not Eligible

A total of six previously reported architecture inventory resources are present within the 1-mile study area (Table 16). None of these resources intersect the transmission line corridor. These resources include an historically inscribed glacial boulder (DE00000051), the Woodlake Evangelical Lutheran church (DE00000053), two historic farmstead complexes (DE00000059 and DE00000060), an historic homestead (DE00000089), and a concrete box culvert (DE00000090). The former three resources have been recommended eligible for listing on the NRHP; the latter three have been recommended not eligible.

Table 16 Previously Reported Architecture Inventory Resources within the 1-Mile Study Area

County	Architecture Inventory Number	Property Name	Property Category	NRHP Eligibility Recommendation
Deuel	DE00000051	Singsaas Stone	Inscribed Boulder	Eligible
Deuel	DE00000053	Woodlake Evangelical Lutheran Church	Church	Eligible
Deuel	DE00000059	N/A	Farmstead	Eligible
Deuel	DE00000060	N/A	Farmstead	Not Eligible
Deuel	DE00000089	Andrew Singsaas Homestead/ Singsaas Farm	Homestead	Not Eligible
Deuel	DE00000090	N/A	Structure (box culvert)	Not Eligible

It is likely that undiscovered archaeological sites exist within the Project Study Area. Furthermore, the presence of previously recorded architecture inventory resources identified within the 1-mile study area indicates a strong historic European American presence in the area.

Impacts and Mitigation

Archaeological resources could be impacted directly during the construction of the proposed Project. Additionally, the transmission line poles may impact viewshed integrity from existing architecture inventory resources.

A letter was sent to the South Dakota State Historic Society (SDSHS) on January 25, 2018 to initiate Project review. RES received a response from the SDSHS on January 30, 2018 (Appendix A); the SDSHS recommended a records search, and based on the results of the search, a Level III Cultural Resource Survey, as well as an accounting of indirect effects to architectural resources be completed prior to Project construction.

It is likely that the Project area has potential to contain archaeological resources. These archaeological resources would most likely be located on or near elevated landforms and areas near permanent water sources. In addition, the moderate amount of recorded architecture inventory resources in the study area imply that additional resources of these types and ages may be present within the Project area. The Applicant has contracted qualified archaeologists to conduct a Phase I archaeological resources inventory of the Project area and work cooperatively with SHPO regarding results and recommendations.

The archaeological resource inventory will focus on the proposed Project's permanent and temporary disturbance areas. These investigations will be conducted by a professional archaeologist meeting the Secretary of the Interior's Standards for Archaeology as published in Title 36 Code of Federal Regulations Part 6. Survey strategies (pedestrian and/or shovel probing and/or deep testing) for the archaeological resource inventory will depend on surface exposure and

the characteristics of the landforms proposed for development. Using the proposed transmission line layout, archaeologists will design an appropriate survey strategy for archaeological resources. This proposed survey strategy will be shared with the SDSHS to gather their input on the methodology. As previously stated, higher potential areas for archaeological resources will most likely include portions of the Project area near a permanent water source, and areas of higher elevation. Field surveys for cultural resources will be conducted during the last two weeks of October 2018.

If archaeological resources are identified during the survey, an archaeologist will identify the location and record Universal Transverse Mercator (UTM) coordinates so that Project construction layout can consider the location and adjust construction plans if desired. If Project construction plans cannot be adjusted, further investigation of the resource may be needed and further coordination with SHPO will be required. This additional investigation would be described and documented on a case by case basis. The results of the investigation will be compiled and documented in a report or reports and shared with SHPO.

19.0 Employment Estimates (ARSD § 20:10:22:24)

Construction and operation of the Project will provide positive economic value to the local community and region. The new transmission infrastructure and the Wind Project will increase generation capacity of a clean, affordable, carbon-free renewable energy source (wind) and improve the security and reliability of the regional electric transmission grid and distributed generation of clean power.

Project operation will be managed by the full-time staff for the Wind Project based at the Project O&M facility planned to be located in Yellow Medicine County, MN. The number of staff needed to operate the Project, in conjunction with the Wind Project, is anticipated to be 4 to 6 full time employees, which may include residents of Deuel County, SD.

Construction of the Project will also provide indirect positive economic benefits to Deuel County businesses and services including food services, lodging, wholesale trade businesses, real estate services, fuel, retail stores, etc. During construction, the number workers will vary on any given day over the span of approximately six months and is generally anticipated to range from 27 to 43 workers. The Applicant provides the following estimated construction employment information for the Project in Table 17 below.

Table 17 Construction Employment Estimates

Job Classification	Number of People	Annual Labor Expenditure
Land Agent	1	$50,000
Survey	2	$200,000
Substation foundations	4-8	$300,000
Substation Apparatus	4-8	$1,200,000
Line Foundation	8-12	$400,000
Line Construction	8-12	$3,300,000

The Applicant's goal and stated policy is to seek out and encourage participation of local businesses on all RES projects. At this time, the Applicant estimates that of the 27-43 total construction jobs generated by the proposed Project, approximately six local temporary construction jobs will be created over the approximate six-month construction timeframe, although the Applicant will seek to hire local construction workers as much as possible. This sometimes affects how the Applicant organizes and staff construction; meaning the Applicant may repackage the scope to provide local suppliers and contractors work opportunities.

The Applicant takes the following steps for further outreach to local labor:

- contact the local Chamber of Commerce;
- identify local newspapers and place advertisements that specifically serve local cities and towns;
- have an open house for the project and invite previously identified businesses;
- contact companies interested in participating in the bidding process;
- submit certification and reference documents by interested companies;
- pre-qualify contractors interested in bidding on the Project;
- send interested businesses' project documents including: SOW, safety, insurance requirements, and subcontract document samples;
- develop a bidders list to track local and other subcontractors;
- evaluate bidder proposals for completeness and capabilities, including financial strength;
- answer all questions, concerns, and mentor local business entities; and
- maintain documentation showing all efforts to utilize local labor.

Associated construction benefits to the local economy include spending by construction crews on lodging, food (groceries/restaurants), gas, automobile and equipment repair and maintenance, and related services and supplies.

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

While final design and routing may slightly modify the proposed Project in this Application based on landowner feedback and field survey information, the Applicant has no current or pending plans for future additions or modifications of the Project. There are no plans at this time for future additions or modifications to the Project because it is being solely constructed to deliver power from the Wind Project to the transmission grid. In the event the Applicant identifies any future additions or modifications, it will notify the SD PUC at that time and obtain any necessary permits or approvals.

