

**APPLICATION TO THE
PUBLIC UTILITIES COMMISSION OF THE
STATE OF SOUTH DAKOTA
FOR A FACILITY PERMIT**

CROWNED RIDGE II TRANSMISSION LINE

Crowned Ridge Wind II, LLC

APRIL 10, 2018

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- Exhibit 1 Map of Transmission Line
- Exhibit 2 Map Book
- Exhibit 3 Wider Area View of Project
- Exhibit 4 Map of State and Federal Lands
- Exhibit 5 Topography
- Exhibit 6 Quaternary Surficial Geology
- Exhibit 7 Bedrock Geology
- Exhibit 8 Water Resources
- Exhibit 9 Aquifers
- Exhibit 10 Land Cover
- Exhibit 11 Potential Dakota Skipper Habitat

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- Appendix B MISO Studies and Agreements
- Appendix C Agency Correspondence
- Appendix D Soils information
- Appendix E Cultural Survey, Level 1
- Appendix F Transmission Structure Drawings for Single Circuit Line

1.0 Executive Summary

Crowned Ridge Wind II, LLC (the Applicant), a wholly-owned indirect subsidiary of NextEra Energy Resources, LLC (NEER),¹ proposes to construct an approximately 7-mile 230-kilovolt (kV) generation tie line (the Project) from the collector substation at Crowned Ridge Wind II (CRW II) to a dead-end transmission structure adjacent to the collector substation at Crowned Ridge Wind (CRW). Utilizing a breaker position at the CRW collector substation, the 300 MWs from CRW II will be aggregated with the 300 MWs from the CRW collector substation and conjoined to the Crowned Ridge 230 kV generation tie line which will terminate at the reactive compensation substation adjacent to the Big Stone South Substation.²

CRW has executed a power purchase agreement (PPA) with Northern States Power Company (NSP) to sell NSP the full output of CRW, while CRW II has entered into a purchase and sale agreement under which it will permit and construct CRW II and this Project, and, thereafter, transfer the CRW II and this Project, along with its Facility Permits to NSP at the commercial operations date. The commercial operations dates for the CRW and CRW II are projected to be December 31, 2019.

On July 6, 2017, the Minnesota Public Service Commission approved NSP's Petition for Approval of the Acquisition of Wind Generation from the Company's 2016-2030 Integrated Resource Plan, which included a PPA with CRW and the acquisition of CRW II. NSP's PPA with CRW and the associated acquisition of CRW II are currently under consideration at the North Dakota Public Utilities Commission.³

The Applicant has worked closely with federal and state agencies, landowners, tribal governments, and local governments to design the route and siting of the transmission line. The Applicant will continue this collaborative process throughout the development, construction, and operational phases of the Project.

¹ NEER, through its affiliated entities, is the world's largest generator of renewable energy from the wind and sun. Affiliates of NEER also own approximately 8,500 circuit miles of high-voltage transmission lines or generation ties and 770 of substations in North America.

² The 230 kV transmission line that connects the CRW collector substation to the Big Stone South Substation is under review in Docket No. EL-17-50. It is anticipated that in June or July 2018 separate applications for the Facility Permits to construct CRW and CRW II wind project will be filed.

³ *Northern States Power Advance Prudence – 1550 MW Wind Application*, North Dakota Public Service Commission, Case No. PU-17-120. On March 19, 2018, NSP and Staff of the North Dakota Public Service Commission have requested that the proceeding be postponed until the record can be updated to reflect the impact of the 2017 Federal Tax Cuts and Jobs Act.

1.1 Completeness Checklist

Consistent with South Dakota Codified Law (SDCL) 49-1-8 and Administrative Rules of South Dakota (ARSD) 20:10:13:01(1), Table 1 sets forth the Commission filing requirements with an identification of where the requirement is addressed in this Application.

Table 1. Completeness Checklist

SDCL	ARSD	Required Information	Location in Application
49-41B-11(1)	20:10:22:06	Names of participants required. The application shall contain the name, address, and telephone number of all persons participating in the proposed facility at the time of filing, as well as the names of any individuals authorized to receive communications relating to the application on behalf of those persons.	3.0
49-41B-11(7)	20:10:22:07	Name of owner and manager. The application shall contain a complete description of the current and proposed rights of ownership of the proposed facility. It shall also contain the name of the project manager of the proposed facility.	3.0
49-41B-11(8)	20:10:22:08	Purpose of facility. The applicant shall describe the purpose of the proposed facility.	4.0
49-41B-11(12)	20:10:22:09	Estimated cost of facility. The applicant shall describe the estimated construction cost of the proposed facility.	5.0
49-41B-11(9)	20:10:22:10	Demand for facility. The applicant shall provide a description of present and estimated consumer demand and estimated future energy needs of those customers to be directly served by the proposed facility. The applicant shall also provide data, data sources, assumptions, forecast methods or models, or other reasoning upon which the description is based. This statement shall also include information on the relative contribution to any power or energy distribution network or pool that the proposed facility is projected to supply and a statement on the consequences of delay or termination of the construction of the facility.	6.0
49-41B-11	20:10:22:11	General site descriptions. The application shall contain a general site description of the proposed facility including a description of the specific site and its location with respect to state, county, and other political subdivisions; a map showing prominent features such as cities, lakes and rivers; and maps showing cemeteries, places of historical significance, transportation facilities, or other public facilities adjacent to or abutting the plant or transmission site.	7.0
49-41B-11(6);34A-9-7(4)	20:10:22:12	Alternative sites. The applicant shall present information related to the selection of the proposed site for the facility, including the following: (1) The general criteria used to select alternative sites, how these criteria were measured and weighed, and reasons for selecting these criteria; (2) An evaluation of alternative sites considered by the applicant for the facility; (3) An evaluation of the proposed plant or transmission site and its advantages over the other alternative sites considered by the applicant, including a discussion of the extent to which reliance upon eminent domain powers could be reduced by use of an	8.0

SDCL	ARSD	Required Information	Location in Application
		alternative site, alternative generation method, or alternative waste handling method.	
49-41B-11(11); 49-41B-22(2)	20:10:22:13	Environmental information. The applicant shall provide a description of the existing environment at the time of the submission of the application, estimates of changes in the existing environment which are anticipated to result from construction and operation of the proposed facility, and identification of irreversible changes which are anticipated to remain beyond the operating lifetime of the facility. The environmental effects shall be calculated to reveal and assess demonstrated or suspected hazards to the health and welfare of human, plant and animal communities which may be cumulative or synergistic consequences of siting the proposed facility in combination with any operating energy conversion facilities, existing or under construction. The applicant shall provide a list of other major industrial facilities under regulation which may have an adverse effect of the environment as a result of their construction or operation in the transmission site or siting area.	9.0-19.0
49-41B-11(11); 49-41B-22(2)	20:10:22:14	Effect on physical environment. The applicant shall provide information describing the effect of the proposed facility on the physical environment. The information shall include: (1) A written description of the regional land forms surrounding the 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 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 transmission site; (5) A description of the soil type at the transmission site; (6) An analysis of potential erosion or sedimentation which may result from site clearing, construction, or operating activities and measures which will be taken for their control; (7) Information on areas of seismic risks, subsidence potential and slope instability for the transmission site; and (8) An analysis of any constraints that may be imposed by geological characteristics on the design, construction, or operation of the proposed facility and a description of plans to offset such constraints.	10.0
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 or transmission site and the effect of the proposed site on surface and groundwater. The information shall include: (1) A map drawn to scale of the plant or transmission site showing surface water drainage patterns before and anticipated patterns after construction of the facility; (2) Using plans filed with any local, state, or federal agencies,	11.0

SDCL	ARSD	Required Information	Location in Application
		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 definitions of their characteristics, including the capacity of the aquifer to yield water, the estimated recharge rate, and the quality of ground water; (5) A description of designs for storage, reprocessing, and cooling prior to discharge of heated water entering natural drainage systems; (6) If deep well injection is to be used for effluent disposal, a description of the reservoir storage capacity, rate of injection, and confinement characteristics and potential negative effects on any aquifers and groundwater users which may be affected.	
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, or siting area; an analysis of the impact of construction and operation of the proposed facility on the terrestrial biotic environment, including breeding times and places and pathways of migration; important species; and planned measures to ameliorate negative biological impacts as a result of construction and operation of the proposed facility.	12.0
49-41B-11(11);49-41B-22(2)	20:10:22:17	Effect on aquatic ecosystems. The applicant shall provide information of the effect of the proposed facility on aquatic ecosystems, and including existing information resulting from biological surveys conducted to identify and quantify the aquatic fauna and flora, potentially affected within the transmission site, or siting area, an analysis of the impact of the construction and operation of the proposed facility on the total aquatic biotic environment and planned measures to ameliorate negative biological impacts as a result of construction and operation of the proposed facility.	13.0
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 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;	14.0

SDCL	ARSD	Required Information	Location in Application
		(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; 49-41B-28	20:10:22:19	Local land use controls. The applicant shall provide a general description of local land use controls and the manner in which the proposed facility will comply with the local land use zoning or building rules, regulations or ordinances. If the proposed facility violates local land use controls, the applicant shall provide the commission with a detailed explanation of the reasons why the proposed facility should pre-exempt the local controls. The explanation shall include a detailed description of the restrictiveness of the local controls in view of existing technology, factors of cost, economics, needs of parties, or any additional information to aid the commission in determining whether a permit may supersede or preempt a local control pursuant to SDCL 49-41B-28.	15.0
49-41B-11	20:10:22:20	Water quality. The applicant shall provide evidence that the proposed facility will comply with all water quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.	16.0
49-41B-11;49-41B-22	20:10:22:21	Air quality. The applicant shall provide evidence that the proposed facility will comply with all air quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.	17.0
49-41B-11(3)	20:10:22:22	Time schedule. The applicant shall provide estimated time schedules for accomplishment of major events in the commencement and duration of construction of the proposed facility.	18.0
49-41B-11(#); 49-41B-22	20:10:22:23	Community impact. The applicant shall include an identification and analysis of the effects the construction, operation, and maintenance of the proposed facility will have on the anticipated affected area including the following: (1) A forecast of the impact on commercial and industrial	19.0

SDCL	ARSD	Required Information	Location in Application
		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	20:10:22:24	Employment estimates. The application shall contain the estimated number of jobs and a description of job classifications, together with 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 country and the township in which the facility is located after construction is completed.	20.0
49-41B-11(5)	20:10:22:25	Future additions and modifications. The applicant shall describe any plans for future modification or expansion of the proposed facility or construction of additional facilities which the applicant may wish to be approved in the permit.	21.0
49-41B-11	20:10:22:34	Transmission facility layout and construction. If a transmission facility is proposed, the applicant shall submit a policy statement concerning the route clearing, construction and landscaping operations, and a description of plans for continued right-of-way maintenance, including stabilization and weed control.	22.0
49-41B-11(2)(11)	20:10:22:35	Information concerning transmission facilities. If a transmission facility is proposed, the applicant shall provide the following information as it becomes available to the applicant: (1) Configuration of the towers and poles, including material,	23.0

SDCL	ARSD	Required Information	Location in Application
		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 overall 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.	
49-41B-7; 49-41B-22	20:10:22:36	Additional information in application. The applicant shall also submit as part of the application any additional information necessary for the local review committees to assess the effects of the proposed facility pursuant to SDCL 49-41B-7. The applicant shall also submit as part of its application any additional information necessary to meet the burden of proof specified in SDCL 49-41B-22.	25.0
	20:10:22:37	Statement required describing gas or liquid transmission line standards of construction. The applicant shall submit a statement describing existing pipeline standards and regulations that will be followed during construction and operation of the proposed transmission facility.	Not applicable
	20:10:22:38	Gas or liquid transmission line description. The applicant shall provide the following information describing the proposed gas or liquid transmission line: (1) A flow diagram showing daily design capacity of the proposed transmission facility. (2) Changes in flow in the transmission facilities connected to the proposed facility; (3) Technical specifications of the pipe proposed to be installed, including the certified maximum operating pressure, expressed in terms of pounds per square inch gauge (psig); (4) A description of each new compressor station and the specific operating characteristics of each station; and (5) A description of all storage facilities associated with the proposed facility.	Not applicable
	20:10:22:05	List of Permits. The application for a permit for a facility shall contain a list of each permit that is known to be required from any other governmental entity at the time of the filing. The list of permits shall be updated, if needed, to include any permit the applicant becomes aware of after filing the application. The list shall state when each permit application will be filed. The application shall also list each notification that is required to be made to any other governmental entity.	24.0
	20:10:22:39	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	26

2.0 Description of the Nature and Location of the Project

The Project will consist of an approximately 7-mile single circuit 230 kV transmission line located in Codington County, South Dakota. The Project connects the CRW II wind project to a dead-end structure adjacent to the CRW collector substation. The purpose of the Project connecting the two wind projects is to allow for the generation from both wind projects to utilize one generation transmission tie corridor from the CRW collector substation to the Big Stone South 230 kV Substation located near Big Stone, South Dakota. Without the Project connecting to the CRW collector substation, the generation from CRW II would require an additional generation transmission tie corridor and line from the CRW II collector substation to the Big Stone South 230 kV Substation, which would add an entire new generation transmission tie corridor and line with additional impacts to the environment, aesthetics and land.

The Project's Construction Easement refers to the 150-foot (ft.) right-of-way (ROW) that is typically 75 ft. on each side of the transmission line centerline. The Project Study Area includes a 1-mile-wide corridor (0.5 mile on each side of the Project centerline).

The Applicant proposes to use tubular steel transmission structures (also referred to as poles) with a typical height of approximately 100 ft. The Project will have average spans between poles of 600 to 1,000 ft., although the spans will vary depending on geological or engineering constraints identified during final design.

The temporary impacts for the construction of the Project will occur within the Project Construct Easement and the approximately 2,500 square ft. per pole temporary laydown areas. Stringing locations at specific intervals along the Project route will require a larger temporary easement of approximately 40,000 square ft. (0.9 acre) per location.

The Project's permanent impacts will be approximately 50 square ft. per pole. The Project is expected to span wetlands and waterways wherever feasible, thereby minimizing direct impacts on these areas. Also, the Applicant is working with landowners on their preferences for the placement of poles to minimize farming impacts.

2.1 The Project

The Project is located in Codington County. See **Exhibit 1** for a Project Overview and **Exhibit 2** for an aerial view of the Project.

The Project begins at the 230 kV high side of the collector substation for CRW II, which is planned to be constructed on the south-west corner of the intersection of 166th Street and 465th

Avenue, approximately 3.65 miles south-east of Waverly, South Dakota.⁴ From the CRW II collector substation, the Project heads west for .4 miles and turns north to cross 166th Street. After crossing 166th Street, the Project heads north for 1.0 mile, crosses 165th Street and immediately turns west to cross 464th Avenue for a total western run of .95 miles. The Project then turns north for .95 miles in its approach to crossing 164th Street. The Project crosses 164th Street at north-west angle and continues in the north-west direction for 1.1 miles. The Project then turns north to cross 163rd and continues for .97 miles before making an immediate turn east for .93 miles on the south side of 162nd Street. The Project then turns north to cross 162nd Street and continues for .76 miles to the Project's ending point at the dead-end transmission structure located across the street and adjacent to the CRW collector substation. **Appendix A** lists each section, township, and range crossed by the Project Study Area.

The Project assists the overall 600 MW development plan by transporting 300 MWs of generation from CRW II to the CRW collector substation where all 600 MWs of generation is conjoined and further transported to the point of interconnection at the Big Stone South 230 kV Substation. The 600 MWs is comprised of three Midcontinent Independent System Operator (MISO) generation interconnection submittals that will utilize both the Project and the 34 mile 230 kV transmission line initiating at the collector substation of CRW. CRW and CRW II have received signed Generation Interconnection Agreements (GIA) for up to 400 MW of interconnection. These GIAs are titled MISO queue position G736 and J442. The third 200 MW generation interconnection submittal is currently under study and the Applicant anticipates receiving the final system impact study in May 2019. The final GIA is expected to be executed in a timely manner to ensure that any required transmission upgrades are completed so the transmission line may be interconnected to the Big Stone South Substation before commercial operations. **Appendix B** includes the MISO Agreements.

⁴ All mileage set forth are approximations.

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

The owner and manager of the proposed Project is Crowned Ridge Wind II, LLC, a wholly-owned indirect subsidiary of NEER.

