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

Wind Quarry Operations, LLC

Willow Creek Wind Energy Facility
Burns & McDonnell Project No. 84046

May 2015

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prepared by

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
ADT	Average Daily Traffic
AMSL	Above mean sea level
ANSI	American National Standards Institute
APE	Area of Potential Effect
ARSD	Administrative Rules of South Dakota
BCR	Bird Conservation Region
BLM	Bureau of Land Management
BMP	Best Management Practices
CadnaA	Computer Aided Design for Noise Abatement
CO_2	Carbon dioxide
COD	Commercial operation date
CWA	Clean Water Act
dB	Decibel
dBA	A-weighted decibels
DOE	U.S. Department of Energy
EA	Environmental Assessment
EIA	U.S. Energy Information Administration
FAA	Federal Aviation Administration
GLO	General Land Office
GW	Gigawatt
Hz	Hertz

Abbreviation	Term/Phrase/Name
IPaC	Information for Planning and Conservation
JEDI	Jobs and Economic Development Impact
km	Kilometer
kV	Kilovolt
LGIA	Large Generator Interconnection Agreement
L_p	Sound pressure
L_w	Sound power level
mph	Miles per hour
MW	Megawatt
MWh	Megawatt-hour
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Lab
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NWR	National Wildlife Refuge
O&M	Operations and maintenance
PEIS	Programmatic Environmental Impact Statement
PGA	Peak ground acceleration
PPA	Power purchase agreement

Abbreviation	Term/Phrase/Name
REPP	Renewable Energy Policy Project
rpm	Revolutions per minute
RPS	Renewable portfolio standard
SCADA	Supervisory control and data acquisition
SDCL	South Dakota Codified Laws
SDDENR	South Dakota Department of Environment and Natural Resources
SDDOA	South Dakota Department of Agriculture
SDDOT	South Dakota Department of Transportation
SDGFP	South Dakota Game, Fish and Parks
SDGS	South Dakota Geological Survey
SDPUC	South Dakota Public Utilities Commission
SHPO	State Historic Preservation Office
SWPPP	Storm Water Pollution Prevention Plan
TMDL	Total maximum daily load
TSS	Total suspended solids
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
V	Volt
Western	Western Area Power Administration

1.0 INTRODUCTION

Wind Quarry Operations, LLC (the Applicant), is proposing to construct the Willow Creek Wind Energy Facility (Project), a 103-megawatt (MW) nameplate capacity wind energy facility located on approximately 40,000 acres of privately owned land in Butte County, South Dakota (Project Area), approximately 10 miles northeast of Newell, South Dakota (Figure 1). The proposed Project includes approximately 45 wind turbines, associated access roads, a new collector substation, an operations and maintenance (O&M) facility, and associated transmission interconnection facilities. The Project would interconnect to the U.S. Department of Energy (DOE) Western Area Power Administration (Western) Maurine to Rapid City 115-kilovolt (kV) transmission line, which extends through the Project Area. The Project would generate utility scale electric power for residential, commercial, and industrial consumers. Power from the Project would help meet the growing generation needs of the region for several decades and provide a significant economic benefit to the local community and government.

The proposed Project includes the following components:

Wind Turbines – The proposed Project would consist of approximately 45 three-bladed, horizontal-axis 2.3-MW wind turbines. The turbines would have a rotor diameter of approximately 108 meters and a rotor speed of 6 to 16 revolutions per minute (rpm). The cut-in speed is 4.0 meters per second (8.9 miles per hour [mph]) and the cut-out speed is 25 meters per second (55 mph). The turbines would have hydraulic braking systems, lightning protection, and active yaw and pitch control. The towers would be constructed of tubular steel with a hub height of approximately 80 meters (262.5 feet). The towers would be manufactured in sections that are transported to the site on specially designed tractor-trailers. The foundations would be specifically designed for each turbine, based upon geotechnical analysis of core samples at each turbine location. Towers would be erected onsite with the base mounted to the foundation using high strength steel bolts. An entry door near the base would provide access to the turbine from the tower interior for service personnel and equipment.

Collector System – A step-up transformer at the base of each turbine would convert the 660-volt (V) turbine output to 34.5-kV. The power from each turbine would flow through a 34.5-kV underground collector system to a central collector substation (Willow Creek Substation), located in the Project Area. The underground collector system would consist of underground cables, buried to a depth of approximately 6 feet. The total estimated length of the proposed collector system is 26 miles.

Fiber Optic Communication Lines – The fiber optic communication lines for the Project would be installed in the same trenches as the underground collector cables and connect each turbine to the O&M facility and Willow Creek Substation.