The Applicant is working with MISO and the transmission owner (Otter Tail Power Company) to determine what, if any, modifications are required at the POI (Astoria Station) to interconnect the Project/Wind Project to the grid; the POI facilities are being permitted separately by Otter Tail Power Company in conjunction with the Astoria Plant. The Applicant is not aware of other system upgrades related to the Project that would be needed in the future.

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

21.1 Route Clearing

The Permanent Easement Area for the proposed transmission line and poles is 200 feet wide plus a 300-foot radius around poles (on participating land), and up to the entire 200-foot wide area may be cleared of vegetation as needed for safe construction and operation of the Project. The Project Substation site and the POI at the Astoria Station will also be cleared of vegetation as needed. Vegetation management, including route clearing activities for the Project, will be conducted to ensure compliance with North American Electric Reliability Corporation (NERC) reliability standards. The Applicant will also employ its standards applicable for route clearing, site preparation and vegetation management as indicated in the written procedures found in the Work Instruction for Clearing and Grubbing document (Appendix D).

The Proposed Route was selected following an analysis of environmental impacts to avoid and minimize impacts and tree clearing to the greatest extent possible, along with close coordination with landowners and consideration of landowner preferences and Deuel County, township, and SD PUC requirements and regulations. Where vegetation removal is unavoidable, trees, brush, shrubs and other low-growing woody plants will be cleared within the 200-foot permanent ROW, at the Project Substation and at the POI with the Astoria Station, as well as along access roads, construction and maintenance accessways, and at pole sites. Future maintenance (i.e., vegetation removal) will be conducted to maintain safe operation of the transmission facilities and require access to and within the easement area and ROW (see also Appendix D). Trees will need to be trimmed within approximately 75 feet of the transmission line during the operation phase for safety purposes.

Trees outside the ROW which are unhealthy or damaged to the extent they could fall and contact the transmission line or otherwise pose a risk to the safe operation of the Project will also be removed or pruned. Vegetation from clearing operations will be offered to the landowner, and any disposal will comply with applicable State and local ordinances. The Applicant will continue to coordinate closely with landowners to ensure awareness of the construction schedule and will conduct any route clearing activities in a manner consistent with easements between the Applicant and landowners.

21.2 Transmission Construction Procedures

Project construction and site preparation activities (e.g., clearing) will commence once final design is completed, soil conditions are known, easements are acquired, and approval from applicable local, state and federal agencies are obtained. Construction will take place in various stages (clearing, grading, excavation of foundations for self-supported structures, pole installation, etc.).

Staging areas will be established for construction of the Project at select locations along the Project route. Staging consists of delivery and temporary storage of materials and equipment needed to construction the Project. Temporary laydown sites may also be needed for the Project for additional storage space during construction. Staging areas and temporary laydown sites will be chosen for their location to the construction area, access, security and ability to minimize excavation and grading requirements. The Applicant will enter into agreements with affected landowners where temporary work areas will be required.

Typical construction equipment that will be used includes tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front end loaders, bucket trucks, bulldozers, flatbed trucks, concrete trucks, pickup trucks, helicopters and construction trailers. Excavation equipment typically use wheel or track-driven systems. Poles are transported to applicable pole sites on tractor-trailers. The majority of the transmission line structures will be directly embedded into the ground, whereas self-supported dead-end structures will require an 8 to 10-foot foundation.

The construction schedule will vary and take into account permit/approval conditions, availability of materials and labor, grid system operations, landowner requirements, weather, etc.

The transportation, treatment, and disposal of any hazardous waste associated with the construction and operation of the Project will be managed in accordance with state and federal regulations.

The Applicant will implement a Spill Prevention, Control, and Countermeasure (SPCC) Plan to minimize risk and contamination. Specifically, this plan will ensure that necessary resources are available to respond to a release and will minimize the risk of contaminating soil and water resources and the associated exposure to humans, wildlife, vegetation, and air quality. The risk of contamination and exposure will be further minimized by the Project's overall design, BMPs, the SWPPP, and other applicable mitigation measures.

Consistent with the Applicant's corporate environmental health and safety policy, the Applicant also will implement an Environmental Training and Monitoring Program that will communicate environmental concerns and appropriate work practices, including spill prevention, control, and countermeasure protocols to all field personnel.

Access Paths

Access for construction and installation of poles will be gained from existing public roads and private field access roads or trails, as much as possible. The Applicant will obtain permission from the landowner prior to accessing the construction corridor. Existing roads may be upgraded and a temporary 20-foot gravel drive path along the Proposed Route will be used to accommodate construction equipment and delivery of materials. Construction matting may also be used in providing access to sensitive areas to minimize site impacts.

Equipment Delivery and Transportation

Construction materials required for the installation of the transmission line, such as poles, conductor, insulators, optical ground wire (OPGW), shield wire, etc. will be staged both at the Project Substation and in a construction storage yard located in Yellow Medicine County, MN (and shared with the Bitter Root Wind Project) to facilitate construction flexibility and minimize transportation efforts (see above). These and other necessary construction materials, including concrete, will be transported to pole locations within the defined access roads, construction accessways, and easements along the route as construction progresses.

Excavation, Foundations and Pole Installation

Depending upon the structure type, soil type, and geotechnical analysis, the poles will have one of four foundation systems:

1. Drilled hole for a directly embedded pole – these drilled holes will have a diameter of 2.5 feet to 3.5 feet. If the soil has adequate stability, the hole can remain uncased. The poles will be placed in the center of the hole, and a crushed rack backfill material will be placed and compacted between the pole and the edge of the drilled hole.

2. Drilled hole with a casing for a directly embedded pole – these drilled holes will have a diameter of 2.5 feet to 3.5 feet. The depth of these foundations will depend on the geotechnical capacity of the soil, but will likely be between 15 to 20 feet deep. Where the soil does not have adequate stability, a corrugated metal pipe, also known as a "casing," with the same size diameter as the drilled hole, will be inserted into the hole. This casing will keep the hole stable during construction. The poles will be placed in the center of these holes and a rushed rock backfill will be placed and compacted between the pole and the inside of the casing.