The contact persons for the owner and manager are:

Tyler Wilhelm
Associate Project Manager
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4.0 Purpose of the Transmission Facility (ARSD 20:10:22:08)

The purpose of the Project is to deliver energy produced from the 300 MW CRW II wind project via an approximately 7-mile single circuit 230 kV transmission line to a dead-end transmission structure adjacent to the collector substation at CRW. Utilizing a new breaker position at the CRW substation, the 300 MWs from CRW II will be aggregated with the 300 MWs from CRW and conjoined to the Crowned Ridge 230 kV generation tie line which will terminate at the reactive compensation substation adjacent to the Big Stone South Substation. The energy will then be transmitted to Big Stone South Substation for delivery to the electrical grid. As explained in the Executive Summary, the full output of the CRW and CRW II will be used by NSP. NSP will be the owner of CRW II, including the 7-mile single circuit 230 kV transmission line. The Project is expected to bring both short-term and long-term benefits to South Dakota. Short-term economic benefits will be derived from activities associated with construction of the Project. Local businesses will likely experience an increase in revenues from construction of the Project, and positive economic gains will result from increased spending on lodging, meals, and other consumer goods and services. In addition, economic benefits will be realized by participating landowners, who will receive payments from the Applicant in exchange for allowing the Project to cross their properties.

The Project will also provide benefits to the local economy in the form of easement payments and approximately \$100,000-\$150,000 in sales/use tax. The Project will also make possible the estimated \$1.5 million that would be generated by CRW II on an annual basis, significantly increasing the tax base in Codington County.

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

The estimated construction cost of the proposed 7-mile transmission line and associated facilities, which includes the 230 kV high-side of the CRW II collector substation, is approximately \$10 million.

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

As explained in the Executive Summary, the need for the output of CRW and CRW II has been recognized by the Minnesota Public Utilities Commission and is under consideration by the North Dakota Public Service Commission. The output of CRW has been contracted to NSP, while NSP will own the Project set forth in this Application and CRW II. Without the construction and operation of the Project, there would be no transmission line connecting CRW II to the CRW collector substation, and, consequently, the 300 MW could not be delivered to the transmission grid and NSP.

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

The Project crosses portions of Codington County. **Exhibits 1 and 2** display the Project from the CRW II collector substation to CRW collector substation. Figures showing other features such as aquatic resources are referred to in the resource sections. **Appendix A** provides the location of the Project by township, range, and section. Should modifications to the Project as a result of permitting, engineering design, and land rights occur, all such changes would occur in the Project Study Area. **Exhibit 3** provides a wider area view of the Project, including the location of CRW and CRW II in relation to the Project connecting the two wind projects, and shows how both CRW and CRW II are delivered to the transmission grid by a transmission line initiating at the collector substation of CRW.⁵

⁵ Exhibit 3 provides the current overview of the entire project (two transmission lines and two wind projects). It provides the current alignment of the 34 mile transmission line that was filed in Docket No. EL-17-050 and the expected wind project boundaries. Each is subject to refinement, based on working with landowners and the counties on the specific placement of the transmission structures and wind turbines. The construction ready centerline for the 34 mile gen-tie transmission line will be submitted in April 2018, and the wind boundaries will be refined prior to the submittal of their respective applications in June or July of 2018.

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

General Criteria

The Applicant's development of a proposed transmission route and consideration of alternative routes involved the application of the following criteria:

- Minimizing total length between the CRW II collector substation and the CRW collector substation;
- Minimizing impact to human settlements;
- Minimizing impacts to the environment, aesthetics, wetlands, grasslands, agriculture, and threatened and endangered species;
- Minimizing crossings of existing infrastructure and county roads;
- Maximizing the paralleling of existing ROW where possible;
- Ability to secure land rights through landowner communication and land leasing efforts;
- Suitable site-specific conditions (including land use constraints);
- Avoidance of sensitive cultural resources; and
- Availability of effective transmission access and adequate transmission capacity.

Based on feedback from local government officials and landowners, additional criteria were added to refine the design of the proposed route and consideration of alternatives:

- Locating the transmission line and associated infrastructure outside of county ROW per the request of Codrington county to avoid unnecessary impacts to existing infrastructure within ROW;
- Locating the transmission line and associated infrastructure as close as reasonably possible to existing ROW with the approval from Codrington county for conductor blowout;
- Utilizing quarter section lines to minimize impacts to agricultural fields and farming operations where paralleling existing ROW is not practical; and
- Avoiding diagonal routing across agricultural fields, wherever possible.

Evaluation of Alternative Routes and the Advantage of Proposed Route over Alternatives

The proposed route set forth in **Exhibits 1 and 2** is the most consistent with the above-described general criteria, including the feedback and input received from local governments and landowners. For example, the proposed route is the shortest viable route from the CRW II collector substation to the CRW collector substation, using a route that parallels section lines, half section lines and ROW where possible, while minimizing close proximity to homes. The proposed route also accommodates the feedback received from the County, which requested that the Project be placed outside of the ROW. The proposed route also minimizes routing across agricultural fields, and, instead, runs along landowner boundaries and half section lines as much as possible. For instance, the Crowned Ridge II transmission line utilizes landowner boundaries

and half section lines for 5.9 miles and proposes cross-field routing of for 1.1 miles. The Project was further designed to minimize the impact on human settlements, major water crossings, wetlands and protected species. Also, the Project does not require any crossings of county or state highways.

The optimization of the proposed route began with efforts to revise the Project's previously considered collector substation location. In this regard, the Project originally started 6.7 miles away from the CRW collector substation at a location adjacent to the intersection of U.S Highway 212 and Highway 312 just north of Goodwin, South Dakota. This location would have required a crossing with U.S Highway 212, additional transmission routing, and additional turning structures to mitigate impacts to highly concentrated wetlands, as well as wetland/grassland easements.

In addition to optimizing the Project's collector substation location, alternative routing between the currently assumed collector substation and the CRW collector substation was considered. Initial routing positioned the transmission alignment with closer proximity to homes and would have also resulted in 4.7 acres of additional tree clearing when compared to the Project's proposed routing.

The optimization of the Project's collector substation location and the consideration of alternative generation transmission tie routing between the Project's collector substation and the CRW collector substation are collectively identified as the Crowned Ridge II Alternate Transmission Route. This alternative route when compared to the proposed route set forth in **Exhibits 1 and 2** does not satisfy the above general criteria considerations as well as the proposed route.

Crowned Ridge II Alternate Transmission Route

The Project could have commenced at the formerly considered CRW II collector substation location and utilized a taller turning structure to accommodate the crossing of U.S Highway 212 in the northern direction. The alternative routing would then head west to cross 466th Avenue before running north and utilizing a transmission corridor between 466th Avenue and 465th Avenue for approximately 6.5 miles. The alternative route would then cross 465th Avenue and shortly after crossing 166th Street on the final approach into the Project's proposed collector substation that is the subject of this application. In total an additional 9.7 miles of generation transmission tie corridor would be required by using the formerly considered collector substation location.

The alternative route also would have commenced 0.5 mile east of the current northern routing and proceeded north for 4.0 miles just outside the western ROW of County Road 33/10 before crossing 163rd Street. The alternate route then continues north for an additional 1.7 miles and concludes at the dead-end transmission structure located adjacent to the CRW collector substation. The alternative route between the CRW and CRW II collector substations, although

straighter in nature and located closer to existing ROW, results in a much closer proximity to homes on both sides of County Road 33/10.

Further, the alternate route is not optimal for the following reasons:

- The closer proximity to the towns of Goodwin and Kranzburg;
- It would be located within 250 ft. of a home;
- The crossings of existing infrastructure, including electrical lines and U.S Highway 212;
- The intersection of a parcel of a non-participating landowner;
- Being less than 0.5 mile from three raptor nests; and
- The inclusion of 26% prairie lands, which generally has a higher cultural site density than agricultural lands.

Additionally, as compared to the proposed route, the alternative route:

- Increased the length of the generation tie line by approximately 9.1 miles;
- Included 14 additional turning structures;
- Would have required an additional 164 acres for easement;
- Had a higher density of occupied residences along the route near the town of Goodwin and along the transmission corridor adjacent to County Road 33/10;
- Crossed more existing infrastructure, including electrical lines and county roads near the town of Goodwin;
- Was adjacent to larger parcels of USFWS wetland and grassland easements;
- Crossed Willow Creek and more flowlines;
- Crosses more wetlands south of Willow Creek;
- Is in proximity to more tribal resources near Willow Creek; and
- Has more diagonal dissection of agricultural lands along the southern portion of route.

The alternate route is not optimal based upon the above listed drawbacks. Also, this alternate route presented greater potential impacts to residences and human settlements, because it was located within 0.6 mile of the town of Goodwin and 0.8 mile from the town of Kranzburg. The alternate route crossed a larger amount of wetlands present near Willow Creek. Additional wildlife concerns included known raptor nests south of Willow Creek and near Goodwin. Also, tribal sensitivity and cultural site density increases near Willow Creek. Approximately 26% of the alternate route consisted of prairie lands, which generally are known to have a high density of

cultural and tribal resources. Due to the increased length, the alternate crossed many existing electrical lines and county roads. The alternate route also bisected agricultural fields rather than running along landowner boundaries to achieve a shorter route.

8.1 Route Identification and Selection Process

The criteria set forth in 8.0 were employed during the route identification and selection process, which began with an analysis that involved collecting geographic information system (GIS) data from local, state, and federal agencies for the area between the CRW II collector substation and the CRW collector substation. The Applicant used the GIS data, along with input from landowners and field reconnaissance, to identify opportunities and constraints within the Project Study Area. The constraints included primarily state and federal lands (as set forth in **Exhibit 4**) and easements, wetlands, and sensitive cultural resources. Based on consideration of the criteria set forth in Section 8.0, the Applicant identified the proposed transmission line, which is set forth in **Exhibits 1 and 2**. Agency coordination regarding the Project is provided in **Appendix C**.

8.2 Project Route

The preliminary route for the Project and the Project Study Area is set forth in **Exhibits 1 and 2**. As of the end of March 2018, 89% of the transmission line route has been leased by the Applicant. The Applicant expects to have all easements finalized by the end of April 2018. The final design of the route, within the 1 mile corridor as set forth in **Exhibits 1 and 2**, will be determined during negotiations with participating landowners, and placement of Project facilities will be micro-sited to avoid or minimize impacts to environmental and cultural resources following field surveys.

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

Sections 10 through 17 describe the existing environment at the time of the submission of the application, anticipated impacts to the existing environment from construction and operation of the proposed Project, identification of irreversible changes that are anticipated to remain beyond the operating lifetime of the proposed facility, and mitigation measures the Applicant will undertake. In the following sections, the “Project Study Area” refers to the project route plus 0.5 mile either side of the route centerline. The “Project Construction Easement” refers to the project route plus 75 ft. either side of the route centerline, plus a 200-ft radius around turning structures.

ARSD 20:10:22:13 states, “The environmental effects shall be calculated to reveal and assess demonstrated or suspected hazards to the health and welfare of human, plant and animal communities which may be cumulative or synergistic consequences of siting the proposed facility in combination with any operating energy conversion facilities, existing or under

construction.” No cumulative or synergistic consequences related to environmental effects contemplated by the regulation are known to exist for the proposed Project.

The Applicant is unaware of any other major industrial facilities in the Project Study Area that may have an adverse effect on the environment as a result of construction or operation of the Project. The Day County II Wind area (under development) is located approximately 45 miles west-northwest of the Project Study Area, and the Dakota Range Wind area (also under development) is located approximately 3.5 miles northwest of the Project Study Area.

To facilitate an understanding of the comparative impacts of the single circuit transmission line, the following table is provided to show approximate values of permanent impacts. The values provided in the table are subject to change during final engineering and construction.

	Structures	Poles per Structure	Total Pole Count	Pole Radius of Impact (ft)	Impact per Pole (sq. ft.)	Total Impact (sq. ft.)
GUYED DEADEND	5	1	5	4	50.27	251.33
HEAVY TANGENT	9	1	9	4	50.27	452.39
LIGHT TANGENT	26	1	26	3.5	38.48	1000.60
GUYED RA	1	1	1	4	50.27	50.27
SS RA	1	1	1	4.5	63.62	63.62
SS DEADEND	2	1	2	4.5	63.62	127.23
Total						1945.43

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

10.1 Existing Environment

10.0.1 Description of Land Forms

The Project crosses two physiographic regions in eastern South Dakota. The northern approximately 2.43 miles of the Project lies within the Prairie Coteau ecoregion, while the southern approximately 4.72 miles lies within the Big Sioux Basin ecoregion. As described by Bryce et al. (1996), the Prairie Coteau ecoregion is the result of stagnant glacial ice melting beneath sediment layers resulting in a tightly undulating, hummocky topography with no drainage pattern, and is perforated with closely spaced semi-permanent and seasonal wetlands. The region has a chain of large lakes that were formed where there was little ice shear and higher precipitation amounts support widespread burr oak woodlands near wetland margins. The Big Sioux Basin ecoregion is a trough that penetrates the core of the Prairie Coteau and is characterized by a well-developed drainage network with more tilled agriculture due to a general lack of wetlands and gentler topography than the Prairie Coteau. Project elevations range from approximately 1,995 ft. above mean sea level (fmsl) to 2,021 fmsl in the northern portion (Prairie Coteau ecoregion) and from approximately 1,956 fmsl to 2,023 fmsl in the southern portion (Big Sioux Basin). Project topography is shown in **Exhibit 5**.

10.0.2 Geological Features and Constraints

The Prairie Coteau and Big Sioux Basin are examples of eastern South Dakota glaciation that occurred during the Late Wisconsin period of the Pleistocene. As illustrated in **Exhibit 6**, end moraine underlies the project in the northern approximately 3.32 miles and the southern approximately 2.31 miles, with undifferentiated moraine underlying the intervening portion of the project (Big Sioux Basin portion). The till deposits generally consist of a compact, silty, clay-rich matrix with sand- to boulder-sized clasts of glacial origin, with an estimated composite thickness of up to 300 ft. (Martin et al 2004). However, pre-Late Wisconsin drift deposits underlie the Late Wisconsin drift deposits, which results in a total thickness for all these glacial deposits of 400 to 700 ft. (Gilbertson 1989). Within the till are shallow glacial outwash deposits of sand and gravel that occur at the land surface to depths of generally 50 ft. or less, and deeper water-bearing sand and gravel units at depths generally greater than 100 ft. below ground surface (Jensen 2003).

Topography in the Big Sioux Basin was controlled by pre-Late Wisconsin glaciation that appears to have avoided the area (Jensen 2003). As described by Martin et al (2004), the geomorphic character of the till deposits ranges from smooth rolling terrain (ground moraine) to elevated linear ridges with hummocky terrain locally at former ice sheet margins (end moraine), while the undifferentiated till exhibits a distinctive weathered, dissected surface typically overlain by up to 10 ft. of loess. In addition to the glacial deposits, Quaternary alluvium is present along the streams crossed by the Project.

As shown in **Exhibit 7** undifferentiated Cretaceous bedrock, consisting of black shale, chalk, and sandstone, underlies the majority of the Project Study Area. This bedrock is not exposed at the surface (Gilbertson 1989).

10.0.3 Economic Deposits

Based on data provided by the South Dakota Department of Environment and Natural Resources (SDDENR), review of aerial photographs, and field observations, economic deposits of sand and gravel potentially underlie the northern 1,230 ft. of the Project Construction Easement. These deposits are described as having fair economic potential, with sand and gravel found in a series of long discontinuous ridges, with an overburden thickness of 1 to 12 ft. and a total deposit thickness of 1 to 35 ft. (Schulz 1991). While many pits have been developed in the northern portion of the Project Study Area, no active gravel pits are located in the Project Construction Easement. The Applicant is not aware of any plans to develop extractive mineral resources in the Project Study Area, but the potential to develop those resources does exist.

10.0.4 Seismic Risks

Risk of seismic activity along the Project Construction Easement is considered low. Between 1872 and 2013, 87 earthquakes have been recorded in South Dakota (SDDENR 2013). None of these earthquakes occurred in Codington County and the closest recorded earthquake, with a Modified Mercalli Intensity of 3.7, occurred in northeastern Roberts County on October 20, 1995. The Applicant is not aware at this time of subsidence potential or slope instability problems with the Project.

10.0.5 Soils

The US Department of Agriculture Natural Resources Conservation Service (NRCS) office for each county defines the soil associations found within their respective county. Soil associations are defined as a group of individual soil series that occur in a repeatable pattern across the landscape and share a distinctive pattern of soils, relief, and drainage. A soil association generally includes two or three major soil series and a few minor soil series.

Soil Survey Geographic (SSURGO) geographic information system (GIS) data are available from the NRCS and were analyzed using ESRI's ArcMap 10.5 software to determine the soil associations located within the Project Study Area and Project Construction Easement. Thirty-eight soil associations were identified in the Project Study Area and 16 soil associations were identified in the Project Construction Easement. Descriptions of the soil associations including map unit symbol, soil type, slope percentage, parent material, drainage characteristics, and acreage area provided in **Appendix D**.

Attributes to identify erodible or highly erodible soils are not provided in the SSURGO data. However, if disturbed, the increased potential for erosion associated with surface runoff for soils increases as slope gradient rises over 2% (Soil Science Division Staff 2017). Nine of the soil associations identified in the Project Construction Easement have slope gradients that may be 2% or greater, with 1 soil association that may range up to a maximum of 40%.