O&M Facility – The proposed location for the O&M facility is in Section 14, Township 11 North, Range 7 East. There is an approximately 3,500-square foot, unfinished, single-family home on the property that would be finished to serve as the office. An approximately 5,000-square foot utility building would be erected for storage and maintenance work.

Access Roads – Primary access to the Project Area would be from U.S. Highway 212, with secondary access from Twilight Road and Double R Road to the north and from Old Highway 212 to the south. New access roads would be constructed within the Project Area to facilitate both construction and maintenance of the wind turbines and associated facilities. The road network would consist of approximately 26 miles of new or upgraded roads.

Transmission Interconnection – The proposed location for the Willow Creek Substation is approximately 0.5 mile northeast of Double R Road on the north side of U.S. Highway 212. At Willow Creek Substation, the power from the collector system would be transformed from 34.5 kV to 115 kV. Power would be delivered from Willow Creek Substation to a new Western-owned substation, interconnected to the existing Western-owned Maurine to Newell 115-kV section of the Maurine to Rapid City 115-kV transmission line. It is anticipated that the new Western substation would be located adjacent to Willow Creek Substation, and the proposed transmission interconnection would consist of three jumpers, approximately 100 feet in length, between the two substations. One steel deadend structure, approximately 65 feet in height, would be installed at each substation to connect the jumpers.

2.0 FACILITY PERMIT APPLICATION

This Application provides information on the anticipated environmental and other impacts by the Project on the following resources:

- Physical (geology, economic deposits, soils)
- Hydrology (water)
- Terrestrial ecosystems (vegetation, wetlands, wildlife, threatened and endangered species)
- Aquatic ecosystems
- Land use (agriculture, residential, displacement, noise, aesthetics, electromagnetic interference, safety and health)
- Water quality
- Air quality
- Communities (socioeconomics, cultural resources)

In addition to this Application, Western is preparing an Environmental Assessment (EA) for the Project in accordance with the applicable requirements and standards of the National Environmental Policy Act (NEPA). The EA will tier off of the analysis conducted in the *Upper Great Plains Wind Energy Programmatic Environmental Impact Statement* (PEIS), prepared jointly by Western and the U.S. Fish and Wildlife Service (USFWS) (Western and USFWS, 2015). The PEIS assesses environmental impacts associated with wind energy development and identifies management practices to address impacts. The EA for the Willow Creek Project will focus on site-specific issues that are not already addressed in sufficient detail in the PEIS. The Project is not expected to have significant impacts on the environment.

Approximately 109 acres of permanent disturbance, representing less than 1 percent of the total acreage within the Project Area, would be broadly dispersed throughout the Project Area. Therefore, the Project is not expected to cause major changes in runoff patterns or volume of runoff, nor is it expected to have adverse impacts on existing hydrology.

Because wetlands within the Project Area are relatively small and widely scattered (approximately 1 percent of the total Project Area), the Applicant anticipates that the Project would avoid locating facilities in most wetland areas. Wind turbines and access roads would generally be located in upland areas, avoiding low-lying wetlands and drainageways. As the design details for Project infrastructure are finalized, any wetland impacts would be identified, and, prior to construction, necessary authorizations (e.g., 404 permit) would be acquired.

Significant impacts (i.e., activities not in compliance with Federal or State wildlife conservation policies or activities affecting the biological viability of wildlife species populations) are not anticipated for this Project. The majority of land proposed to be directly affected by construction of the Project is grazed rangeland. Construction of Project facilities in grazed rangeland is not expected to negatively affect terrestrial ecosystems. Best management practices (BMPs) would be utilized to avoid or minimize impacts to the vegetation resources of the Project Area during construction.

The only federally listed or candidate species with confirmed occurrence in the Project Area is Sprague's pipit. Northern long-eared bats have been encountered through passive acoustical monitoring within the vicinity of the Project Area; however, none have been encountered within the Project Area itself. For raptors, only ferruginous hawks breeding activity has been documented within the Project Area, but both bald eagles and golden eagles fly over, forage within, and perch within the Project Area. Additional assessment of potential Project impacts to these species and other listed species with the potential to occur in the Project Area will be conducted in conjunction with the EA process.

Existing land uses are not anticipated to be significantly changed or impacted by the Project. Noise from the Project construction activities would be temporary and generally limited to daytime hours. Once the Project is operational, noise from the turbines and other facilities is not expected to be above 45 weighted decibel units (dBA) at sensitive noise receptors (i.e., occupied residences).

Construction activities for this Project would be short-term. Therefore, no long-term negative impact to the socioeconomics of the area is expected; any short-term effects likely would be beneficial to businesses in the region.