3. Concrete foundation for a self-supported pole – Self-supported structures will require a concrete foundation 8 to 10 feet in diameter. The variations in the diameter will depend on varying loads that are applied to the transmission line structure. The depths of these caissons will depend heavily on the geotechnical capacity of the soil. Typically, the foundations to support these types of structures could extend 24 feet to 35 feet below grade. If the soil has adequate stability, the hole can remain uncased.

4. Concrete foundation with a casing for a self-supported pole – Self-supported structures will require a concrete foundation 8 to 10 feet in diameter. The variations in the diameter will depend on varying loads that are applied to the transmission line structure. The depths of these caissons will depend heavily on the geotechnical capacity of the soil. Typically, the foundations to support these types of structures could extend 24 feet to 35 feet below grade. Where the soil does not have adequate stability, a casing with the same size diameter as the drilled hole, will be inserted into the hole. This casing will keep the hole stable during construction.

To simplify construction of the transmission line, poles will be configured with insulators and other necessary hardware while on the ground. The steel poles will then be lifted, placed and secured by a crane, and holes will be backfilled with select aggregate or concrete for direct embedded culvert foundations. Concrete will be delivered to pole locations where drilled pier concrete foundations will be used from a local plant; excess soil will be removed from the site and properly disposed of offsite unless otherwise requested by the landowner.

Stringing Transmission Line Conductors

Stringing setup areas will be established within the ROW approximately every two miles and at corners. To ensure traffic flow will not be impeded and that contact with existing cables and conductors is not made, temporary clearance poles will be installed over existing electric

transmission and distribution lines, communication lines, streets, roads, highways, railways, driveways, etc. Temporary clearance poles will only be used following necessary notifications or the procurement of required permits. Upon completion of steel pole installation, crews will pull conductor line to the required tension, and will use bucket trucks or helicopters to finalize conductor installation.

21.3 Landscaping and Restoration Procedures

Crews will attempt to limit ground disturbance during construction to the greatest extent possible, including the installation of construction mats to distribute vehicle weight where necessary. Following completion of construction, areas disturbed during construction and not required for continuing operations of the Project facilities will be restored to preexisting contours and elevations.

Where possible, some locations where vegetation is disturbed or removed for construction and operation of the Project will be allowed to naturally reestablish to pre-construction conditions. In other locations, disturbed areas will be restored through use of appropriate erosion control measures and reseeding areas. Native species that do not interfere with safe operation of the Project will be allowed to reestablish in disturbed areas, or returned to cropland, according to landowner preferences.

Cropland will be considered restored upon acceptable regrading of contours and elevations in accordance with landowner preferences, and other, uncropped land will be reseeded with appropriate and regulatory agency-approved native seed mixes, and in accordance with landowner preferences. In locations where significant soil compaction and disturbance from construction activities occur, various methods may be used to reestablish the vegetation stratum and control soil erosion including: prompt revegetation; erosion control blankets; silt fences; and biologs/compost stocks.

The Applicant will contact each landowner after completion of construction to review damage that has occurred due to construction activities. If damage has occurred, the Applicant will fairly reimburse the landowner for damages to crops, fences or applicable land parcels according to landowner agreements.

21.4 Maintenance Procedures

The Transmission Line, poles and associated facilities will require periodic inspection, maintenance and repair once the Project is constructed and operational. Project facilities are designed to operate for several decades and require moderate maintenance after the initial years of operation. To be more efficient and timely with responses to issues, the Applicant's O&M staff for the Wind Project will also conduct inspection of the transmission facilities.

Regular ROW vegetation maintenance for the Project will include, but is not limited to vegetation inspection and management, transmission line visual inspection, special line assessment, and general facilities/grounds upkeep. As described in Section 22, the Applicant will adhere to the requirements set forth in applicable NERC reliability standards. The Applicant will implement a Work Instruction for Clearing and Grubbing management program (Appendix D), which outlines a schedule for regularly scheduled inspections, established vegetation clearances to be maintained,

crew qualifications and required training, and established a process for the immediate communication of vegetation conditions that present an imminent threat to the line. Additional requirements include an annual plan and quarterly reporting requirements.

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

Project facilities include Collection Lines (six underground collector lines each approximately 200 feet in length from the Minnesota/South Dakota boundary to the Project Substation in South Dakota), a Project Substation, and a Transmission Line (a single circuit 345-kV overhead transmission line approximately 10.42 miles in length indicated in Exhibits 2 and 3). The Project will also require interconnection facilities (a four-ring bus) at the POI, and this will be permitted separately by Otter Tail Power. The Applicant initiated preliminary design of the transmission facilities and the design follows the Rural Utility Service (RUS) *Design Manual for High Voltage Transmission Lines* (Bulletin 1724E-200) and the National Electrical Safety Code, *C2-2012* (NESC 2012) which takes into account 11 specific design standards (e.g., clearances, loading, sagging, etc.). Additional details concerning the pole configurations, conductors, alternatives, reliability, safety, right-of-way requirements and clearing are discussed below.

22.1 Configuration of Towers and Poles

The transmission line design will consist of steel monopole tangent structures, self-supporting steel monopole light angle structures, and self-supporting steel dead-end structures (Exhibit 11). A summary of the design and foundations for the proposed single pole structures to be installed for the Project is included in Table 18.

Table 18 Pole and Foundation Design Information

Line Type	Pole Type	Pole Material	ROW Width (feet)	Typical Pole Height (feet above ground)	Typical Pole Base Diameter (inches)	Typical Foundation Diameter (feet)	Typical Span Length Between Poles (feet)
345 kV	Tangent, Monopole, Direct Embed	Galvanized steel	110 to 200	95-113	30-42	2.5-3.5	600-950
345kV	Self-Supporting, Light Angle, Direct Embed	Galvanized steel	110 to 200	120	42-60	7	800-950
345kV	Self-Supporting, Dead-end, Concrete Foundation	Galvanized steel	110 to 200	100-130	48-72	8-10	800-950

Preliminary design includes a total of 85 structures, including 70 steel monopole tangent structures, 9 self-supporting steel monopole dead-end structures, and 6 self-supporting light angle structures.