10.0.6 Prime Farmland

The NRCS defines prime farmland as areas that have acceptable acidity or alkalinity, a dependable supply of moisture from irrigation or precipitation, favorable temperature, and an adequate growing season. Typically, soils in prime farmland are sufficiently well-drained and not excessively erodible during the growing season. Table 10.1.6 presents the percent of area by farmland classifications for the Project Study Area and Project Construction Easement.

Table 10.1.6. Farmland Classification within the Project Study Area and Project Construction Easement

Farmland	Project Study Area	Project Construction Easement
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	Total Acreage	Percent	Total Acreage	Percent
All areas are prime farmland	2,683.96	54.39%	91.02	59.26%
Farmland of statewide importance	910.11	18.44%	22.04	14.35%
Prime farmland if drained	76.59	1.55%	N/A	N/A
Prime farmland if irrigated	170.78	3.46%	N/A	N/A
Not prime farmland	1,092.99	22.15%	40.54	26.40%
Total	4,934.43	100.00	153.60	100.00

10.1 Potential Impacts

The risks posed by the Project are generally limited by the characteristics of the geologic materials in the area. The unconsolidated geologic and soil materials along the majority of the Project Construction Easement are composed of glacial till consisting of ground moraine and end moraine that are generally of low permeability, although sand and gravel glacial outwash deposits and aeolian dusts and sands are present in the soil profile. The first occurrence of water-bearing sand and gravel deposits in the glacial till is generally greater than 100 ft. The sand and gravel outwash deposits have high permeability, but are limited in size and aerial extent. The Project Construction Easement crosses these surficial aquifer materials from approximately 162nd Street to 163rd Street and from approximately 1,230 ft. south of 164th Street to 165th Street. Otherwise, the Project Construction Easement and southern substation are underlain by aquifer materials where the first occurrence of sand and gravel deposits is generally greater than 100 ft. below ground surface (Jensen 2003).

Soil erosion is the greatest risk to the geologic environment. Where the land slope is relatively flat, the soil erosion potential is low. However, where steeper slopes (i.e., greater than 6%) are present, the potential for soil erosion increases significantly.

As review of **Appendix D** indicates, three soil associations (area totaling 2.0 ac) along the Project Construction Easement have a slope greater than 6%, while two additional soil associations (comprising an area totaling approximately 34 ac) have a slope that ranges from 2 to greater than 6%. In addition to slope, soil properties that also influence erosion from water runoff include soil texture, percent organic matter, structure infiltration capacity, and soil permeability. Soils containing high proportions of silt and fine sand are most erodible, while well-drained and well-graded gravels and gravel sand mixtures with little or no silt are the least erodible materials. The soil composition and general drainage characteristics are also described in **Appendix D**. Slope length and gradient; frequency, intensity, and duration of rainfall; and the amount of time bare soils are exposed all influence erosion caused by storm water runoff. In addition to natural processes, erosion could be caused by site clearing and earthmoving activities.

Information compiled by Schulz (1991) indicates that economically valuable mineral deposits,

such as sand and gravel, underlie only the northern-most portion of the Project Study Area, and encompass approximately the northern 1,230 ft. of the Project Construction Easement. Permanent impacts to economic deposits may occur due to support structures being located on top of these deposits that could potentially be mined at some future date, but the Applicant is not aware of any plans to develop these resources within the Project Construction Easement.

10.1.1 Soils

Construction of the Project will temporarily impact soils within the Project Construction Easement. A 32-foot-wide temporary travel path within the Project Construction Easement will be used for vehicular access to each structure location, and approximately 2.88 acres of temporary impacts are estimated for installation of each pole, which equates to a radius of approximately 200 ft. around each pole location. Therefore, the Applicant estimates approximately 183.76 acres of temporary impacts to soils from construction activities and approximately 1.63 acres of permanent impacts to soils from installation of poles, guys and anchors, exclusive of the southern substation.

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

10.1.2 Prime Farmland Impacts

Table 10.2.2 provides the estimated temporary and permanent impacts to farmland classifications associated with construction and operation of the Project.

Table 10.2.2. Estimated Temporary and Permanent Impacts to Farmland Classifications in the Project Construction Easement

Project Feature	Farmland Classification	Temporary Impacts (acres) ¹	Permanent Impacts (acres) ²
Poles, structure locations, guy anchors, and temporary travel lane	All prime farmland	88.64	0.97
	Farmland of statewide importance	21.46	0.23
	Prime farmland if drained	N/A	N/A
	Not prime farmland	39.48	0.43
Laydown areas and wire stringing areas ³	Unknown	19.66	0.0
CR II Substation ⁴	All prime farmland	14.52	14.52
Total Project	NA	183.76	16.15

¹ Temporary impacts are calculated assuming 2.88 acres of temporary impact around each structure location, including guy anchor areas and a 32-ft-wide temporary travel lane. Additional temporary impacts are anticipated from laydown areas and wire stringing areas.

² Permanent impacts are calculated as a 4-ft radius (50.0 sq. ft.) around each structure, plus guy anchor areas that extend from the edge of the permanent pole impact radius to the end of the anchor point plus 5 ft. and a width of 25 ft. Temporary travel lanes do not have permanent impacts.

³ The exact locations of laydown areas, wire stringing areas, and their access roads are not known at this time but will be determined during final design; therefore, it is not known what type of prime or statewide importance soils will be impacted by these facilities. Current design includes one 10-acre laydown yard and one 1.38-acre wire-stringing work area for each of the 7 dead-end structures.

⁴ The Crowned Ridge I Off-Site Gen-Tie Substation is shown on all Exhibits for informational purposes, but is not included in this application as it is being permitted separately.

10.2.3 Mitigation

The Project has been routed to minimize impacts to land forms, geology, and economic deposits. Available geologic data indicate that the Project will not significantly affect soil conditions or bedrock geology. Seismic activity is not anticipated to affect the performance of the transmission line structures. The placement of structure foundations in the ground will have a minor impact to 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 facility. Additional geotechnical testing will be completed prior to construction to further evaluate site-specific geologic conditions at each structure placement location.

Soil erosion is possible in areas of steep slopes, but no significant areas of steep slopes have been identified along the Project Construction Easement. To reduce adverse effects to and from soils, the project will obtain a General Permit for Storm Water Discharges Associated with Construction Activities (SDR100000) from the SDDENR and will develop and implement a Storm Water Pollution Prevention Plan (SWPPP) and use Best Management Practices (BMP) during construction to protect topsoil and minimize soil erosion. Soil areas disturbed during construction will be decompacted and returned to pre-construction contours to the extent practicable and in accordance with landowner agreements. The goal is to have all surfaces drain naturally, blend in with the natural terrain, and be left in a condition to facilitate re-vegetation, provide for proper drainage, and prevent erosion.

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

11.0 Existing Environment

The Project crosses one hydrologic region and three watersheds including the Upper Mud Creek Watershed, Willow Creek Watershed, and the Round Lake Watershed, as defined by the United States Geological Survey (USGS). The northern approximately 2.43 miles of the Project Study Area lies in the Prairie Coteau and the southern approximately 4.72 miles lies in the Big Sioux Basin. These physiographic regions are described in detail in Section 10.1. **Exhibit 8** shows the hydrologic resources discussed in this section.

11.0.1 Rivers and Streams

The Project Study Area crosses four watershed units: Upper Mud Creek, Round Lake, Willow Creek, and an unnamed tributary to Willow Creek. The USGS-named streams, and their floodplain listing, crossed by the Project Study Area and the Project Construction Easement are listed in Tables 11.1.1 and 11.1.1a. The Project Study Area crosses named streams 16 times (Table 11.1.1). The Project Construction Easement does not cross any named streams, but rather only crosses unnamed tributaries of Willow Creek three times with no mapped floodplains for those locations (Table 11.1.1a). The widest Project Construction Easement water crossing for the unnamed Willow Creek tributary is 753.4 ft. located in the northeastern quadrant of the intersection of County Road 67/10 and 463rd Avenue.

Electronic Federal Emergency Management Agency (FEMA) floodplain data is available for Codrington County. Review of these data indicates that two water bodies within the Project Study Area contain 100-year-floodplains (shown as FEMA flood zone A on **Exhibit 8**). The Project Construction Easement crosses one mapped floodplain and parallels one additional mapped floodplain. As shown on **Exhibit 8**, other named and unnamed streams and water bodies do not have designated 100-year-floodplains within the Project Study Area.

Table 11.1.1 USGS-Named Streams/River Crossings within the Project Study Area

Surface Water Name	Number of Crossings	Floodplain Present at River Crossing ¹
Willow Creek Tributaries	9	NA
Round Lake	6	NA
Upper Mud Creek Tributary	1	NA
Total	16	NA

¹ Includes review of available digital floodplain data for Codrington County.

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

Table 11.1.1a USGS-Named Streams/River Crossings within the Project Construction Easement

Surface Water Name	Number of Crossings	Floodplain Present at River Crossing ¹
Unnamed Tributary to Willow Creek	3	NA
Total	3	NA

¹ Includes review of available digital floodplain data for Codrington County.

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

11.0.2 Wetlands

According to the NWI, the majority of wetlands crossed by the Project Study Area and Project Construction Easement are freshwater emergent wetlands, as shown in Table 11.1.2.

Table 11.1.2 NWI-Mapped Wetlands Identified within Project Study Area and the Project Construction Easement

Description	Project Study Area		Project Construction Easement	
	NWI mapped Wetland Area (Acres)	Percent of Area Containing Wetlands	NWI-mapped Wetland Area (Acres)	Percent of Area Containing Wetlands
Freshwater Emergent Wetland	190.4	93.9	5.3	92.6
Freshwater Pond	12.3	6.1	0.4	7.4
Total	202.7	100.0	5.7	100.0

The USFWS manages wetland easements in the extreme southern portion of the Project Study Area, which contains 134.5 acres of USFWS grassland/wetland easements. There are no USFWS grassland/wetland easements within the Project Construction Easement. Only the designated protected basins within grassland/wetland easements are protected by the easement. Uplands surrounding the projected basins within USFWS grassland/wetland easements commonly are in agricultural use.

11.0.3 Groundwater Resources

As shown in **Exhibit 9**, the majority of groundwater resources in the Project Study Area in Codington County occur in deposits of sand and gravel that are generally at depths greater than 100 ft. below the land surface. However, a glacial outwash channel deposit and recent alluvium are located in the western half of the Project Study Area, where first occurrence of these aquifer materials is generally less than 50 ft. below ground surface (Jensen 2003). No mapped aquifer materials have been identified between 50 and 100 ft. of the surface. As mapped by the NRCS (2017), shallow groundwater occurs in the soils along the Project Construction Easement at depths ranging from 0 inches at the soil surface to greater than 80 inches. The approximate depth to shallow groundwater in the soils within the Project Construction Easement exhibit the following distribution: 6 to 18 inches, 12%; 18 to 30 inches, 15%; 49 to 61 inches, 30%; and, greater than 80 inches, 21%. The minimum average depth of shallow groundwater is 41 inches and the maximum average depth is 50 inches (NRCS 2017). While these shallow groundwater resources may not provide adequate yields to wells for use as a domestic or livestock water supply, they are important sources of recharge for the deeper underlying aquifers and to support agricultural plant growth.

11.1 Potential Impacts

11.1.1 Rivers and Streams

Potential impacts to rivers, streams, and floodplains are expected to be avoided and minimized as much as feasible by spanning these resources. Placement of structures in aquatic resources currently is not anticipated. If placement of a structure in an aquatic resource becomes necessary due to landowner preferences, other constraints, or constructability issues, the Applicant will make every effort to keep potential permanent and temporary impacts below the United States Army Corps of Engineers (USACE) nationwide permit (NWP) thresholds. Temporary impacts are expected to be further minimized with the use of matting for cranes and other equipment. The Applicant will obtain and implement a SWPPP, including appropriate BMPs, to avoid sedimentation and runoff.

11.1.2 Wetlands

The Applicant expects the Project will span all wetlands within the Project Construction Easement. Placement of structures in wetlands currently is not anticipated. If a circumstance arises wherein a structure must be placed in a wetland area, the Applicant will utilize standard construction BMPs to minimize impacts and will make every effort to keep permanent impacts below USACE NWP thresholds. Standard construction BMPs include the following:

- On construction plans, clearly mark the limits of construction. In the field, fence-off critical areas with high visibility fencing to prevent unintended impacts;
- Keep construction staging and stockpiling of materials out of wetlands and their buffers;
- Restrict site access of machinery to as few areas as possible to reduce soil compaction;
- Use removable crane mats instead of building construction pads;
- If movable equipment must be in the wetland or buffer, do not leave it there over night or on weekends;
- Do not store fuel or refuel movable equipment in a wetland or its buffer. When refueling equipment that is not readily movable (i.e. cranes), follow best management practice for temporary spill prevention, control, and containment; and
- Do not mix, test, store, or dispose of concrete within a wetland or its buffer.

The Project Construction Easement does not contain USFWS wetland easements. Therefore, no surface impacts to protected basins regulated by the USFWS are anticipated.

The exact location of laydown yards and access roads are not known at this time; however, the Applicant will site these features to avoid impacts to wetlands. Wetland delineation surveys are ongoing and results of these surveys will be utilized to refine and select exact locations of laydown yards and access roads. Further, the storm water BMPs that will be implemented as part of the SWPPP will provide additional protections to wetlands located in the Project Construction Easement. Based on the foregoing approaches, the Applicant anticipates that temporary and/or permanent impacts to wetlands during construction will be avoided or minimized.

11.1.3 Groundwater Resources

The Project will not use groundwater as a potable water source nor will any sort of water or waste discharge occur to groundwater. The Project will not result in discharge of heated water or deep well injections. The Project will not use offsite pipelines or channels for water transmission. The Project Study Area is underlain by undifferentiated Quaternary till and other glacial and periglacial deposits, such as outwash and glaciolacustrine features. None of these deposits are significantly developed for groundwater supplies.

Permanent impacts to groundwater are not expected. Depending upon the exact locations of the transmission support structures, the embedded portions of the poles (typically 25 to 30 ft.) will intersect the shallow groundwater, and shallow groundwater dewatering may be required for construction. This will be a temporary impact to groundwater. If dewatering is necessary, a Temporary Discharge Permit (SDG070000) will be obtained from the SDDENR at least 30 days prior to the anticipated discharge date and BMPs will be implemented, as needed. The potential drawdown effects of any dewatering activity will be local and temporary. Permanent impacts to groundwater from construction dewatering activities and/or structure placement in the shallow groundwater flow regime is not expected.

Risk for groundwater contamination caused by release of contaminants during construction is low. The overall low permeability of the unconsolidated geologic and soil materials will inhibit contaminant flow, although isolated high permeability granular lenses of limited size may be present that could result in a more rapid contaminant distribution. The Project will not require water storage, reprocessing, cooling, or deep well injection. Permanent effects to aquifers and potable water supplies are not expected.

11.2 Mitigation

The Applicant has minimized and avoided any direct permanent impacts to rivers, streams, and floodplains to the extent feasible, although temporary impacts may occur from construction activities.

To the extent practicable, impacts to water bodies and wetlands will be avoided through the siting process and through the use of storm water BMPs during construction. As described above, placement of structures in water bodies and wetlands currently is not anticipated. If a circumstance arises wherein a structure must be placed in a water body or wetland, the Applicant will utilize standard construction BMPs, described above in Section 11.2.2, to minimize impacts and will make every effort to keep permanent impacts below USACE NWP thresholds. No permanent impacts or structures will be placed within USFWS wetland easement protected basins.

To limit impacts to hydrologic resources caused by soil erosion, groundwater contamination or storm water runoff, the Applicant will obtain a South Dakota General Permit for Storm Water Discharges Associated with Construction Activity (SDR100000), develop and implement a SWPPP, and use BMPs to reduce impacts during construction. As required by SDR100000 and the SWPPP, any vehicle fueling within the Project Construction Easement will employ appropriate BMPs and will occur at an appropriate distance from waterways determined by site-specific conditions, such as ground cover, slope, and soil type.

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

12.0 Existing Environment

12.0.1 Methods

In order to develop a characterization of the existing environment, a desktop analysis was performed for the Project Study Area and the Project Construction Easement. The desktop analysis consisted of a review of publicly available resources with pertinent environmental data, including the USGS National Land Cover Database, high resolution aerial imagery, and data available from South Dakota State University's Public Research Access Institutional Repository and Information Exchange (PRAIRIE). These data were combined in GIS and manually reviewed by biologists experienced with aerial photography interpretation and the ecological communities of eastern South Dakota.

12.0.2 Terrestrial Vegetation and Wildlife Cover/Habitat Types

The Project crosses two physiographic regions in eastern South Dakota. The northern approximately 2.43 miles of the Project lies within the Prairie Coteau ecoregion; the southern approximately 4.72 miles is within the Big Sioux Basin ecoregion (Bryce 1998). These physiographic regions are described in detail in Section 10.1.

The predominant cover type within the Project Study Area and the Project Construction Easement is herbaceous (58.42 and 62.49 percent, respectively) followed by cultivated crops

(Tables 12.1.2 and 12.1.2a; Exhibit 10). Cropland provides minimal habitat for most terrestrial species, though it may provide limited food source and cover for some species.

The National Land Cover Dataset class “herbaceous” includes land currently not used for hay/pasture or cropland, but that may or may not have been disturbed in the past. These areas likely provide suitable habitat for grassland and some prairie species. However, Bauman et al (2016) conducted a GIS exercise to quantify undisturbed lands in eastern South Dakota that are most likely to support native, undisturbed prairie that, in turn, are more likely to support prairie obligate and sensitive species. This exercise is described below.

Table 12.1.2 Land Cover within the Project Study Area

Land Cover	Total Area (Acres)	Percent of Total Area
Herbaceous	2,882.70	58.42
Cultivated Crops	1,747.03	35.40
Developed, Open Space	116.98	2.37
Developed, Medium Intensity	48.05	0.97
Hay/Pasture	30.34	0.61
Emergent Herbaceous Wetlands	43.02	0.87
Deciduous Forest	11.20	0.23
Developed, Low Intensity	9.75	0.20
Developed High Intensity	2.22	0.05
Open Water	43.14	0.87
Total	4,934.43	100.00

Table 12.1.2a Land Cover within the Project Construction Easement

Land Cover	Total Area (acres)	Percent of Total Area
Herbaceous	95.99	62.49
Cultivated Crops	35.72	23.25
Developed, Open Space	13.31	8.67
Developed, Medium Intensity	5.36	3.49
Open Water	2.79	1.82
Developed, Low Intensity	0.43	0.28
Total	153.60	100.00

Bauman et al (2016) utilized South Dakota Farm Service Agency's 2013 Common Land Unit data layers, and the 2012 US Department of Agriculture (USDA) National Agriculture Imagery Program county mosaic aerial imagery to evaluate approximately 22.6 million acres of land in the 44 counties that comprise eastern South Dakota. Land currently under crop production, or that has in the past been used for crop production, was removed from consideration for the exercise. This was followed by manual removal of other disturbed areas. The remaining land tracts were then categorized as potentially "undisturbed grassland" or "undisturbed woodland." Water bodies larger than 40 acres as defined by the South Dakota Department of Game, Fish, and Parks' (SDGFP) Statewide Water Bodies layer were then removed to allow a more accurate interpretation of the remaining undisturbed grassland/wetland complex. The resulting dataset provides an indication of the location of likely undisturbed grasslands that may support native prairies and provide habitat for prairie species (Bauman et al 2016). These areas may overlap with the cover types "herbaceous" and/or "hay/pasture" in Tables 12.1.2 and 12.1.2a.

According to Bauman et al (2016), there are 70 discrete tracts of land that may support native prairie within the Project Study Area. These tracts range in size from 0.05 acre to 378 acres, with an average size of 22 acres. The total acreage of land that may contain native prairie habitat within the Project Study Area is approximately 1,553 acres. Within the Project Construction Easement, there are approximately 51.24 acres that may contain native prairie habitat, with discrete tracts ranging from 0.31 acre to 15 acres.

12.0.3 State and Federally Listed Plant Species

The USFWS South Dakota Ecological Services Field Office publishes a list of threatened and endangered species known or presumed to occur within counties in South Dakota (USFWS 2017a). The SDGFP also maintains a list of threatened, endangered, and candidate species (SDCL Chapter 34A-8 and 34A-8A), and provides information on recorded observations within a given county (SDGPF 2016). Previous coordination with the USFWS and SDGPF also was reviewed for information on federally or state listed species (**Appendix C**). According to these sources, there are no records of state or federally listed plant species in Codington County.

12.0.4 State and Federally Listed Terrestrial Wildlife

The sources described in section 12.1.3 were reviewed for records pertaining to state and federally listed wildlife species known or expected to occur in Codington County. The results of this review are provided in Table 12.1.4.

Table 12.1.4 State and Federally Threatened and Endangered Species, and Species Protected under the Bald and Golden Eagle Protection Act, with Potential to Occur in Codington County

Common Name	Scientific Name	Codington County Occurrence	Status ¹	Global Rank ²	State Rank ²
Insects					
Dakota skipper	<i>Hesperia dacotae</i>	Recorded in county	FT	G2G3	S2
Poweshiek skipperling	<i>Oarisma poweshiek</i>	Recorded in county	FE	G2	S2
Mammals					
northern long-eared bat	<i>Myotis septentrionalis</i>	Potentially present in county	FT	G4	S3
northern river otter	<i>Lontra canadensis</i>	Recorded in county	ST	G5	S2
Birds					
bald eagle	<i>Haliaeetus leucocephalus</i>	Recorded in county	BGEP A	G4	S1B,S2N
golden eagle	<i>Aquila chrysaetos</i>	Potentially present in county	BGEPA	G5	S3S4B,S3N
osprey	<i>Pandion haliaetus</i>	Recorded in county	ST	G5	S1B,SZN
piping plover	<i>Charadrius melodus</i>	Recorded in county	FT, ST	G3	S2B,SZN
red knot	<i>Calidris canutus rufa</i>	Potentially present in county	FT	G4T2	SNRN
whooping crane	<i>Gus americana</i>	Potentially present in county	FE, SE	G1	SZN

¹FT – 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)

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

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

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

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 (S3B,SZN) indicates an S3 rank in breeding season and SZ in nonbreeding season.

12.1 Potential Impacts

Construction of the Project will result in temporary impacts to terrestrial communities within the Project Construction Easement. These impacts will result from human presence, development of temporary auxiliary features, use of construction equipment, and vehicle access along the Project Construction Easement. Vehicle traffic may increase along county roads in the Project area through the end of construction. The Project design and construction planning will be developed to minimize these impacts to the greatest extent practicable. Minor permanent impacts will occur only in small, isolated areas where structures are placed.

12.1.1 Prairie Butterflies – Dakota Skipper (Federally Threatened) and Poweshiek Skipperling (Federally Endangered)

The Dakota skipper (*Hesperia dacotae*) is an obligate of undisturbed, native prairies, and generally inhabits wet lowlands dominated by bluestem grasses, or dry uplands that are a mix of bluestem and needle stem grasses (Vaughn 2005). Larvae have been observed feeding on several grasses, although little bluestem (*Schizachyrium scoparium*) is the preferred food source; the preferred nectar source for adults is purple coneflower (*Echinacea angustifolia*; Vaughn 2005), in addition to other prairie flowering species. As of 2002, Dakota skippers had been recorded at 53 sites in 10 counties, including two sites in Codington County (USFWS 2002). Of the Dakota Skipper sites recorded in Codington County, none are within the Project Study Area or Project Construction Easement. The closest occurrence is approximately 18 miles west of the Project Study Area. The USFWS does not have designated critical habitat for the Dakota skipper in Codington County. The closest critical habitat is designated in Grant County approximately 9 miles north of the Project Study Area and in Deuel County approximately 16 miles southeast of the Project Study Area. Dakota skippers have not been recorded in the Project Study Area or the Project Construction Easement (USFWS 2015a). See **Exhibit 11**.

The Poweshiek skipperling (*Oarisma poweshiek*) lives in high quality tallgrass prairie in both upland, dry areas and low moist areas (USFWS 2014). Nectar species for the Poweshiek skipperling include purple coneflower, black-eyed Susan (*Rudbeckia hirta*), palespike lobelia (*Lobelia spicata*), and other flowering prairie species. There is no definitive research available regarding which plant species are necessary for larvae to develop, but they appear to select fine-stemmed grasses and sedges, such as slender spike rush (*Eleocharis elliptica*), prairie dropseed (*Sporobolus heterlepis*), and little bluestem (USFWS 2014; Shepherd 2005). Skadsen (2015) suggests the Poweshiek skipperling may be extirpated from South Dakota.

The Project could impact potentially suitable habitat for these prairie butterfly species through habitat removal or modification. Impacts could occur through placement of structures within suitable habitat or through routing of temporary features such as access roads. The species,

where present, are vulnerable to impacts within larval habitat year-round and adult habitat during the flight season (approximately June 15 – July 20, weather dependent).

12.1.2 Northern Long-eared Bat (Federally Threatened)

Summer habitat for the northern long-eared bat (*Myotis septentrionalis*) consists of forested areas with trees greater than 3 inches in diameter at breast height (USFWS 2017a). Northern long-eared bats roost in live trees and/or snags that have exfoliating bark, cracks, crevices, and/or cavities (USFWS 2017a). 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 2017a). Northern long-eared bats also may roost in human-made structures such as buildings, barns, bridges, and bat houses (USFWS 2017a). The species hibernates in caves, mines, or other cave-like structures during the winter. The USFWS lists the northern long-eared bat as possibly present in Codrington County, indicating that the county is within the range of the species and may contain suitable habitat. However, there are no records of the species being present in the county (USFWS 2017b). The nearest county records published by USFWS indicating known presence of the northern long-eared bat are in Brookings County to the south of the Project and in Roberts County to the north (USFWS 2017b).

The northern long-eared bat was listed as a threatened species with a 4(d) rule on April 2, 2015 (USFWS 2015b). The 4(d) rule prohibits purposeful take of the species range-wide, while removing prohibition of incidental take that results from certain activities, in certain areas, during certain times of year. The USFWS cites White Nose Syndrome, a fungal pathogen specific to bats, as the primary cause for the decline of the species, rather than habitat removal (USFWS 2015b). Acoustic surveys conducted within the nearby Crowned Ridge Wind Resource Area in 2016 resulted in no detections of northern long-eared bats during 830 detector nights (Tetra-Tech 2016). A detector night consists of one detector deployed for one calendar night. Tetra-Tech (2016) deployed three detectors for 210 nights and one detector for 200 nights between August and December 2016.

There is limited likelihood that northern long-eared bats are present within the Project Construction Easement. If the species is present, removal and fragmentation of forested habitat could affect northern long-eared bats. Removing potential roost trees (trees that provide roosting opportunity but are not known to be roosts) degrades the quality of the habitat, and removal of trees may eliminate potential foraging habitat. Felling occupied roost trees during the summer could affect individual northern long-eared bats, if present. The Applicant anticipates that minimal to no tree-clearing will occur as a result of the Project, due to the paucity of trees in the Project Construction Easement (see Table 12.1.2a). Impacts to northern long-eared bats, if present, are expected to be avoided and minimized even further through Project design and BMPs described below in Section 12.3.

12.1.3 Northern River Otter (State Threatened)

Northern river otters (*Lontra canadensis*) can occupy many types of habitat; however, riparian vegetation along a wetland margin is a key habitat feature (SDGFP 2012). This species is more prevalent in areas with abundant food and limited disturbance (SDGFP 2012). Northern river otters and beavers are closely associated; the northern river otter exploits dens, downed trees, ponds, and prey that thrive in beaver ponds (SDGFP 2012). The northern river otter was reintroduced into the Minnesota River valley in 1980 and 1981 (Skadsen 2016a). Since then, Skadsen (2016a) reports that the population has expanded its range and the species now is frequently observed along the Yellowbank River drainages in Grant County adjacent to the Project county, and along other tributaries and lakes within the Minnesota River valley. The Project Study Area contains tributaries of Round Lake, Mud Creek, and Willow Creek, which have the potential to support northern river otters (Table 11.1.1 and 11.1.1a). However, it is unknown whether northern river otters frequently utilize these tributaries in Codington County (SDGFP 2012). The closest documented observation of the northern river otter was along an unnamed tributary approximately 9 miles east of the Project Study Area (observation details not provided; South Dakota Natural Heritage Database (SDNHD) spatial data accompanying correspondence shown in **Appendix C**).

Habitat removal and degradation are the primary potential impacts to the northern river otter. Erosion and siltation can affect water quality, limiting prey availability for northern river otters. Impacts to streams and waterbodies will be avoided to the extent practicable through project design and BMPs described below in Section 12.3.

12.1.4 Bald Eagle and Golden Eagle (Protected under Bald and Golden Eagle Protection Act)

Bald eagles (*Haliaeetus leucocephalus*) typically occupy habitat near large rivers, lakes, and marshes with available food sources (USFWS 2007). They build stick nests as large as 10 ft. in diameter in trees and occasionally on human-made structures (USFWS 2007). Skadsen (2017) identifies the bald eagle as an “uncommon migrant” in northeast South Dakota. The golden eagle (*Aquila chrysaetos*) nests primarily west of the Missouri River in South Dakota, usually on cliffs, rocky outcrops, and in large trees (Kochert et al. 2002; Pulkrabek and O’Brien 1974). Skadsen (2017) lists the golden eagle as a “rare migrant” in northeast South Dakota.

Ongoing eagle use surveys conducted within a nearby study area, located partially in the same county as the Project, indicate the presence of bald eagles in the vicinity of the Project; however, no golden eagles have been observed during these recent surveys. In 2015, eagle use studies in another nearby study area indicated bald eagles but no golden eagles were observed in the general Project vicinity (Tetra-Tech 2015). A total of 453 hours of survey was conducted over all four seasons during the 2015 survey, during which four bald eagles and zero golden eagles were

observed (Tetra-Tech 2015). The timing of the sightings suggests that observed individuals likely were migrants and not resident breeding adults (Tetra-Tech 2015). In the spring and fall of 2008, avian surveys were conducted for a proposed wind energy development project in Grant, Codington, Deuel, and Brookings Counties in an area adjacent to the project (Tetra-Tech 2008a and 2008b). Three golden eagles and zero bald eagles were observed (Tetra-Tech 2008a and 2008b).

Potential impacts to bald and golden eagles, if present in the Project area, include the possibility for collisions with power lines and structures. Siltation and erosion that results from the Project could lead to degradation of water quality, potentially affecting bald eagle and golden eagle prey sources. Impacts to bald and golden eagles will be avoided to the extent practicable through project design and BMPs described in Section 12.3.

12.1.5 Osprey (State Threatened)

Ospreys (*Pandion haliaetus*) inhabit areas near large water bodies that support their prey, which consists almost exclusively of fish (SDGFP 2017). Their nest sites include large trees on or near water bodies, with preference to locations that offer separation from surrounding vegetation to avoid predators (SDGFP 2017).

Osprey have the potential to collide with power lines and structures. Siltation and erosion that results from the Project could lead to degradation of water quality, potentially affecting osprey prey sources. Impacts to osprey will be avoided to the extent practicable through project design and BMPs described below in Section 12.3.

12.1.6 Piping Plover (Federally and State Threatened)

Within South Dakota, piping plovers (*Charadrius melodus*) breed and nest on open beaches, alkaline wetlands, and sandflats (Aron 2005). In the Northern Great Plains, the nesting season extends from late April through August, with peak activity in May and June (Aron 2005). Nests consist of shallow scrapes in the sand lined with rocks or small shells (Aron 2005). The SDGFP (2016) lists the piping plover as known to have occurred in Codington County; however, the USFWS (2017b) does not list the species as a known or potential occurrence in Codington County. The Platte River Recovery Implementation Program (PRRIP; 2017) indicates that the species nests primarily on the Missouri River, downstream of the Gavins Point and Fort Randall Dams, with some nesting on tributaries of the Missouri. The PRRIP (2017) also states that piping plovers have been observed at Horseshoe Lake in western Codington County.

Potential impacts to piping plovers include the possibility for collisions with power lines and structures. Impacts to piping plover will be avoided to the extent practicable through project design and BMPs described below in Section 12.3.

12.1.7 Red Knot (Federally Threatened)

The red knot (*Calidris canutus rufa*) is a shoreline species that breeds in drier Arctic tundra areas that generally are sparsely vegetated. Nests are cup-shaped depressions lined with vegetation and located on the ground. Outside of the breeding season, the species primarily is found in marine habitats, especially near coastal inlets, estuaries, and bays (Harrington 2001). The species may be present in South Dakota as a migrant or accidental occurrence, but breeding or wintering populations have not been observed (Harrington 2001).

This species is present only as a migrant within South Dakota. There is limited potential for collision with power lines and structures.

12.1.8 Whooping Crane (Federally and State Endangered)

According to a November 26, 2007, letter from USFWS, there are records of migrating whooping cranes (*Grus americana*) in Codington County (**Appendix C**). The USFWS indicates that South Dakota is within the whooping crane migration corridor and that the species may stopover in suitable habitat including cropland and pastures, wet meadows, shallow marshes, shallow portions of large water bodies, and both freshwater and alkaline basins (**Appendix C**). Stehn and Wassenich (2007) mapped 1,858 confirmed whooping crane sightings that occurred between 1975 and 2007 during migration and determined a 220-mile wide corridor within which 95% of the sightings occurred. The Project is approximately 84.5 miles east of this migration corridor, indicating that it is relatively less likely for the species to be present within the Project than in areas closer to the migration corridor.

The USFWS identifies power-line-strike mortality as one of the prominent threats to the species, in addition to the potential for disturbance if construction occurs during spring or fall migration (**Appendix C**). Avoidance of stopover habitat due to power line obstruction is another potential impact (Stehn and Wassenich 2007). Impacts to whooping cranes, if present, will be avoided to the extent practicable through project design and BMPs described below in Section 12.3.