Additional details regarding structures follows:

- **Tangent Monopole Structures:** Tangent monopole structures make up the majority of the line. These structures are steel with three braced-line post insulators (two on one side of the structure and one on the other side of the structure); the shielding wires are supported on arms at the top of the pole. These structures will be directly embedded into the ground. The total pole heights range from 110 ft to 130 ft depending on the location of the structure; with embedments assumed at 10% of the pole height plus 5 feet (which will be verified based upon geotechnical information), the above ground structure heights are currently between 95 feet and 113 feet. The structure diameters will be around 2.5 to 3.5 feet at ground for these structures (Exhibit 11).

- **Self-Supporting Light Angles:** These structures will be a steel structure with 3 suspension insulators vertically stacked on the same side of the structure and one shield wire arm. The structure will be supported on a cast in place drilled caisson foundation. The total structure height is currently modeled at 120 feet above ground. The structure will be supported on a cast in place drilled pier foundation. The foundations will be revealed above ground surface approximately 1.5 feet and the foundation will be approximately 7 feet in diameter (Exhibit 11).

- **Self-Supporting Dead-ends:** Self-supporting dead-ends are used on corner structures/angles as well as the structure leading into the interconnect POI facilities and Project Substation. These structures will be steel structures with a vertical configuration of insulators and will be on foundations. The above ground structure heights will be between 100 feet and 130 feet depending on the location. The foundations will be revealed above ground surface approximately 1.5 feet and the foundation will be approximately 8-10 feet in diameter (Exhibit 11).

Average spans between the poles is approximately 674 feet as determined by landowner request, land use, and environmental, geological, and engineering constraints identified during preliminary design. The shortest span length is approximately 113 feet from the Project Substation to Structure No. 1; the longest span length is approximately 950 feet from Structures 6 to 7 (this location spans the USFWS grassland easement discussed herein). Where possible, wetlands and waterbodies will be avoided via spanning.

The foundations of monopole and self-supporting structures will be designed using Moment Foundation Analysis and Design (MFAD) which can be used for drilled shaft or direct embedment pole foundations. The MFAD programs determines the required foundation depth based upon specified soil conditions and specific structural loading. Typical foundation depths range from 15 to 20 feet below ground surface.

Corrugated steel culvert foundations (typically 30-60 inches in diameter) may be required for direct-embedded structures in soils with poor soil stability. The pole is installed into the culvert

and select granular backfill is used around the pole. The Applicant will complete geotechnical studies to obtain specific soil information required to design the foundations. Based upon geotechnical information, a final foundation design will be prepared and implemented for the Project.

Other structure types may be considered based upon site-specific conditions once more detailed design and soil information has been evaluated and completed. Appropriate standards and safety requirements will be followed during and after construction of the Project.

With the exception of the Project Substation site which overall is approximately 6.5 acres and no more than 2.83 acres of permanent impact, the Project's permanent land impacts will be approximately 9.6 square feet per pole for tangent structures, 38.5 square feet per pole for light angle structures, and 78.5 square feet per pole (for square feet per pole (for angle and dead-end poles) or approximately 9.6 square feet per pole for dead-end structures. The total permanent footprint for the pole structures is estimated at 1,600.8 square feet, or 0.04 acres.

22.2 Configuration of Conductors

The proposed transmission line consists of a single circuit 345 kV high voltage transmission line, with three phases that each contain two conductors as indicated in the schematics included in Exhibit 11. Preliminary design of the transmission line consists of:

- a double bundle conductor assembly ((2)-795 kcmil 26/7 ACSR, 1.108 inch diameter, "Drake" conductors (2 per phase), and either braced post insulators, vertical bundle for tangent structures or 345 kV suspension polymer insulators with corona ring and 345 kV jumper post insulators for angle structures);
- a shield wire assembly (3/8 inch EHS galvanized steel, 0.36 inch diameter); and
- an optical ground wire (OPGW) assembly (48 fiber OPGW, 0.646 inch diameter).

The conductors will provide adequate capacity for electricity generated by the size of the Wind Project. The structures will be grounded with ground pads at the top and bottom of the poles tied to the shield wire at the top and a minimum of two 8-foot copper bonded ground rods. Two shield wires will be used on the transmission line design to minimize the possibility of lightning contacting the phase wires and causing a flashover. Avian protection will be provided by installing Swan Flight Diverters (SFDs) on the overhead shield wires and spaced a maximum distance of 50 feet along the portion of the route near Fish Lake.[17] The configuration and size, span length between poles and number of circuits per pole are indicated in Exhibits 2 and 11.

The Applicant will continue to work closely with landowners and road authorities to determine the most acceptable locations for placement of structures, construction access, and workspace areas to minimize impacts to farming operations. See Exhibits 2 and 10 for more details and schematics of the proposed transmission line design.

[17] SFDs will be installed as indicated by *Suggested Practices for Avian Protection On Power Lines: State of the Art in 2006,* Avian Power Line Interaction Committee, the Edison Electric Institute, and the California Energy Commission.

22.3 Proposed Transmission Site and Major Alternatives

Detailed maps of the Proposed Route are included in Exhibit 2. No major alternatives or route segment alternatives to the Proposed Route or the Project Substation site exist in relation to the Wind Project configuration and planned electric collection line layout. The Applicant has been discussing the Project with area landowners and reviewing various transmission line routes, alternative route segments, and substation location which would connect the Project Substation to the POI. The planned Project Substation site indicated in this Application has been sited in accordance with landowner requirements to minimize impacts to active agricultural use of surrounding land. The Applicant has reached agreement with approximately 60% of the landowners along the Proposed Route and expects to secure the final agreements by the end of 2018.

The Proposed Route included in this Application addresses landowner requests and concerns, minimizes impacts to land use and environmentally sensitive areas, and routes along existing roads, property lines, and field lines to the extent possible to avoid and minimize impacts to existing land use and landowner concerns. The Applicant will continue to work with landowners in final routing and siting matters, in conjunction with consideration of engineering and design requirements, potential environmental impacts and other relevant factors.

22.4 Reliability and Safety

22.4.1 Transmission Line Reliability

As indicated in Sections 23.1 and 23.2 above, the transmission line is begin designed following RUS *Design Manual for High Voltage Transmission Lines* (Bulletin 1724E-200) and the National Electrical Safety Code, *C2-2012* (NESC 2012) standards. As such, the transmission line and associated facilities will be built to endure regional weather extremes and other environmental factors.