12.2 Mitigation

Permanent and temporary impacts to wetland habitats will be avoided whenever possible. The Project Construction Easement will span all surface waterbodies (e.g., streams) to the extent feasible to minimize the potential for direct impacts to these resources. In areas where temporary impacts to wetlands are unavoidable, the Applicant will re-vegetate disturbed areas to as close to preconstruction conditions as possible, in consultation with the landowner and per applicable permit conditions and requirements, to avoid potential permanent wetland habitat degradation. If any direct and permanent impacts are expected as a result of final infrastructure placement, the Applicant will work to the extent practical to limit all crossings of potentially jurisdictional wetlands and waters to under 0.10 acres of permanent impacts to remain eligible for USACE

NWPs. These efforts also would work to minimize impacts to the northern river otter and avian species that feed primarily on aquatic resources, if these species are present within the Project Construction Easement. Standard erosion and sediment control BMPs will be applied near streams, wetlands, and waterbodies to maintain water quality. Examples include construction of temporary sediment barriers, slope breakers, and mulching to avoid sedimentation and runoff as prescribed by a SWPPP.

Additionally, maintaining wetland habitat minimizes the potential for avian species to be impacted through wetland stopover avoidance. In order to avoid or mitigate for impacts to avian species discussed in Section 12.2, Project design will follow the guidance in the *APLIC Reducing Avian Collisions with Power Lines: the State of the Art in 2012* (APLIC 2012). This will minimize the potential for avian collisions in areas where stopover habitat could be used.

Any tree clearing, which is expected to be extremely minimal if required, that cannot be avoided will be conducted during fall to late winter to avoid disturbing breeding birds during the nesting season and to avoid direct impacts to northern long-eared bats in the event they are present within the Project Construction Easement. In areas where seasonal avoidance is not possible, a nest survey will be conducted prior to clearing. If nests are discovered, an appropriate buffer will be established around them and clearing will not occur until young have fledged from the nests.

The Applicant has reviewed potentially suitable Dakota skipper and Poweshiek skipperling habitat through desktop and field studies. Where suitable habitat cannot be avoided, the Applicant will avoid construction activities in those specific locations during the adult flight period (approximately June 15 to July 20, weather dependent) and/or re-vegetate disturbed areas to as close to preconstruction conditions as possible in coordination with the landowner and per applicable permit conditions and requirements. Seed mixes will be designed to incorporate vegetative species that support Dakota skippers and Poweshiek skipperlings.

The Project is not anticipated to result in sizable permanent impacts to existing natural and undisturbed areas. Typically, transmission line projects do not result in sizable permanent impacts due to a limited footprint of ground-disturbing activities. Land use will be permanently modified only in small, isolated areas where structures are placed. Temporary modification may occur for access, initial construction, or other ancillary features. Where temporary impacts are required, the land will be returned to pre-construction conditions. In previously natural areas (i.e., non-cropland), native vegetation seed mixes will be used to revegetate disturbed ground where feasible and pending landowner preferences.

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

13.0 Existing Environment

Aquatic resources are present as lakes, ponds, streams, and palustrine wetlands. These aquatic resources have been altered to various levels, ranging from wetlands that are annually cultivated to channelized watercourses to naturally occurring pothole wetlands that have little physical alteration. The Project Study Area and Project Construction Easement crosses wetland and other aquatic resources as discussed in Section 11.1.

13.0.1 State and Federally Listed Aquatic Wildlife

The USFWS South Dakota Ecological Services Field Office publishes a list of threatened and endangered species known or presumed to occur within counties in South Dakota (USFWS 2017). The SDGFP also maintains a list of threatened, endangered, and candidate species (SDCL Chapter 34A-8 and 34A-8A), and provides information on recorded observations within a given county (SDGFP 2016). Previous coordination with the USFWS and SDGFP also was reviewed for information on federally or state listed species with potential to occur in the Project Study Area (**Appendix C**). The sources were reviewed for records pertaining to state and federally listed aquatic species known from or expected to occur in Codington County. Only the Topeka Shiner (*Notropis topeka*) is listed or known to occur in Codington County (SDGFP 2016).

Table 13.1.1. State and federally listed aquatic wildlife potentially present within the Project Study Area

Common Name	Scientific Name	Codington County Occurrence Data	Status ¹	Global Rank ²	State Rank ²
Topeka shiner	<i>Notropis topeka</i>	Recorded in county	FE	G5	S3

¹ FE – federally endangered

² Global/State Rank Definition (applied rangewide for global rank and statewide for state rank)

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.

G5 S4 – Demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery.

13.1 Potential Impacts

Potential impacts to aquatic resources could occur through installation of structures in aquatic habitat or sediment deposition related to construction activities. However, the Applicant will avoid installation of structures in aquatic habitat to the maximum extent feasible. During

construction, sediment may reach surface waters as a result of ground disturbance and excavation, grading, and traffic within the Project Construction Easement. These potential impacts apply to all aquatic species and their habitat described below.

13.1.1 Topeka Shiner (Federally Endangered)

The Topeka shiner (*Notropis topeka*) is a small minnow native to eastern South Dakota, and is found within tributaries to the James, Vermillion, and Big Sioux drainages. The species prefers a variety of habitats including runs, pools, and backwater areas in cool, perennial streams. Occupied streams typically are groundwater-fed; and have high water quality, clean gravel substrates, and vegetated banks (Shearer 2003). The Topeka shiner has confirmed populations present in Codington County including in Willow Creek within the Big Sioux Watershed (**Appendix C**). The Project Construction Easement does not directly cross Willow Creek; however, the Project Construction Easement does cross a tributary upstream of Willow Creek at three locations. Other tributaries within the Project Study Area have the potential to support Topeka shiner. Information is not available to determine whether or not the Topeka shiner actually inhabits the Project Construction Easement.

13.2 Mitigation

Potential impacts to wetlands, rivers, and streams are expected to be avoided by spanning such resources. As described in Section 11, the Applicant does not currently anticipate siting any structure in an aquatic resource. If placement of a structure in an aquatic resource becomes necessary due to landowner preferences, other constraints, or constructability issues, the Applicant will make every effort to keep potential permanent and temporary impacts below USACE NWP thresholds. Temporary impacts are expected to be further minimized with the use of BMPs, such as matting for cranes and other equipment. Although not currently anticipated, if any instream work must occur, the Applicant also will avoid construction activities during the Topeka shiner's peak spawning period (approximately May 15 through July 31).

The Applicant will obtain and implement a SWPPP, including appropriate BMPs such as construction of temporary sediment barriers, slope breakers, and mulching to avoid runoff, sedimentation, and waterbody degradation. Where appropriate, the Applicant will re-vegetate disturbed upland areas to as close to preconstruction conditions as possible in coordination with the landowner and per applicable permit conditions and requirements.

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

14.0 Current Land Use

This Section discusses the existing environment, including current land use, displacement of residences or businesses, noise, communication facilities, and aesthetics of the Project Study Area and the Project Construction Easement. Also described are the Project's potential impacts on these resources and measures to mitigate the potential impacts. Local land use controls, including zoning ordinances, are discussed in Section 15.

14.0.1 Existing Environment

The Project is located entirely on private land, which includes undeveloped rural areas, agricultural lands, and residential farmsteads. The primary land use within the Project Study Area and Project Construction Easement is herbaceous grassland and cultivated agricultural land used for planted crops (see Section 12, Tables 12.1.2 and 12.1.2a for land cover acreage and percentage). The Project Study Area and Project Construction Easement cross land used for row and non-row crops in rotation, non-agricultural lands including pasturelands, wetlands, other hay/non-alfalfa fields, developed open space, and undisturbed native grasslands (**Exhibit 10**). Land along the Project Study Area is characterized by tilled agriculture and a well-developed drainage network across the Big Sioux Basin and hummocky topography with relatively steep slopes along the Prairie Coteau Escarpment. Vegetation is primarily cropland and grassland with small patches of planted trees around farmsteads/homesteads, in the form of shelterbelts, and near natural streams. The Project Study Area and Project Construction Easement do not cross irrigated lands, major industries, existing or potential extractive nonrenewable resources, areas zoned as residential, commercial or institutional uses, or municipal water supply and water sources for organized water systems. Rural residence and farmsteads are located within the Project Study Area but not the Project Construction Easement. One sand and gravel pit is located along the Project Construction Easement.

14.0.2 Potential Impacts

The Project is compatible with existing land use, and is not anticipated to result in sizable permanent impacts to surrounding land. Typically, transmission line projects do not result in sizable permanent impacts due to their limited footprint of ground-disturbing activities. Land use will be permanently modified only in small, isolated areas where structures (e.g., pole foundations, guy wires) are placed. Temporary modification may occur for access, initial construction, or other ancillary features. Where temporary impacts are required, the land will be returned to pre-construction conditions. The area surrounding the Project Construction Easement primarily is used for agricultural production, which is expected to continue following

construction and operation of the Project (see Section 19.2). Construction of the Project will result in short-term disturbances to agricultural lands in the form of increased traffic and noise on local roads adjacent to agriculture and temporary air quality impacts in the form of diesel exhaust and dust. Long-term operation of the proposed Project is not expected to adversely impact rural lifestyles or create hardships for rural residents. The addition of income for agricultural landowners also is expected to facilitate continued farming and ranching of the lands in agricultural production because operation of the Project is a compatible use.

Based on data collected by the Planning Districts of South Dakota, eight structures associated with farmsteads are located within the Project Study Area. No farm structures are located within the Project Construction Easement.

The Applicant will execute lease options or purchase land rights for private property crossed by the Project, in accordance with state and federal land acquisition requirements. Land rights will be recorded as part of the public record.

14.0.3 Mitigation

The Project is generally compatible with the existing land uses in the area, and no additional mitigation is required. The project will minimize impacts to agricultural operations.

14.1 Displacement

14.1.1 Existing Environment

Displacement results from ROW acquisitions that require the use of property occupied by a business or residence. A displacement is defined as an impact to an occupied business or home that is located within the Project Construction Easement.

Businesses and residences near the Project were identified through field observations and review of aerial photography.

Only ten residences are located within the Project Study Area. According to the South Dakota GIS, and no rural residential structure and/or farmsteads are located within, or within 500 ft. of, the Project Construction Easement.

14.1.2 Potential Impacts

No occupied businesses or residences are located within the Project Construction Easement. Therefore, no businesses or residences will be displaced.

14.1.3 Mitigation

No mitigation is proposed because no businesses or residences will be displaced.

14.2 Noise

Noise, defined as unwanted sound, may comprise an assortment of sounds of different intensities across the full frequency spectrum. Noise is measured on a logarithmic scale in units of decibels (dB). Human hearing is not equally sensitive to all frequencies of sound, and the A-weighted decibel (dBA) scale most closely corresponds to the frequency sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA (Table 14.3). Cumulative noise increases along the scale of human perception in a logarithmic scale with noise levels at less than 3 dBA being barely perceptible and changes in noise levels over 20 dBA being dramatically perceived.

Table 14.3 Typical human response to A-weighted decibel noise (dBA)

Sound Pressure Level (dBA)	Human perception
Less than 3 dBA	Barely perceptible
5 dBA	Clearly noticeable
10 dBA	Doubling or halving of loudness
20 dBA	Dramatic change in loudness

14.2.1 Existing Environment

The primary land uses surrounding the Project Study Area and Project Construction Easement are agricultural and consist of farms. Existing noise in rural areas vary between 40 and 50 dBA, and noise in suburban areas varies generally between 50 and 60 dBA (Smith et al. 1999). General background noises such as a quiet rural area, a whisper, a library, and a quiet suburb are under 50 dBA. Noise levels in urban areas range from 60 to 70 dBA (Smith et al. 1999) and include noises such as conversations in restaurants, offices, and running of household items including a dishwasher, vacuum, or radio. Examples of noise levels are described in Table 14.3.1. Higher noise levels, generally those between 80 to 180 dBA, include jet takeoffs, motorcycles, concerts, stadium noise, shotguns, and a rocket launch (Noise Help 2017; IAC Acoustics 2017).

Table 14.3.1 Noise source examples of A-weighted decibel noise (dBA)

Sound Pressure Level (dBA)	Noise Source Example(s)
10	A pin dropping
20	Rustling leaves
30	Whisper; quiet rural area
40	Computer; library
50	Refrigerator; quiet suburb
60	Air conditioner at 100 ft.; conversation in restaurant, office, background music
70	Dishwasher; vacuum cleaner; radio; passenger car at 65mph
80	Garbage disposal, car wash, propeller plane

	flyover at 1,000 ft.; diesel truck at 40 mph
90	Boeing 737 at one nautical mile; lawn mower
100	Motorcycle (riding); garbage truck; jet flyover at 1,000 ft.
110	Concert with live rock music; jackhammer; steel mill, automobile horn at 3.2 ft.
120	Thunderclap; chainsaw; oxygen torch
130	Peak stadium crowd noise
140	Jet engine at takeoff; air craft carrier deck
150	Fighter jet launch
160	Shotgun
170	Safety airbag
180	Rocket launch

Sources: Noise Help 2017; IAC Acoustics 2017.

14.2.2 Potential Impacts

Construction activities will generate short-term and intermittent noise that may affect nearby residences on a short-term basis. Construction noises may vary depending on equipment used and the operation being performed but may typically range from 70 to 100 dBA for use of typical construction equipment such as air compressors, backhoes, concrete mixers, cranes, bulldozers, generators, jackhammers, scrapers, shovels, and trucks (National Transportation Library 2017).

Corona is a phenomenon associated with all energized transmission lines. Under certain conditions, the localized electric field near an energized conductor can be sufficiently concentrated to produce a tiny electric discharge that can ionize air close to the conductors. This partial discharge of electrical energy is called corona discharge, or corona. Transmission lines can generate a small amount of sound energy during corona activity. Several factors, including conductor voltage, shape and diameter, and surface irregularities such as scratches, nicks, dust, or water drops can affect a conductor's electrical surface gradient and its corona performance. The noise level is also contingent on weather conditions. In foggy, damp, or rainy weather, transmission lines can make a crackling sound due to the small amount of electricity ionizing the moist air near the conductors. People do not normally hear noise from a transmission line during heavy rain because the background noise level of the rain usually is greater than the noise from the transmission line. During dry conditions, corona noise results in noise levels of 40 to 50 dBA in close proximity to a transmission line, which is comparable with general rural area noise. In wet conditions, corona noise may increase to 50 to 60 dBA, which is comparable to suburban or urban area noise levels (Transmission Line Noise Fact Sheet 2017).

The State of South Dakota does not regulate noise from transmission lines (corona noise) with measureable standards (Edison Electric Institute 2013; South Dakota statutes Chapter 49-41B).

Corona is usually not a design issue for power lines rated at 230 kV and lower. The conductor size selected for the Project's transmission line is of sufficient diameter to lower the localized

electrical stress on the air at the conductor surface and would further reduce already low conductor surface gradients so that little or no corona activity would exist under most operating conditions.

Audible noise calculations for the single circuit are discussed further in Section 23.4.3, with noise for single circuit typically ranging between 7.2 to 36.9 dBA.

14.2.3 Mitigation

During construction, noise levels will be minimized by ensuring that construction equipment is equipped with working mufflers to minimize noise levels. Construction activities generally will be limited to the hours of 7 a.m. to 9 p.m. No additional mitigation measures are necessary because there will be minimal noise impacts from the Project.

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

Corona discharge from high-voltage transmission lines can generate electromagnetic “noise” at the same frequencies used to transmit radio and television signals. Corona discharge is caused by the ionization of the air surrounding conductors and hardware and can cause interference with the reception of radio and television signals depending on the strength and frequencies in which these signals are broadcast.

If radio interference from corona discharge associated with a transmission line occurs, satisfactory reception from AM radio stations can be achieved by appropriate modification of, or an addition to, the receiving antenna system. Typically, AM radio frequency interference occurs directly underneath a transmission line and dissipates quickly as one moves to either side of the line.

Corona-generated radio frequency noise currents decrease in magnitude with increasing frequencies and are relatively small within the FM broadcast band. Therefore, FM radio receivers generally do not pick up interference from transmission lines. Additionally, the inherent interference rejection properties in FM radio systems make them virtually immune to amplitude-type disturbances.

Cellular phones operate on a wide range of radio frequencies and are not expected to pick up interference from transmission lines. Furthermore, as telecommunication carriers broaden the capabilities of cellular phones, corona-generated noise has too small a frequency range and will become increasingly insignificant as an interference source. The current generation of cellular phones increasingly incorporates satellite communication capabilities; as such, interference from the Project’s corona-discharge is not expected to occur.

Signal blocking caused by large metal structures may cause interference with two-way mobile radios if the structure is aligned between the receiver and a weak, distant signal. However, this

interference usually is removed by repositioning the mobile radio receivers away from transmission line structures, thereby restoring communications.

Although rare, television interference may occur when a large transmission structure is aligned between the receiver and a weak distant signal, creating a shadow effect. Television interference also may be caused by loose and/or damaged hardware along the transmission line.

Global Positioning System (GPS) units use three or more satellite signals to triangulate a position. The accuracy of this position is affected by the number of satellites, the geometry of the satellites' position in the sky at a given moment, and by atmospheric factors. GPS units are constantly receiving or dropping satellite signals as satellites constantly orbit the earth. A study published by the Institute of Electrical and Electronics Engineers determined that GPS signals are not affected by overhead conductors or by electromagnetic interference (Siva and Olsen 2002). Although a rare event, a temporary drop in GPS accuracy may occur as a result of line-of-sight blockages if a transmission structure is situated between a GPS receiver and a satellite. Signal and GPS accuracy is usually restored with minor repositioning of the unit or satellites above.

14.3.1 Existing Environment

Twenty Federal Communications Commission (FCC)-registered communication towers are located in Codrington County; however, none of the towers are located within the Project Study Area or the Project Construction Easement (Homefacts 2017).

14.3.2 Potential Impacts

In June 2009, national television broadcasts were transitioned to digital signals. Digital reception is typically less resistant to multipath reflections, and more tolerant of "noise" in most cases, than analogue broadcasts. Although digital television broadcasts are more tolerant of radio frequency noise, if reflections or noise levels are great enough, they can impact digital television reception. There is a potential for corona and gap discharges associated with the high voltage transmission line to impact transmissions from omnidirectional communication towers, such as radio and television, if the height of the transmission line and the beam paths from those towers are aligned.

14.3.3 Mitigation

Project hardware will be designed and maintained to minimize corona and gap discharges. However, if interference to radio, cellular telephone, television, GIS or other communication tower facilities occurs, the Applicant will work with the communication towers' owners to mitigate the impacts. If interference from corona discharge occurs for radio or television stations

within the primary coverage area, the Applicant will work with residents to achieve satisfactory reception. Modification to the existing antenna system, or installation of an outside antenna if one is not present, typically restores satisfactory reception. In the rare instance that the Project causes interference within a primary coverage area, the Applicant will work with the affected parties to correct the problem at the Applicant's expense.

14.4 Aesthetics

Landscapes that include a balance of diversity and harmony have the highest potential for scenic value and may be considered important to persons living in or traveling through a region. Viewer perception is founded on two items: the sensitivity and magnitude of the viewer's concern for the view shed, and exposure (i.e., function of the type, distance, perspective, and duration of the view). Sensitive visual and aesthetic resources within the Project Study Area include historical structures.

14.4.1 Existing Environment

Dominant visual characteristic in the Project Study Area is agricultural land (both cultivated and grazed) followed by a mixture of rural residential, wetlands, and water features. Constructed infrastructure, including homes, county roads, barns, silos, and other structures exist throughout the Project Study Area but not within the Project Construction Easement, with the exception of roads. Area topography includes a well-developed drainage network and tilled agriculture along the Big Sioux Basin. However, along the Prairie Coteau Escarpment, steep slopes are present, and the topography within the Coteau des Prairies is variable. Visual topographic characteristics include seasonal and semi-permanent wetlands, hummocks, hills, perennial streams, and flat land areas. Topography and project elevation (which ranges from 1,955 to 2,023 fmsl) are discussed in detail in Section 10. Project topography is shown in **Exhibit 5**.

14.4.2 Potential Impacts

The degree to which the Project will be visible will vary by location. The Project would be frequently visible to landowners who live along or near the Project, or residents who travel the roads near the Project. However, constructed features (e.g., existing utility lines), topography, and natural landscape features such as tree cover, in relation to a viewer's physical location, may impede view of the Project. Generally, the Project also will be visible outside of local communities, such as Watertown.

14.4.3 Mitigation

The Applicant utilizes measure to minimize the impact the Project will have upon existing scenic integrity. Many areas near the Project Study Area and Project Construction Easement currently

are visually impacted by existing roadways. The Applicant will continue to work with landowners and public agencies to identify concerns related to the Project and aesthetics. Placement of infrastructure will be designed to minimize visual impacts to scenic locations and maximize the feasible distance from road and trail crossings. The Applicant will use care to preserve the natural landscape and prevent impacts to the natural surroundings where feasible.

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

The Project will be constructed on land regulated by the Codington County zoning ordinances Section 5.22 and land use control policies. Land use in the area is described in detail in Section 14. A comprehensive land use plan is available for Codington County. Construction of the Project will comply with applicable local ordinances as discussed in Section 24.0 and is consistent with the comprehensive land use plan for Codington County.

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

16.1 Existing Environment

Section 303(d) of the federal Clean Water Act requires that the states develop a list of waterbodies that do not meet their designated uses due to excess pollutants (impaired waters) and to determine total maximum daily loads of all pollutants from all sources that a waterbody can receive and still meet applicable water quality standards. The 303(d) list of impaired waters is issued every 2 years and is based on violations of water quality standards violations. Review of the SDDENR (2016) indicates that the Project Construction Easement does not cross any waterbodies that are listed as impaired by the U.S. Environmental Protection Agency (USEPA).

16.2 Potential Impacts

During the construction of the Project there is a potential for sediment from disturbed lands or other contaminants to reach surface waterbodies as a result of excavation, grading, equipment operation, construction traffic, or other unforeseen circumstances. If land surface erosion or other potential contaminant sources are not controlled during construction, the quality of any receiving surface waterbodies has the potential to be affected.

16.3 Mitigation

The Project Construction Easement will span all surface waterbodies to the extent feasible (i.e., prairie potholes, ponds, lakes, streams, rivers, etc.) to minimize the potential for direct impacts to these resources. If any direct and permanent impacts are expected as a result of final infrastructure placement, the Applicant will keep all crossings of potentially jurisdictional wetlands and waters under the 0.10 acre threshold of permanent impacts to remain eligible for using the NWPs.

However, due to the nature and extent of the construction activity, the Applicant will need a National Pollutant Discharge Elimination System (NPDES) general permit for storm water discharges associated with construction activities (SDR100000) from the SDDENR. Additionally, the Applicant will prepare and implement a SWPPP that describes storm water BMPs that will be used to minimize the potential for erosion and subsequent sedimentation as a result of Project construction.

Once Project construction has been completed, no significant impact to surface water quality is expected because wetland and waterbody impacts will have been avoided and minimized, and disturbed land will be restored to as close to pre-construction conditions as possible, as required by the SWPPP.

The Applicant will implement BMPs during construction of the Project to protect topsoil and adjacent waterbodies and minimize soil erosion. Structural and non-structural erosion and sediment control practices will be employed to minimize the potential for contaminants to be discharged to surface waterbodies. These BMPs may include, but are not limited to, the following:

- Containment of stockpiled material away from surface waterbodies and shorelines;
- Control of storm water run-on and runoff;
- Topsoil will be segregated and stockpiled separately in areas where topsoil is removed. Topsoil will be respread following construction completion. In temporary travel lanes, laydown areas, or other areas where the topsoil has become compacted, the topsoil will be decompacted prior to reseeding; and
- Disturbed areas will be reseeded and revegetated with native grasses.

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

17.0 Existing Environment

The State of South Dakota follows ambient air quality goals and standards as defined under federal government regulations (ARSD 74:36:02). The Project Study Area and Project Construction Easement are located in an area currently under National and South Dakota Ambient Air Quality Standards. The nearest Ambient Air Quality Monitoring Site is located in Watertown in Codington County, South Dakota, west of the Project.

The existing air quality of the Watertown region is good, based on the air quality index established by the USEPA under federal regulations. The Project Study Area has limited air pollutant emissions. The Brookings and Watertown area has only exceeded the 24-hour particulate matter 10 microns in diameter or less (PM 10) standard three times in the 27 years the measurement system has been in operation. These exceeding events were due to high wind

events causing fugitive dust levels to exceed the 24-hour standard (SDDENR 2014). Fugitive dust emissions are generated from wind erosion of disturbed areas and may affect both rural and urban environments. Air quality pollutant emissions include particulate matter such as fine dust from vehicle travel on unpaved roads; agricultural activities; other wind-blown dust and air pollutants; ozone or ground-level smog such as carbon monoxide; and sulfur dioxide and nitrogen oxides from vehicles, stationary sources burning coal and oil, electric utilities, and industrial boilers. Sulfur dioxide and nitrogen oxide are monitored in Sioux Falls, which is the closest monitoring station to the Project Study Area that monitors these elements (SDDENR 2017).

17.1 Potential Impacts

Temporary impacts to air quality are expected as a result of Project construction. Construction may result in increased short-term fugitive dust particulate matter and emissions due to increased vehicle traffic. Construction activities may include ROW clearing, hauling, and excavation. These impacts are temporary, and no long-term impacts are anticipated from construction activities. No impacts from Project operation are anticipated.

17.2 Mitigation

Codington County currently is listed as attainment for all criteria pollutants. Therefore, general conformity is not applicable. The Applicant will use standard BMPs to minimize air quality pollution emissions. Such BMPs may include dust control, monitoring, and reclamation during and after construction.

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

The Applicant proposes that the Project be in-service by December 31, 2019. The following table provides the anticipated, high-level permitting and construction milestones and schedule.

Table 18 Permitting and Construction Schedule

Schedule Item	Date
Submit PUC Facility Permit Application	April 2018
Material Procurement	August 2018
Final Transmission Line and Substation Connection Design	August 2018
Completion of Construction Easement Acquisition	August 2018
Anticipated Date of Commission Decision on Facility Permit	April 2019
Construction Start	April 2019
In-Service Operations	On or about December 31, 2019

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

This section describes the main community characteristics in and around the Project Study Area, including the Project's impacts on socioeconomics, community resources, agriculture, transportation, and cultural resources. Socioeconomic variables evaluated include population, minority populations, poverty, employment and income, and housing. These variables were obtained or derived from 2010 and 2016 U.S. Census Bureau data and projections.

19.0 Socioeconomic and Community Resources

The socioeconomics analysis area is Codington County. Data for the City of Watertown and the State of South Dakota occasionally are used for comparison.

19.0.1 Existing Environment

Table 19.1.1 shows select demographic factors for Watertown, Codington County, and South Dakota. Watertown's percentage of minorities is lower than Codington County and the state as a whole. The percent of population living below poverty level is highest for the state, followed by Watertown, and then Codington County.

The median annual household income totaled \$46,766 in Watertown, \$48,912 in Codington County, and \$50,957 in the state of South Dakota. The median annual household income accounts for multiple household earners, whereas the per capita income measures the average income earned by each person in a given area. Therefore, multiple income earners in the same family or household are counted separately. Using 2015 inflation-adjusted dollars, the per capita income in Watertown was \$26,389 and Codington County was \$26,787. The per capital income for the state was \$26,747. The percentage of persons living below the poverty level ranked highest at the state level at 13.7%, followed by Watertown at 11.1%, and Codington County at 10.3%.

Table 19.1.1 Socioeconomic factors in select regions

Location	Population	Minority Populations (Percent)	Population Below Poverty Level (Percent)	Per Capita Income
Watertown	21,482	5.2	11.1	\$26,389
Codington County	27,227	5.7	10.8	\$26,767
State of South Dakota	814,180	14.1	13.5	\$26,747

Source: U.S. Census Bureau, 2010

Table 19.1.1a Employment by occupation in select regions, shown as percent of employed persons

Industry/Labor Market	Watertown	Codington County
Sales and Administration	27.3	25.9
Production and Transportation	17.9	17.4
Science and Arts, including Health Facilities	9.7	9.9
Management	6.9	8.7
Farming	1.4	2.2
Construction and Extraction	5.6	5.6
Installation, Maintenance, and Repair	3.7	3.5
Business	3.1	3.0

As shown in Table 19.1.1a, the largest employment and labor markets by occupation in Watertown and Codington County are similar and consist of sales and administration (27.3 % and 25.9%, respectively), production and transportation (17.9% and 17.4%, respectively), science and arts (including health facilities) (9.7% and 9.9%, respectively), management (6.9% and 8.7%, respectively), and construction and extraction (5.6% for each region). The three largest employment industries in Watertown and Codington County are similar and include manufacturing (21.6% and 20.2%, respectively), educational and healthcare services (16.9% and 16.4%, respectively), and retail trade (13.1% and 12.2%, respectively). Smaller industries and labor markets with fewer employees in Watertown and Codington County include infrastructure, fire protection, law enforcement, recreational facilities, schools, and other community or government services.

Current housing and land values in the region are similar across areas. In 2016, the U.S. Census Bureau reported 10,050 housing units in Watertown, 12,937 housing units in Codington County, and 3,572 in Grant County. The Codington County 2016 data reflect a 4.36% increase in housing units when compared with 2010 Census data. Watertown shows a 4.06% increase since 2010. In 2010, the median value of owner-occupied housing units in Watertown and Codington County were similar at \$144,900 and \$145,500, respectively. The Codington County 2016 figures reflect a 4.36% increase in value since the 2010 Census, and Watertown shows a 4.37% increase.

The Census Bureau provides periodic socioeconomic estimates for selected geographies to help provide information on the changing demographics of the population between decennial censuses. Through the American Community Survey, the Census provided 3-year socioeconomic estimates for Codington County and the State of South Dakota, as summarized in Table 19.1.1b.

Table 19.1.1b Socioeconomic projections from 2010 to 2016

Location	Population	Race Percentage (White)	Percentage of Population Below Poverty Level	Per Capita Income
Watertown	22,172	94.8	11.1	\$26,389
Codington	28,063	94.4	10.8	\$26,767
South Dakota	865,454	85.2	13.7	\$26,747

Source: U.S. Census Bureau 2010

19.0.2 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 county's 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 Codington County. 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 to Watertown or to Codington County. Additional benefits will result from the Project's capability to transmit energy generated from renewable resources that could spur energy development in the area, thereby resulting in additional economic gains. Further information on benefits of the Project is presented in Section 4.0.

Construction and operation of the Project is not anticipated to affect the local distribution of jobs or occupations in the community. The Project is not anticipated to have significant short- or long-term effects on commercial and industrial sectors, housing, land values, labor markets, health facilities, sewer or water treatment facilities, solid waste management facilities, fire or police facilities, schools, recreational facilities, and other government facilities or services. The Applicant does not expect a permanent impact on the population, income, occupation distribution, or integration or cohesion of communities.

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

The Project will have a positive impact on the local area as a result of lodging and food sales and other indirect economic benefits associated with transient workers. The Applicant expects the

Project will employ workers associated with construction and support service areas. Employee estimates are described in Section 20.

The Project is not expected to have an impact on assessed values of private property and, therefore, on property taxes (Hoen et al. 2013).

The transportation, treatment, and disposal of hazardous waste will be required in accordance with state and federal regulations. Additionally, there is the possibility that the improper use, storage, and/or disposal of hazardous materials such as fuels, oils, and maintenance fluids could result in a release that could cause contamination and exposure during construction, operation, and maintenance activities associated with the Project. Direct effects of a release would include contaminating soil and water resources; indirect effects could include exposing humans, wildlife, and vegetation to the contamination. The Applicant will implement a Spill Prevention, Control, and Countermeasure plan to minimize this 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 and BMPs, such as adequately sized containment structures, regular facility inspections, and properly trained personnel.

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.

19.1 Agriculture

19.1.1 Existing Environment

Codington County has a total land area of 717 square miles, with approximately 577 square miles of land (80% of the county land area) being in farms (rounded to the nearest whole number) (United States Census Bureau 2013, Census of Agriculture for 2012). In 2012, there were a total of 713 farms, and the average-sized farm was 518 acres. Crop sales were primarily grains, oil seeds, dry beans, and dry peas, and cattle, hogs, and sheep comprised the majority of livestock sales (Census of Agriculture 2012). From 2007 to 2012, the number of full-time farms increased by 7.5% from 2007 to 2012, land acres used for farming increased by 0.94%, and the average farm decreased in size by 0.65 percent. Sales of farm goods increased 60 percent from 2007 to 2012, and totaled \$172,411,000 in 2012.

19.1.2 Impacts and Mitigation

The Project is expected to have minimal effects on agriculture in the region. Field observations, review of aerial photography, and land cover data (NRCS 2018) indicate that the majority of

active farming operations involve cattle grazing, with cultivated crops comprising 35.72 acres (23.25%) of the land within the Construction Easement.

The Project will result in temporary and permanent impacts to farmland along the Project route. No impacts to livestock operations are anticipated. During Project construction, cattle will be restricted from grazing in the vicinity of the Project Construction Easement. After construction is completed, grazing in the Project Construction Easement will be permitted. Permanent impacts to agricultural lands primarily will result from structure installation along the Project Construction Easement. Construction of the Project is anticipated to result in a permanent loss of approximately 16.15 acres of agricultural land from pole and guy anchor installations and the southern substation (please see Table 10.2.2), and exclusive of the northern substation, which is included in a previous application. The permanent impacts associated with each structure were calculated assuming a 4-ft. radius (approximately 50 square ft.) around each pole and guy wires as they intersect the ground surface. At the time of this Application, exact locations of structures and associated features (e.g., access roads) are not known. Construction of the Project will result in an estimated 183.76 acres of temporary impacts to farmland due to structure installations, laydown areas, structure assembly areas, wire stringing areas, and travel paths (please see Table 10.2.2). This impact is estimated based on the National Land Cover Database land cover breakdown of the Project Construction Easement, the temporary use of a 32-ft. wide travel path within the Project Construction Easement, installation of pole structures, and stringing of conductors.