Transmission lines and related equipment may fail if they are subjected to extreme weather conditions (e.g., extremely high winds, tornados, extreme flooding, extreme ice events, etc.) which are in excess of design standards. The transmission facilities are monitored and automatically taken out of service via protective relaying equipment that activate when a fault is identified in the transmission system. Additionally, maintenance outages high voltage transmission systems need only infrequent scheduling and therefore these systems have very high annual use. In the event of a line outage or failure, the Applicant will respond to the event, take steps to correct the problem and return the transmission system to a safety operating mode.

22.4.2 Safety

The proposed Project will be designed and constructed according to the National Electrical Safety Code (NESC) C2-2007 and transmission owner standards, as well as local, state, Applicant and industry standards. The Project will be designed and constructed to meet the local, state, and NESC standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength and type of materials, and ROW widths. Construction crews will comply with local, state, NESC, and the Applicant's standards regarding installation of facilities and standard construction practices. During construction, temporary workspace will be used as needed to allow for safe and proper installation of proposed facilities.

The Applicant will also employ safety practices for operation of the Project Substation and transmission facilities associated with the Project. This includes equipping the transmission line with protective devices (e.g., breakers, relays, etc.) to safeguard against transmission line failure or an accident occurs. If such an event occurred, the protective devices would de-energize the transmission line. The Project Substation area will be fenced, gated with security and include limited access to only authorized staff.

22.4.3 Electric and Magnetic Fields

Electricity produces two types of fields, electric and magnetic. Electromagnetic fields (EMF) are electric and magnetic fields that combine together in high frequency radiating fields and are present around appliances and other devices and equipment that use or carry electricity.

Because the two types of fields are quite different, power line frequencies should have EMF separated into electric fields (EFs which are measured in kilovolts per meter [kV/m]) and magnetic fields (MFs which are expressed in units of magnetic flux density and measured in milliGauss [mG]). These fields are dependent on the voltage of a transmission line (EFs) and current carried by a transmission line (MFs). The intensity of the EF is proportional to the voltage of the line, and the intensity of the MF is proportional to the current flow through the conductors (as the current increases, so does the MF). Over the electromagnetic spectrum, power transmission lines operate at extremely low frequency (ELF) of 60 hertz (cycles per second or Hz).

Electric Fields

There are no federal or South Dakota standards for transmission line EFs, although surrounding states have imposed standards designed to prevent serious hazards from shocks when touching large objects parked under alternating current (AC) transmission lines of 500 kV or greater.[18] The EFs produced in high-voltage electric transmission lines have very little ability to penetrate buildings or even skin.[19] They are easily shielded by common objects such as trees, fences and walls. Scientific studies have shown no association between exposure to electric fields and human disease.

EFs generated from a transmission line can couple with a conductive object (vehicle, metal object, etc.) if it is near the line, which could induce a voltage on the object. The induced voltage depends on various factors (weather conditions, object shape, size and orientation, object to ground resistance, object capacitance, and location along the ROW). Insulated or semi-insulated objects from the ground that are touched by a person will pass a small current through that person's body to the ground, similar to a spark discharge and mild shock a person might feel when walking across a carpet and touching a grounded object or other person.

[18] See In the Matter of the Route Permit Application for a 345 kV Transmission Line from Brookings County, South Dakota to Hampton, Minnesota, Docket No. ET-2/TL-08-1474, Order Granting Route Permit (adopting ALJ Findings of Fact, Conclusions and Recommendation at Finding 194 (April 22, 2010 and amended April 30, 2010)) (September 14, 2010).

[19] See "EMF Electric & Magnetic Fields" Brochure, Public Service Commission of Wisconsin, October 12, 2017 at https://psc.wi.gov/Documents/Brochures/EMF.pdf.

Magnetic Fields

Similar to EFs, there are no federal or South Dakota standards for transmission line MFs. MFs are created only when there is an electric current, the motion of electric charges (electrons) in a conductor (such as a wire). MF generated by a transmission line varies and depends upon the configuration of the conductors, the height of the conductors to the ground, and operating conditions of the line; peak levels are generally along the transmission line centerline and they decrease rapidly and become weaker as the distance from the centerline increases (proportional to the inverse square of the distance from source).

More than three decades of significant research (epidemiological, laboratory and clinical studies) has been conducted to determine whether exposure to power-frequency (60 hertz) MFs causes biological responses and health effects. Epidemiological and toxicological studies have shown no statistically-significant cause-and-effect relationship between measured MFs and cancer rates, or between distances from transmission lines and cancer rates. Public health professionals have also investigated the possible impact of exposure to EMF upon human health for the past several decades. While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields can cause biological responses or health effects continues to be debated.

22.4.4 Stray Voltage

The term "stray voltage" is the occurrence of electrical potential between two objects that ideally should not have any voltage difference between them. It is a condition that can occur on the electric service entrances to structures from distribution lines. 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. Because transmission lines convey power for subsequent distribution and are not connected to non-utility structures, stray voltage is not encountered in such lines. The proposed 345 kV transmission line will connect the Project Substation to the POI where it will connect with the bulk power grid.

22.4.5 Farming Operations, Vehicle Use and Metal Buildings Near Transmission Lines

Current farming operations in the Study Area and Permanent Easement Area are compatible with construction and operation of the proposed Project. The Applicant has coordinated with (and will continue to coordinate with) individual landowners to define limitations or restrictions to use of the land within the Project Permanent Easement Area to ensure the safe operation of the Project.

Insulated electric fences used in livestock operations can pick up an induced charge from a transmission line. The induced charge will usually drain off when the charger unit is connected to the fence. When the charger is disconnected either for maintenance or when the fence is being built, shocks may result. Potential shocks can be prevented by using a couple of methods, including:

i. one or more of the fence insulators can be shorted out to ground with a wire when the charger is disconnected; or

ii. an electric filter can be installed that grounds out charges induced from a power line while still allowing the charger to be effective.

Farm equipment, passenger vehicles and trucks may be safely used under and near power lines. The proposed transmission line will be designed to meet or exceed minimum clearance requirements with respect to roads, driveways, cultivated fields and grazing lands 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 high voltage transmission lines 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. Such buildup is a rare event because generally vehicles are effectively grounded through tires. Modern tires provide an electrical path to ground because carbon black, a good conductor of electricity, is added when they are produced. Metal parts of farming equipment are frequently in contact with the ground when plowing or engaging in various other activities. Therefore, vehicles will not normally build up a charge unless they have unusually old tires or are parked on dry rock, plastic, or other surfaces that insulate them from the ground.