Areas disturbed during construction will be repaired and restored to preconstruction contours to the extent practicable so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural re-vegetation, provide for proper drainage, and prevent erosion. Construction laydown areas and temporary transmission line travel paths will be restored per landowner agreements.

Drain tile lines may be present along the Project route. 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. If drain tile lines are inadvertently damaged by construction of the Project, the Applicant will repair tile lines. Landowners will be compensated for any crop damage that occurs during construction.

19.2 Transportation

Transportation within the Project Study Area includes state highways, Codington County highways, township roads, unauthorized roads, and roads on private lands.

19.2.1 Existing Environment

Most of the Project is collocated with existing county roads or within 0.25 mile of existing transportation routes, including township and county roads. The network that will comprise the transportation system used during Project construction and operations and maintenance (O&M) includes rural and section line roads. The Project will not cross any active railroads. Major roads within the Project Study Area are depicted in **Exhibits 1 and 2**. The closest airports to the Project in South Dakota are the Watertown Regional Airport, west of Interstate 29 and approximately 12.2 miles southwest of Project Study Area, and the Milbank Municipal Airport, 21.2 miles northeast of the Project Study Area. No private air strips occur near the Project Study Area.

19.2.2 Impacts and Mitigation

The Project is not anticipated to result in permanent impacts to transportation resources in the Project Study Area. No impacts to registered commercial facilities are anticipated. Indirect effects may include increased traffic volume along local, state, and federal roadways. Impacts are anticipated to be minor, as a relatively low number of workers and equipment will be accessing any one location within the Project Study Area at any time. Direct effects to transportation also will be minimal during O&M activities. The Applicant will work with state and local highway departments regarding applicable permitting requirements. There will no anticipated impacts to registered commercial aviation facilities.

19.3 Cultural Resources

Results of a record search and review of previously recorded cultural resources, and results of the current Level III survey conducted for the Project are presented in this section.

In accordance with the *Guidelines for Cultural Resource Surveys and Survey Reports in South Dakota (For Review and Compliance)* (South Dakota State Historical Society 2005), the Project Study Area was extended by 1 mile in all directions for purposes of the cultural resources desktop review only. This area constitutes the Records Review Area. A records search was conducted for the Records Review Area on July 10, 2017 through the Archaeological Research Center at the South Dakota State Historical Society. Pursuant to South Dakota Codified Law 1-20-21, information contained within the records search data is considered confidential and not for public distribution. Additional background research included review of the historical General Land Office (GLO) plat maps available online from the Bureau of Land Management. Information presented below is a summary of the data obtained from the Archaeological Research Center and from the GLO database; site specific locational information has been omitted.

The results of the records search indicate that three previous cultural resource inventories have been conducted within one mile of the Project Construction Easement for diverse other projects.

None of these inventories overlap the Project Construction Easement. Two of the previous inventories were completed in the past 10 years.

19.3.1 Existing Environment

The records search indicates that 14 previously recorded archaeological sites, three previously recorded standing historic structures, and no previously recorded historic bridges and cemeteries have been documented. All three previously recorded standing historic structures remain unevaluated for the National Register of Historic Places (NRHP). Previously identified sites intersected by the Project Construction Easement are discussed below by resource type.

19.3.1.1 Previously Documented Archaeological Sites

The Project Construction Easement intersects two of the 14 previously recorded archaeological sites. These sites include one Native American earthwork/artifact scatter/mound (39CD0009) and one Euro-American alignment (39CD0096) (**Appendix E, Table 1**). The remaining sites identified within the Records Review Area include four Native American cairns or alignments (39CD0093, 39CD0101, 39CD0109, and 39CD0110), one historic school foundation (39CD0083), one Euro-American cairn (39CD0116), one Euro-American cairn/foundation and depression (39CD0095), one Euro-American artifact scatter and farmstead (39CD0056), one Euro-American foundation/dump/alignment and depression (39CD0097), and one alignment of unknown temporal affiliation (39CD0094). Two historic linear sites also occur in the Records Review Area including one road alignment (39CD0119) and one (inactive) railroad alignment (39CD2015). Although no previously recorded site areas of these historic linear sites are intersected by the Project Construction Easement, the Project Construction Easement does cross the historic railroad alignment approximately 0.9 mile to the west-southwest of a previously recorded segment.

The railroad site has been determined eligible for the NRHP, and 39CD0056 has been recommended not eligible for listing on the NRHP. The remaining 12 sites in the Records Review Area have not been evaluated for their eligibility for listing on the NRHP.

19.3.1.2 Previously Identified Standing Structures

Within the Records Review Area, three previously recorded standing structures have been identified (**Appendix E, Table 2**). Standing structures include residences, agricultural buildings, farmsteads, churches, schools, and commercial buildings. No previously recorded standing structures are located within the Project Construction Easement.

All three of the previously recorded standing structures (CD00000191, CD00000193 and CD00000194) have not been evaluated for the NRHP. None of these structures are directly adjacent to the Project Construction Easement.

19.3.1.3 Previously Identified Historic Bridges

No previously recorded historic bridges have been identified within the Records Review Area.

19.3.1.4 Previously Identified Cemeteries

No previously recorded cemeteries have been identified within the Records Review Area.

19.3.1.5 General Land Office Review

The GLO survey plat maps were reviewed for historic features within the Records Review Area. One GLO survey plat map, dating from 1873, is available for the townships and ranges crossed by the Records Review Area. Review of the GLO survey plat maps revealed that, from 1873, none of the townships or ranges (Township [T] 117 North (N) Range [R] 51 West (W) and T118N R51W) within the Records Review Area had surveyed evidence of European American settlement. The Project Construction Easement bisects a natural unnamed drainage indicated in the northern half of Sec 35 T118N R51W on the 1873 survey plat map. Codington County was established in 1877 after the survey plats had been completed (South Dakota Genealogy Trails 2006ab).

19.3.2 Current Level III Survey for Cultural Resources and Architectural History Survey

Level III Surveys have been conducted in multiple mobilizations and are currently on-going for archaeological, historical, and tribal resources within 75 ft. either side of the Project Construction Easement, within a 300-ft. radius of turning structures along the Project route, including a substation at the southern end of the alignment. An architectural history survey is also being completed of standing buildings and structures within 1 mile either side of the Project centerline, and including the substation. The Level III Survey is being performed by tribal members from the Sisseton Wahpeton Oyate, Yankton Sioux, and Spirit Lake Nation selected to represent those tribes in identifying significant tribal resources and is being led by archaeologists meeting the U.S. Secretary of the Interior's Professional Qualification Standards in that field. The architectural history survey is being led by architectural historians meeting the U.S. Secretary of the Interior's Professional Qualification Standards in that field.

To date, the Level III Survey has identified 29 tribal sites and isolated artifacts during Project Construction Easement surveys. The historic architectural survey as field-checked to date shows approximately 34 standing building and structure locations, where historic setting and feeling may be important, for consideration of potential visibility of the Project within 1 mile of the

Project centerline; these include, but are not limited to, previously recorded historic buildings and structures, including bridges and cemeteries, noted in earlier sections.

All tribal sites, which are represented by rock cairns, alignments, and other traditionally recognized features on the landscape, are considered important to the tribes and will be considered as eligible for listing on the NRHP. Standing buildings and structures that are eligible for NRHP listing and where historic setting and feeling are important for conveying their historic significance, and that are not screened from the Project (such as by wind rows or other trees or rolling landscape), are also considered to be part of the existing environment, which is potentially exposed to Project impacts, beyond the immediate Project Construction Easement.

19.3.3 Avoidance of Potential Impacts

Planned construction activities for the Project may occur within the vicinity of sites important to tribal cultural traditions, archaeological sites, or historic standing structures. Sites evaluated as not eligible for NRHP listing are not significant and impacts to these sites would therefore not be considered. Those sites that are evaluated as eligible or of undetermined NRHP eligibility will be protected from direct impacts by establishing avoidance buffers around these resources. In addition to avoiding potential direct physical impacts to sites from construction activities, indirect secondary effects from the introduction of new visual elements into the historic setting of NRHP-eligible buildings and structures could impact the historic integrity of these sites.

19.3.4 Mitigation

Mitigation for NRHP-eligible tribal and archaeological resources will be to avoid physical disturbance and destruction of those resources, where feasible. Avoidance of impacts will be accomplished by the following: (1) all ground-disturbing construction activities will be conducted away from these resources; (2) not placing project structures within areas containing these resources, and (3) using only overhead spans of those resources that remain in the Project Construction Easement. In the event that the avoidance of all impacts is not feasible, the Applicant, in coordination with the consulting tribes and the South Dakota State Historic Preservation Office, will develop a mitigation plan to address any potential impacts.

Mitigation of NRHP-eligible buildings and structures beyond the Project Construction Easement will be conducted for those buildings and structures where integral historic setting could be impacted by the introduction of new visual elements. This mitigation will be accomplished through the recording of these historic structures and buildings so that their importance can be documented in the public record through filing with the Archaeological Research Center at the South Dakota State Historical Society.

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

The Project is expected to employ approximately 50-60 temporary workers to support Project construction. It is likely that general skilled labor is available in Codington County or the state to serve the basic infrastructure and site development needs of the Project. Specialized labor will be required for certain components of Project construction. It is likely that this labor will be imported from other areas of the state or from other states, as the relatively short duration of construction does not warrant special training of local or regional labor. Balancing the use of local contractors and imported specialized contractors will likely alleviate any labor relations issues.

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

There are no plans for future additions or modifications to the Project due to it being solely constructed to deliver energy from the CRW II to the transmission grid.

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

22.0 Route Clearing

Route clearing activities will be conducted to ensure that the Project's ROW is compliant with North American Electric Reliability Corporation (NERC) Reliability Standard FAC-003. For example, clear cutting (the removal of all trees, brush and other low-growing vegetation) will occur within the ROW, and along construction and maintenance travel paths, access roads and at structure erection sites. Also, consistent with FAC-003, trees that could present a danger to the safe operation of the Project (so termed "danger timber") will also be removed or pruned. Danger timber refers to those trees outside of the ROW which are sufficiently unhealthy or damaged or are significantly tall such that they could fall and make contact with the transmission line. Disposal of timber, tree tops, limbs, and slash will occur in compliance with applicable state and local ordinances. Wood from the clearing operation will be offered to the landowner or removed from the Project Construction Easement. The Applicant will coordinate with property owners and residents so that they are aware of the construction and clearing schedule, and will conduct the route clearing activities consistent with the easements granted by the property owner.

22.1 Transmission Construction Procedures

22.1.1 Equipment Delivery and Transportation

Most of the material required for construction of the transmission line (e.g., poles, conductor wire, insulators, steel arms) will be delivered to a temporary laydown area along the middle of the route (location not yet determined) to facilitate and minimize transportation efforts. These and other needed materials and equipment, including concrete, will be transported to pole locations within the Project Construction Easements along the route as construction progresses. Poles will be delivered by truck to structure locations within the Project Construction Easement.

22.1.2 Excavation, Foundations, and Structure Erection

Steel arms, insulators and other hardware will be attached to each structure while on the ground. Foundations for steel pole structures would require excavating or auguring a hole approximately 20 to 30 ft. deep and approximately 6 to 9 ft. in diameter. Exact excavation dimensions will depend upon soil conditions, and whether the structures will support an angle.

Steel pole structures will then be lifted, placed in the excavated hole, or placed and secured on the concrete foundation by a crane or similar heavy-lift equipment. The holes will be back-filled with select aggregate or concrete. Concrete trucks will deliver the concrete from a local batch plant. Excess soil will be removed from the site unless otherwise requested by the landowner. Most steel pole structures are anticipated to be directly buried and will not require a foundation.

22.1.3 Transmission Line Conductor Stringing

Conductors will be installed by establishing stringing setup areas within the Project Construction Easement, typically every two miles, where the spools of conductor cable will be stored. Temporary guard or clearance structures will be installed as needed over existing distribution or communication lines, streets, roads, highways, railways, or other obstructions after any necessary notifications are made and permits obtained. The use of the guard structures ensures that conductors will not obstruct traffic or contact existing energized conductors or other cables. Once the steel pole structures have been erected, either a helicopter will fly along or ground crews will drive along the Project Construction Easement, securing the conductor pulling line through stringing blocks suspended from the insulators on the poles. The pulling line will be used to pull the conductor through each block, and subsequently pulled to the required tension. Finally, the conductor will be clipped in using bucket trucks or helicopters once final sag is established. The shield wire will be installed in a similar manner.

22.1.4 Access Roads

Where the transmission line parallels existing county or township roads, structure access will be obtained from existing roads. On cross-country segments, access will be along or within the Construction Easement. Access to these cross-country portions of the transmission line will require limited, if any, matting (such as over pipelines or wet areas), but will not require construction of temporary access roads along the length of the ROW.

22.2 Restoration Procedures

Crews will attempt to limit ground disturbance during construction to the greatest extent possible, including avoiding driving over wet soils when feasible. Temporary disturbance areas will be restored to their original condition to the extent practical, and as negotiated with each landowner. Reclamation activities will include removing and disposing of debris, dismantling all temporary facilities, leveling or filling tire ruts, and controlling erosion. Reseeding areas disturbed during construction will be done with a seed mix free of noxious weeds, similar to that which was removed.

22.3 Maintenance Procedures

Access to the easement of the completed transmission line is required periodically to perform inspections, conduct maintenance and repair damage. Regular maintenance and inspections will be performed during the life of the facility to ensure its continued integrity. Generally, the Applicant will inspect the transmission line by ground at least once per year with a ground inspection one every five years. Inspections will be limited to the easement and areas where obstructions or terrain may require off-easement access. If problems are found during inspections, repairs will be performed and the landowner will be compensated for any potential damage as a result.

The easement area will be managed to remove vegetation that interferes with the operation and maintenance of the transmission line. Native shrubs that will not interfere with the safe operation of the transmission line facility will be allowed to reestablish in the easement area. The Applicant's practice provides for the inspection of major transmission lines (230 kV and above) annually to determine if clearing is required. Clearing practices include a combination of mechanical and hand clearing, along with herbicide application where allowed to remove or control vegetation growth.

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

A high voltage transmission line consists of three phases; each phase is located at the end of a separate insulator string, all physically supported by structures. Each phase consists of a single conductor. Conductors are metal cables consisting of multiple strands of steel and aluminum wire wound together. The conductors for the Project will be approximately one to two inches in diameter.

Shield wire cables are strung above the electrical phases to prevent damage from lighting strikes. These shield wire cables are typically less than one inch in diameter. The shield wire can also include a fiber optic cable that allows a path for substation protection equipment to communicate between terminals on the transmission line.

The transmission line ROW (i.e., Construction Easement) width is primarily dependent on structure design, span length, and electrical safety requirements associated with the transmission line's voltage. The ROW will be typically be 150 ft. wide for the single circuit design with additional ROW at angles to encompass additional pole spacing, guy wires, and associated hardware as required.

The single circuit design will have three phases, each consisting of a single conductor. The conductors will be placed on the tangent structures in a delta configuration having one phase on one side and two phases on the other. On dead-ends and turning structures the three phases will be on the same side. The single circuit design can utilize a single tubular steel turning structure with guy wires that are approximately 100 ft. tall.

23.0 Configuration of Towers

The Applicant proposes to use tubular steel structures with a height of approximately 100 ft. and spans of 600 to 1,000 ft. between poles for the Project. Running angle or dead-end structures will be guyed to support the structure, with guys located completely within the Project ROW. The steel structure would be typically less than 5 ft. in diameter at ground level. The design of the single circuit transmission towers is set forth in **Appendix F**.

Table 23.1 Structure Summary					
Structure Type	Typical Application	Structure Material	Typical Structure Height Above Ground (feet)	Typical Foundation Diameter Per Pole (feet)	Typical Span Length (feet)
Direct-Embedded Monopole	Tangent, Light Angle	Galvanized Tubular Steel	100	6-8	600 - 1000
Guyed, Direct-Embedded Monopole	Angles and Deadends	Galvanized Tubular Steel	100	6-8	600 - 1000
Self-Supporting Monopole	Angles and Deadends	Galvanized Tubular Steel	100	6-10	600 - 1000

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

23.1 Conductor Configuration

The single circuit design will have three phases, each consisting of a single 1272 kcmil 45/7 Bittern conductor.

23.2 Proposed Transmission Site and Major Alternatives

The site of the Project is described in Section 2.1 and shown on Figures 1 and 2. Section 8.0 outlines the route identification and selection process.

23.3 Reliability and Safety

23.3.1 Transmission Line Reliability

The Project will be designed in compliance with the American Society of Civil Engineers Manual of Practice No. 74, Guidelines for Electrical Transmission Line Structural Loading, and the NESC. Transmission lines are automatically taken out of service by the operation of protective relaying equipment when a fault is detected on the system. Scheduled maintenance outages are infrequent on high voltage transmission lines.

23.3.2 Safety

The Project will be designed to meet the local, state, and NESC standards regarding clearances to ground, crossing utilities, and buildings. Construction crews will comply with all applicable standards and design drawings regarding the installation of facilities and standard construction practices. The Applicant's and industry safety procedures will be followed during and after installation of the transmission line. The Project will be monitored by trained transmission operators at an operations center, and associated substations equipped with relays and breakers that insure the line is operating safely.

23.3.3 Electric and Magnetic Fields

Voltage on a conductor produces an electric field. The intensity of the electric field is proportional to the voltage of the transmission line. The flow of electrical current on a wire produces a magnetic field. The intensity of the magnetic field is proportional to the current flow through the conductors. Electric and magnetic fields (EMF) extend outward from the conductor and decrease rapidly with distance from the conductor. There is no federal or South Dakota state standard for transmission line EMF.

Because the use of electric power is so widespread, people frequently are exposed to EMF from secondary power lines, home wiring and lighting, and electric appliances and tools. EMF is highest closest to these types of electrical equipment or devices and falls rapidly with distance. Existing sources of EMF in proximity to the proposed Project include the existing electric transmission and distribution lines in the area.

Electromagnetic Fields Analysis

Electromagnetic field and audible noise levels were evaluated for the proposed tangent structure configurations shown on **Exhibits F**, assuming typical pole heights and lowest phase-to-ground distances equal to the design clearance (26').

Calculations were performed using the *Bonneville Power Administration Corona and Field Effects Program (Corona II)*.

Magnetic Field Calculations

For the Project, magnetic fields were calculated for the single-circuit option under "full-power" (300 MW, 0.95 p.f., 793 A) and "half-power" (150 MW, 0.95 p.f., 396 A) conditions.

The calculated values for anticipated magnetic fields at the edges of the proposed easement and the maximum value within the easement are provided in the table below. Magnetic field profiles

for both “full-power” and “half-power” conditions are also included below (see Table 23.4.3 and Figures 23.4.3.1 and 23.4.3.2).

Table 23.4.3 Calculated Magnetic Field Levels, in milliGauss (mG)

	Edge	Maximum
Full-Power Case, 300 MW	21.9	142.7
Half-Power Case, 150 MW	11.0	71.3

Figure 23.4.3.1

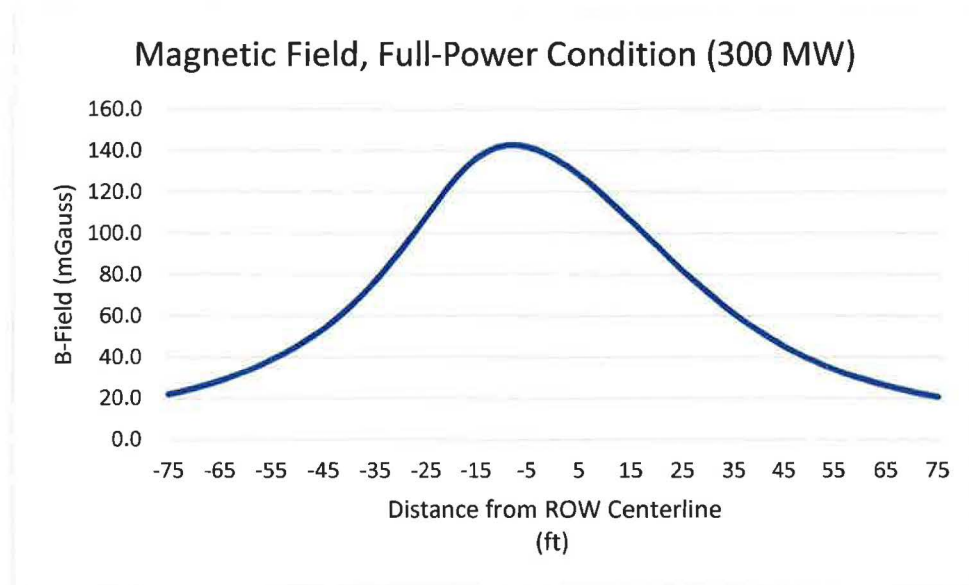
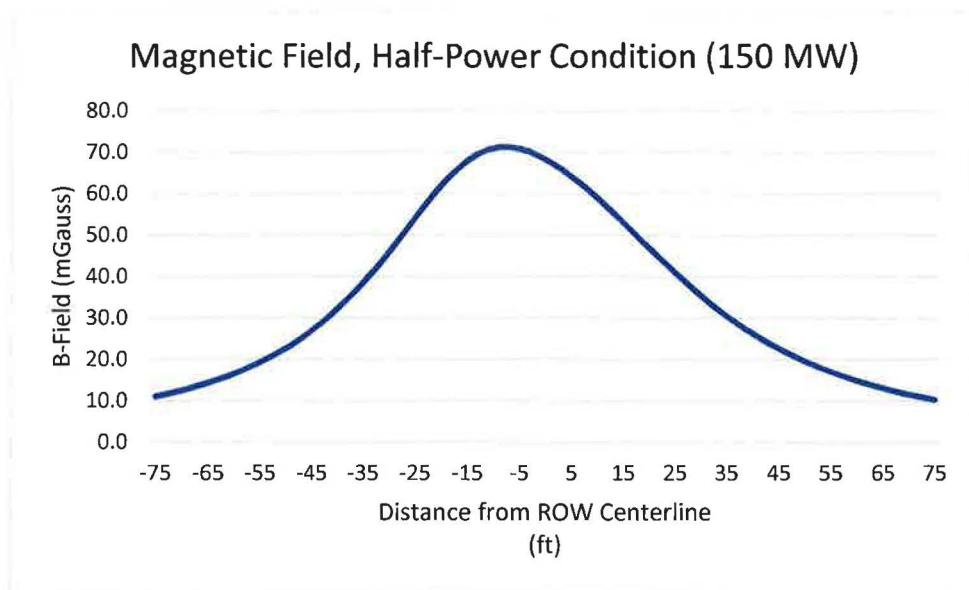


Figure 23.4.3.2



Electric Fields and Audible Noise Calculations

Electric field intensity and audible noise levels are independent of power flow, being only a function of the transmission line voltage. The following table (Table 23.4.3a) provides calculated values for electric fields and audible noise levels that may be anticipated for the single circuit option. Again, values provided are calculated at the edges of the proposed easement and the maximum value within the easement. Electric field and audible noise profiles are also included below in Figures 23.4.3.3 and 23.4.3.4.

Table 23.4.3a Calculated Electric Field and Audible Noise Levels

	Edge	Maximum
Electric Field (kV/m)	0.662	4.723
Audible Noise, Fair Weather (L_{50} , dBA)	7.2	11.9
Audible Noise, in Rain (L_{50} , dBA)	32.2	36.9

Figure 23.4.3.3

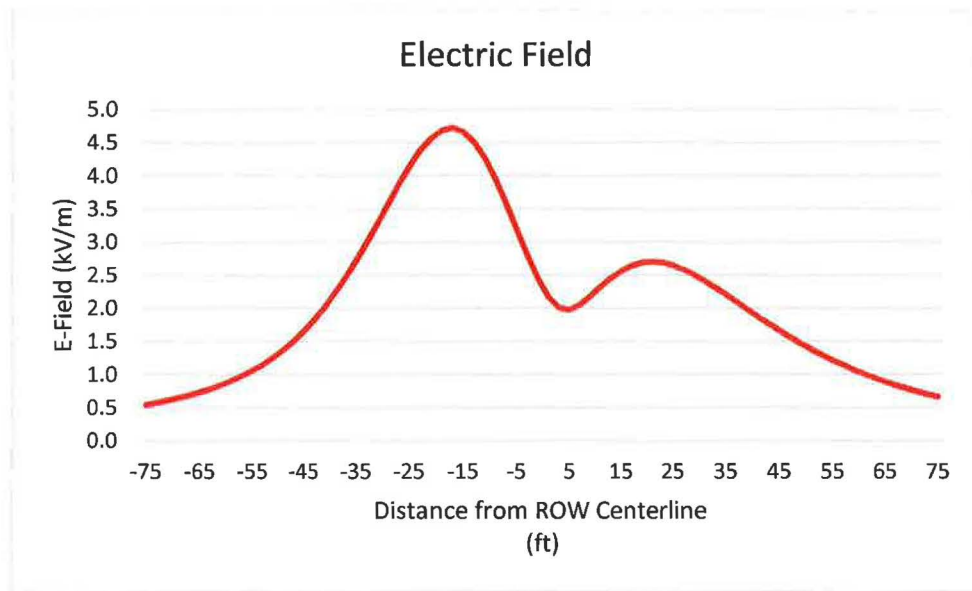
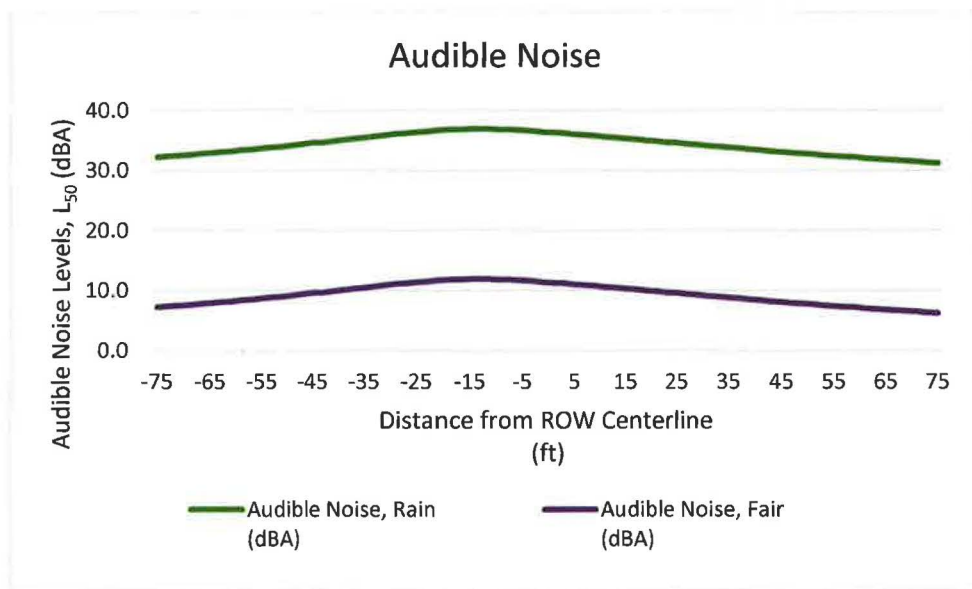


Figure 23.4.3.4



23.3.4 Stray Voltage

The Institute of Electrical and Electronics Engineers (IEEE) defines “stray voltage” as “voltage resulting from the normal delivery and/or use of electricity (usually smaller than 10 volts) that may be present between two conductive surfaces that can be simultaneously contacted by members of the general public and/or their animals. Stray voltage is caused by primary and/or secondary return current, and power system induced currents, as these currents flow through the impedance of the intended return pathway, its parallel conductive pathways, and conductive loops in close proximity to the power system. Stray voltage is not related to power system faults, and is generally not considered hazardous (IEEE 2010). Electric transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. However, transmission lines can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line. Measures will be taken to address potential stray voltage issues on a case-by-case basis and mitigation if required will be installed by the Applicant.

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

All normal and current farming operations in the Study Area are compatible with the construction and operation of the proposed Project. The Applicant will coordinate with individual landowners if limitations or restrictions to use of the land within the Project Construction Easement are required for the safe operation of the Project.

23.3.6 ROW

The width of the Project Construction Easement will be 150 ft. with additional easement at angles to encompass additional pole spacing, guy wires, and associated hardware as required. The Project will require the acquisition of easements to cross private property and coordination with appropriate agencies where the transmission line shares ROW with other public utilities or public roads. The Applicant expects to obtain all easements by the first quarter of 2018. The Applicant’s land rights agents will continue to work with the landowners to obtain permission for route surveys, environmental surveys, and soil investigations to occur prior to construction.

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

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.

23.3.7 Necessary Clearing Activities

The Project will not require extensive tree clearing. A minimal number of trees will need to be removed pursuant to easement requirements. Wood that will be cleared from the ROW will be offered to the landowner or removed from the site, dependent upon the preference of the landowner. General easement clearing and maintenance is described in Section 22.1.

23.3.8 Underground Transmission

No portion of the Project is expected to require underground transmission. It is rare for electrical transmission lines to be constructed underground because the cost to construct underground can be significantly greater and is more difficult to mitigate environmental issues. Due to the significantly greater expense associated with underground transmission construction and as the majority of the route is adjacent to existing road ROW or section lines, underground construction is not warranted on any portion of the route.

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

Table 24 identifies federal, state, and local permits, approvals, and other coordination that may be needed for the Project.

Table 24. Potential Required Permits and Approvals

Agency	Type of Permit, Approval, or Coordination	Status*	Need or Description
Federal			
U.S. Army Corps of Engineers	Section 404 of the Clean Water Act	2	Nationwide Permit 12 is required for dredging or fill in jurisdictional waters of the U.S. for utility line
State of South Dakota			
Public Utilities Commission	Facility Permit	1	Required for transmission lines greater than 115 kV.
Department of Environment & Natural Resources	Section 401 Water Quality Certification	2	Required for fill in jurisdictional waters of the U.S.
	NPDES Permit: General Permit for Storm Water Discharges Associated with Construction Activities	2	Required for disturbance of over one acre of land. Must prepare a Storm Water Pollution Prevention Plan.
	Temporary water use permit for construction activities	2	Required for compliance with the Water Pollution Control Act. Temporary permits

Agency	Type of Permit, Approval, or Coordination	Status*	Need or Description
			for the use of public water for construction, testing, or drilling purposes. Construction contractors will obtain as necessary.
	General Permit for Temporary Dewatering	2	Compliance with the Water Pollution Control Act. Temporary permit for the discharge of water for construction dewatering. Construction contractors will obtain as necessary.
	Air Quality Permit	2	Required for a process or fuel burning unit that emits a pollutant into the ambient air.
South Dakota State Historical Society	SDCL 1-19A-11.1	2	Compliance required for state permits.
Department of Transportation	Highway Access Permit; Road Crossing Agreements	2	Permit required for construction of access roads from state highways.
	Utility Permit	2	Required for utility crossings on state highway ROW, as necessary.
	Oversize/overweight Permit	2	Required for heavy hauling construction equipment and materials on state highways. Construction contractor will obtain, as necessary.
Local			
Codington County	Building Permits or Conditional Use Permits; Road Crossing Agreements; Oversize/overweight Permit; Open Burning Permits.	2	Conditional Use Permits required for the Project and the 2 substations. Building Permits, Road Crossing Agreements, and Oversize/overweight Permits may be required, as determined on a case-by-case basis.
Townships	Road Crossing Agreements; Oversize/overweight Permit	2	The Project will require crossing agreements.
*1: Applied – decision pending 2: Final design will determine whether the permit/approval is required, or final layout is needed for permit application. C: Complete.			

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

The Application, including attachments and supporting testimony meet the Applicant's burden of proof specified in SDCL 49-41B-22. The Applicant has also provided in **Appendix C** correspondence associated with its coordination efforts with state, federal, tribes and local governments.

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

The Applicant is submitting testimony and exhibits in support of the Application. The Exhibits are identified in the Application, and the following will provide testimony in support of the Application:

Name and Title	Entity	Subject Matter
Jason Utton, Executive Director of Development	NextEra Energy Resources, LLC	Need for the Transmission Line, Outreach Activities and Other Permits
Mark Thompson, Manager of Engineering, Transmission	NextEra Energy Resources, LLC	Transmission Route and Siting

27.0 Applicant's Verification

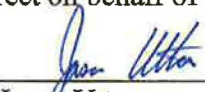
VERIFIED APPLICANT'S SIGNATURE

State of Florida)
County of Palm Beach) :SS

Jason Utton, being duly sworn, deposes and says that he is the authorized agent of Crown Ridge Wind, LLC.

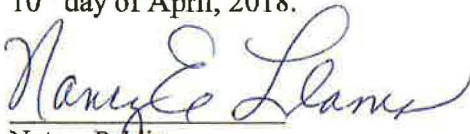
He states that he does not have personal knowledge of all the facts recited in the forgoing application, but the information in the application has been gathered by and from employees, contractors of the owners of Crown Ridge Wind, II LLC; and that the information in the application is verified by him as true and correct on behalf of Crown Ridge Wind, II LLC.

Dated this 10 day of April, 2018.



Jason Utton
Vice President
NextEra Energy Resources, LLC

Subscribed and sworn to before me this
10th day of April, 2018.



Notary Public
My Commission Expires:



28.0 References

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