Buildings are permitted near transmission lines but are generally discouraged within the ROW itself because a structure under a line may interfere with safe operation of the transmission facilities (e.g., a fire in a building on the ROW could damage a transmission line). As a result, NESC guidelines establish clear zones for transmission facilities. Metal buildings may have unique issues. For example, metal buildings near power lines of 200 kV or greater must be properly grounded. The Applicant will follow NESC and all other applicable standards and guidelines for the safe construction and operation of the Project.

22.5 Right-of-Way or Condemnation Requirements

The Project does not include any eminent domain or land condemnation. The width of the Construction Disturbance Area (e.g., that workspace needed to construct the Project) varies from 55 to 186 feet in width along the Proposed Route and depends upon site conditions and construction requirements, with appropriate additional temporary easement to encompass pole spacing requirements and associated facilities as necessary (Exhibit 2).

The Applicant will acquire a Permanent Easement Area consisting of 100 feet on either side of centerline and a 300-foot radius around pole locations on participating private property and will coordinate with appropriate local and state agencies where transmission facilities share ROW with public entities (e.g., County and township road authorities). The Applicant expects to obtain all easements by the fourth quarter of 2018. The Applicant will continue to coordinate with landowners to schedule necessary environmental and engineering surveys prior to the commencement of construction.

Transmission line staging and laydown areas will be limited to previously disturbed or developed areas wherever possible. If additional temporary work-space is required for construction efforts, temporary easements may be obtained from landowners and will be limited to specific construction needs external to the transmission line Construction Disturbance Area.

The Applicant will purchase the land planned for the Project Substation from the landowner. The Applicant has been coordinating this purchase with the landowner to minimize impacts to surrounding agricultural land owned by this landowner. This planned parcel will require rezoning from Deuel County to allow use of the site for the Project Substation, which the Applicant will initiate and complete with the cooperation of the landowner.

It is the Applicant's understanding that it does not have the right of condemnation. The Applicant will not use condemnation for the Project. All land use agreements will be voluntary and based on easement agreements with landowners.

22.6 Necessary Clearing Activities

The proposed approximate 6.5-acre Project Substation site contains a partially wooded area and agricultural land, which the landowner has agreed to convey to the Applicant for this facility and which minimizes impacts to surrounding agricultural land. The Project Substation will be constructed on approximately 2.83 acres of the 6.5-acre site.

Approximately 0.95 acres of trees and vegetation will be permanently removed for construction of the Project Substation. During construction, temporary impacts will occur on the remaining 3.7 acres, with approximately 2.32 acres of trees and vegetation that will be temporarily cleared for construction of the Project Substation which will be allowed to revegetate after completion. There will be relatively limited land disturbance along the Proposed Route since most poles will be directly embedded and a narrow temporary access way will be required during construction. Approximately 13.26 acres of trees and vegetation will be temporarily cleared for construction of the transmission line.

As proposed, the Project will not require extensive tree clearing along the Proposed Route. The number of tress removed will be dependent upon transmission line Permanent Easement Area, management requirements and landowner agreements. Clearing and maintenance of the permanent easement is described in Section 22.1.

22.7 Underground Transmission

There is no portion of the proposed 345 kV transmission line that will be placed underground. The electric collection lines connecting the Wind Project turbines to the Project Substation will be buried. In South Dakota, the electric collection lines are approximately 200 feet in length extending from the Minnesota border into the Project Substation. The Project Substation will collect and interconnect approximately six underground cable 34.5 kV feeders in a straight bus configuration.

At each wind turbine site which are all located in Minnesota, the power from step-up transformers located in the turbine nacelle will be run through an underground collection system consisting of buried cables of varying size. Collection lines and fiber optic lines will be installed within the same trench and will be buried to greater than 42 inches deep so as not to affect or be impacted by farming equipment. The lines will be accessible as necessary via aboveground junction boxes. All the collection system and fiber optic cables will terminate at the proposed Project Substation, where additional substation equipment will be installed to accommodate the proposed Project.

Where necessary to avoid impacts to USFWS easements, wetlands, other sensitive lands, or existing public roads and infrastructure, the electric collection lines will be installed via directional bores. All utility protection and metering equipment will meet the Applicant's and NESC standards for parallel operations.

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

23.1 Project Substation

The Project Substation is proposed to be located near the intersection of 189th Street and 488th Avenue in the northeast corner of Section 34 in Township 141 North, Range 47 West in Deuel County, South Dakota, immediately across the Minnesota/South Dakota state line from the western edge of the Wind Project (Exhibits 1 and 2a). The POI is to be located at the proposed Astoria Station also located in Deuel County, and the interconnection facilities will be permitted separately from this Application.

The Project Substation site is planned to be a parcel approximately 6.5 acres in size, approximately 2.8 acres of which would be a gravel area enclosed with a chain link fence and equipped with a lockable gate. It will consist of switch gear, metering gear, transformers, electrical control and communications systems, and other high voltage equipment needed to transform the electricity generated by the Project from 34.5 kV to 345 kV. Final specifications of the Project Substation will be determined by the agreements the Applicant has with MISO, as well as the transmission owner, Otter Tail Power Company.

The Project Substation will collect and interconnect six underground cable feeders in a straight bus configuration. The power from step-up transformers located in the nacelle in the wind turbine will be run through an underground electric collection system consisting of buried cables of varying size. Collection lines and fiber optic lines will be installed within the same trench and will be buried to greater than 42 inches deep so as not to affect or be impacted by farming equipment. The lines will be accessible as necessary via aboveground junction boxes. All the collection system and fiber optic cables will terminate at the proposed Project Substation, where additional substation equipment will be installed to accommodate the proposed Project.

The Project Substation will consist of circuit breakers, switch gear, metering, transformers, electrical control and communications systems, and a main power transformer to step up the 34.5 kV output to 345 kV so that it may interconnect to the POI at Otter Tail Power's proposed Astoria Station and for protection and control of the wind turbines. Final specification of the Project Substation will be determined by the agreements the Applicant has with MISO, as well as Otter Tail Power Company, the transmission line owner.

Because of the Project Substation is planned to be located entirely within South Dakota, the Applicant will seek approval from Deuel County for use of the land as the Project Substation in addition to approval from the SD PUC for the proposed Project.

23.2 POI Switchyard at Astoria Station

The POI switchyard for the Project is planned to be co-located with the Astoria Station generator 345 kV tie-in and will be permitted by Otter Tail Power separately from this Application. The POI

is the location where the electricity generated from the Wind Project is transferred to the bulk electric grid. The POI and delivery point consist of several motorized disconnect switches, and several circuit breakers. The proposed 345 kV transmission line from the Project Substation will terminate at a switch at the POI site.

23.3 Agency Contacts

23.3.1 Federal and State Agencies

The Applicant contacted and/or met with applicable federal and state agency representatives to inform them of the Project and request information concerning possible environmental effects or other comments related to each agency's jurisdiction (Appendix A). On January 25, 2018, the Applicant sent a letter to agency contacts that described the Project and requested comments. Agencies contacted include the USACE, USFWS, FAA, USDA NRCS, SD SHPO, SD GFP, SD DENR, and SD DOT.

As of the date of this Application, the Applicant received written responses from the USACE, USFWS, SD SHPO, SD GFP, and SD DENR (Appendix A). A summary of these responses and Applicant responses are included in pertinent sections of this Application. The Applicant will continue working with these agencies as the Project progresses and the route design is finalized.

23.3.2 Local Government Units

As indicated above, the Applicant sent a letter to the Deuel County Zoning Officer and Auditor describing the Project and requesting comments. No formal written responses were received from these offices, however, the Applicant discussed the Project on the phone with the Deuel County Highway Superintendent on June 5, 2018 and met with Deuel County representatives on August 14, 2018, to discuss the Project, review the Proposed Route, and reviewed the required county approvals. Consultation with the County is further discussed in Section 15 of the Application.

23.4 Permits and Approvals

Prior to construction of the Project, the Applicant will be required to obtain permits/approvals from applicable federal, state and local authorities and agencies. A description of potential permits or other approvals that may be required for construction and operation of the Project, as well as the current status, is included in Table 19 below.

Table 19 Potential Federal, State, and Local Permits and Approvals

Agency	Permit/Approval	Description	Status
Federal			
USACE	Section 404 of the Clean Water Act	Section 404 compliance for impacts to jurisdictional waters of the U.S. Nationwide Permit and Regional Conditions required for dredging or fill in jurisdictional waters	Prior to construction; Q4 2019 (if wetlands are affected)

Agency	Permit/Approval	Description	Status
		of the U.S. for utility line projects.	
USEPA	SPCC Plan	An SPCC Plan is required if a facility has an aggregate aboveground oil storage capacity greater than 1,320 U.S. gallons or a completely buried storage capacity greater than 42,000 U.S. gallons and there is a reasonable expectation of an oil discharge into or upon navigable waters of the U.S. or adjoining shorelines.	Prior to construction, Q1 2020, if required
USFWS	Compliance with Section 10 of the ESA and BGEPA; T&E species consultation; impacts to fee title lands	The ESA prohibits activities affecting species designated as endangered or threatened, unless an incidental take permit is issued by the USFWS. The BGEPA prohibits anyone from taking bald or golden eagles, including their parts, nests, or eggs, without a permit. Crossing USFWS grassland or wetland easement areas requires approval.	Initiated consultation 3/1/18; anticipate completing Q3 2019
South Dakota			
SD PUC	Facility Siting Permit	Required for transmission lines greater than 115kV.	Initiated with this Application
SD DENR	Section 401 Water Quality Certification	Required for fill in jurisdictional waters of the U.S.	In conjunction with Section 404 permit (see above)
	NPDES Permit - General Permit for Storm Water Discharges Associated with Construction Activities	Required for construction activities resulting in greater than one acre of land. Must prepare a Storm Water Pollution Prevention Plan (SWPPP).	Prior to construction; Q1 2020

Agency	Permit/Approval	Description	Status
	Temporary Water Use Permit for Construction Activities	Temporary permits for the use of public water for construction, testing, or drilling purposes; issuance of a temporary permit is not a grant of water right.	Prior to operation, if required
	General Permit for Temporary Discharge Activities	Temporary permit for the use of public water for construction dewatering.	Prior to construction, if required
SD GFP	State-listed Endangered Fish and Wildlife Review & Coordination	Coordination regarding effects on state-listed threatened or endangered species.	Initiated consultation 3/1/18; response dated 3/19/18; anticipate completing Q4 2019
SD SHPO	Cultural and Historic Resources Review & SDCL 1-19A-l l.l	Compliance required for state permits. Compliance with Section 106 of the National Historic Preservation Act is required if a federal permit is required for the Project.	Prior to construction
SD DOT	Highway Access Permit & Road Crossing Agreements	Permit required for any access roads abutting State roads.	Prior to construction
	Utility Permit	Permit required for utility crossings or use within State Highway ROW.	Prior to construction
	Oversize & Overweight Permit	Permit required for heavy equipment and materials transport on State highways.	Prior to heavy hauling
SDCL 49-32-3.1	Notice to Telecommunications Companies	Telecommunications companies will review the electrical layout and may suggest revisions to reduce impacts to telecommunication systems.	Prior to construction
Local			
Deuel County	Platting	Revise platting for use of the parcel for the Project Substation facility.	Prior to construction

Agency	Permit/Approval	Description	Status
	Special Exception Permit for Project Substation and transmission line	Special Exception approval required from the County for the Project.	Anticipate completion by Q4 2019
	Building Permits	Permit required for Project Substation facility.	Prior to construction
	Variance for Project Substation site (zoning/land use)	Rezoning approval from the County required for use of the Project Substation site.	If required, anticipate completion by Q4 2019. Prior to construction
	County Road Permits	Permit required for ROW occupancy, utility crossings, road approaches, and overweight loads	Prior to construction
	County Road Use Agreement	Road use agreement may be required	Prior to construction
Norden Township and/or Scandinavia Township	Oversize/Overweight Permit, Building Permit, Driveway/Access Permit, Road Crossing Agreements	Permits may be required if not delegated to Deuel County for approval.	Prior to construction, as necessary

24.0 Testimony and Exhibits (ARSD § 20:10:22:39)

24.1 List of Preparers

This Application was prepared by staff from the following companies:

- Renewable Energy Systems Americas Inc.
- Stinson Leonard Street, LLP
- Ulteig Engineering, Inc.
- Western Ecosystems Technology, Inc.
- Wenck Associates, Inc.

24.2 Witnesses for Testimony and Exhibits

Testimony and exhibits are provided in support of this Application and are directed toward issues and concerns to be addressed. The following individuals represent Applicant's witnesses in this matter who will support the information in this Application:

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24.3 Applicant's Verification and Signature

STATE OF MINNESOTA)
)ss.
COUNTY OF HENNEPIN)

Michelle Matthews, being first duly sworn, deposes and says that she is the Development Manager for the Bitter Root Transmission Line & Substation Project and is an authorized agent of Flying Cow Wind, LLC. She further states that she does not have personal knowledge of all of the facts recited in the foregoing Application, but the information in the Application has been gathered by and from employees and contractors of the Applicant, and that the information in the Application is verified by her as being true and correct on behalf of the Applicant.

Dated this 26th day of September, 2018.

Michelle Matthews

Development Manager II

Subscribed and sworn to before me
this 26th day of September, 2018.

Notary Public

Jonathan Kroger Pettengill Jr
Notary Public
Minnesota
My Commission Expires 01.31.22

My commission expires: 01/31/2022 (SEAL)

25.0 Definitions

Term	Definition
Ambient Air	Atmospheric air in its natural state; what is breathed in when the atmosphere is not contaminated by air-borne pollutants
Aquifer	A body of permeable rock that can contain or transmit groundwater
Avian	Of, or relating to, birds
A-weighted Scale	Applied to instrument-measured sound levels to account for the relative loudness perceived by the human ear
Aquatic Ecosystem	Communities of plants and animals living in water
Best Management Practices	Methods or techniques found to be the most effective and practical means in achieving an objective (such as preventing or minimizing pollution) while making the optimum use of resources
Conductor	A material or an object that conducts heat, electricity, light, or sound
Corona	An electrical discharge brought on by the ionization of a fluid such as air surrounding a conductor that is electrically charged
Critical Habitat	A specific geographic area that contain features essential to the conservation of an endangered or threatened species and that may require special management and protection
Cultural Resource	Physical evidence or place of past human activity: site, object, landscape, structure; or a site, structure, landscape, object or natural feature of significance to a group of people traditionally associated with it
Decibel	A unit used to measure the intensity of a sound or the power level of an electrical signal by comparing it with a given level on a logarithmic scale
Easement	A right to cross or otherwise use someone else's land for a specified purpose
Economic Deposits	Earth materials that can be used for economic and/or industrial purposes

Term	Definition
Electromagnetic Fields (EMF)	A physical field produced by electrically charged objects
Fauna	The animals of a particular region, habitat, or geological period
Flora	The plants of a particular region, habitat, or geological period
Floodplain	An area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding
Fugitive Dust	Dust that is not emitted from definable point sources, such as industrial smokestacks. Sources include open fields, roadways and storage piles
Geologic Epoch	A unit of geological time during which a rock series is deposited
Greenfield	Relating to or denoting previously undeveloped sites for commercial development or exploitation
Greenhouse Gas Emissions	Emissions into the Earth's atmosphere of any of the gases that contribute to the greenhouse effect by absorbing infrared radiation produced by solar warming of the Earth's surface
Historic Property	Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register
Hydrocarbons	Any organic compound containing only hydrogen and carbon, often occurring in petroleum, natural gas, coal, and bitumens
Hydrology	The branch of science concerned with the properties of the earth's water, especially its movement in relation to land
Insulator	A material or an object that does not easily allow heat, electricity, light, or sound to pass through it
Ionization	The process by which an atom or a molecule acquires a negative or positive charge by gaining or losing electrons to form ions, often in conjunction with other chemical changes
Kilovolt	A unit of electromotive force, equal to 1000 volts
Megawatt	A unit of power equal to one million watts, especially as a measure of the output of a power station

Term	Definition
Mitigative Measures	The elimination, reduction or control of adverse environmental impacts of a project
Oxide	A binary compound of oxygen with a more electropositive element or group
Ozone	A form of oxygen that is found in a layer high in the earth's atmosphere
Prime Farmland	Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses
Raptor	A bird of prey
Right-of-Way	The legal right, established by usage or grant, to pass along a specific route through grounds or property belonging to another
Span	The full extent of something from end to end; the amount of space that something covers
Stray Voltage	The occurrence of electrical potential between two objects that ideally should not have any voltage difference between them
Stakeholder	Either an individual, group or organization who is impacted by the outcome of a project
Stormwater	Surface water in abnormal quantity resulting from heavy falls of rain or snow
Subsidence	The gradual caving in or sinking of an area of land
Terrestrial Ecosystem	A community of organisms existing and living together on the land
Ultraviolet Radiation	Invisible rays that are part of the energy that comes from the sun
Voltage	An electromotive force or potential difference expressed in volts
Wetland	Areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season (formally referred to as swamps)

26.0 Acronyms

Acronym	Definition	Acronym	Definition
AADT	Average Annual Daily Traffic	POI	Point of Interconnection
BBCS	Bird and Bat Conservation Strategy	PPA	Power Purchase Agreement
COD	Commercial Operation Date	PTC	Production Tax Credit
CON	Certificate of Need	PV	Photovoltaic
CSAH	County State Aid Highway	RES	Renewable Energy Systems Americas, Inc.
CR	County Road	RPS	Renewable Portfolio Standard under Minn. Stat. §216B.1691
dBA	A-weighted Decibels	RPM	Revolutions per Minute
FCW	Flying Cow Wind, LLC	SCADA	Supervisor Control and Data Acquisition
GHG	Greenhouse Gas	SD	South Dakota
IPP	Independent Power Producer	SD DENR	South Dakota Department of Environment & Natural Resources
kV	Kilovolt	SD GFP	South Dakota Game Fish and Parks
kWh	Kilowatt-hour	SDGS	South Dakota Geological Survey
LWECS	Large Wind Energy Conversion System	SDSHS	South Dakota State Historical Society
MISO	Midcontinent Independent System Operator, Inc.	STH	State Trunk Highway
MW	Megawatt	USACE	United State Army Corps of Engineers
MWh	Megawatt-hour	USEPA	United States Environmental Protection Agency
O&M	Operations and Maintenance	USFWS	United States Fish and Wildlife Service

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