During Project construction, fugitive dust emissions would increase due to vehicle and equipment traffic in the area. The additional particulate matter emissions would not exceed the National Ambient Air Quality Standards (NAAQS). The Project would not produce air emissions during its operation.

Cultural resource records review for the Project Area identified previously-recorded archaeological and historic resources located within or near the Project Area. Additional cultural resource evaluation is in progress for the Project Area through the EA process. The Applicant will make every effort to physically avoid identified cultural resources.

Mitigation measures proposed for the Project include:

- Wind turbines will be illuminated as required by Federal Aviation Administration (FAA) regulations

- Existing roads will be used for construction and maintenance where possible
- Access roads created for the Project will be located to minimize cuts and fills
- Temporarily disturbed uncultivated areas will be reseeded with certified weed-free seed mixes to blend in with existing vegetation
- BMPs will be used during construction to control erosion and prevent impacts to drainageways and streams by sediment runoff from exposed soils
- The Project will use tubular towers for wind turbines instead of lattice tower structures, to minimize potential avian and visual impacts
- Direct impacts to eligible or potentially eligible sites for the National Register of Historic Places (NRHP) will be avoided
- The Applicant plans to avoid impacts to wetlands to the greatest extent practicable

In this Application, the Applicant has addressed each matter set forth in South Dakota Codified Laws (SDCL) Chapter 49-41B and in Administrative Rules of South Dakota (ARSD) Chapter 20:10:22 (Energy Facility Siting Rules) related to wind energy facilities. Included with this Application is a Completeness Checklist (Table 3-1) that sets forth where in the application each rule requirement is addressed.

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

- The proposed wind energy facility complies with applicable laws and rules
- The facility will not pose a threat of serious injury to the environment or to the social and economic condition of inhabitants in, or near, the Project Area
- The facility will not substantially impair the health, safety, or welfare of the inhabitants
- The facility will not unduly interfere with the orderly development of the region, having given consideration to the views of the governing bodies of the local affected units of government

3.0 COMPLETENESS CHECK

The contents required for an application with the South Dakota Public Utilities Commission (SDPUC) are described in SDCL 49-41B and further clarified in ARSD 20:10:22:01(1) et seq. The SDPUC submittal requirements are listed in Table 3-1 with cross-references indicating where the information can be found in this Application.

Table 3-1: Completeness Checklist

SDCL	ARSD	Required Information	Location
49-41B-11(1)	20:10:22:06	**Names of participants required.** The application shall contain the name, address, and telephone number of all persons participating in the proposed facility at the time of filing, as well as the names of any individuals authorized to receive communications relating to the application on behalf of those persons.	Section 4.0
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.	Section 5.0
49-41B-11(8)	20:10:22:08	**Purpose of facility.** The applicant shall describe the purpose of the proposed facility.	Section 6.0
49-41B-11(12)	20:10:22:09	**Estimated cost of facility.** The applicant shall describe the estimated construction cost of the proposed facility	Section 7.0
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.	Section 6.0
49-41B-11(2)	20:10:22:11	**General site description.** The application shall contain a general site description of the proposed facility including a description of the specific site and its location with respect to state, county, and other political subdivisions; a map showing prominent features such as cities, lakes and rivers; and maps showing cemeteries, places of historical significance, transportation facilities, or other public facilities adjacent to or abutting the plant or transmission site.	Section 8.0 Figures 1, 10, 13 Appendix C (Attachment B)

SDCL	ARSD	Required Information	Location
49-41B-11(6); 49-41B-21; 34A-9-7(4)	20:10:22:12	**Alternative sites.** The applicant shall present information related to its selection of the proposed site for the facility, including the following: (1) The general criteria used to select alternative sites, how these criteria were measured and weighed, and reasons for selecting these criteria; (2) An evaluation of alternative sites considered by the applicant for the facility; (3) An evaluation of the proposed plant, wind energy, or transmission site and its advantages over the other alternative sites considered by the applicant, including a discussion of the extent to which reliance upon eminent domain powers could be reduced by use of an alternative site, alternative generation method, or alternative waste handling method.	Section 9.0
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:13	**Environmental information.** The applicant shall provide a description of the existing environment at the time of the submission of the application, estimates of changes in the existing environment which are anticipated to result from construction and operation of the proposed facility, and identification of irreversible changes which are anticipated to remain beyond the operating lifetime of the facility. The environmental effects shall be calculated to reveal and assess demonstrated or suspected hazards to the health and welfare of human, plant and animal communities which may be cumulative or synergistic consequences of siting the proposed facility in combination with any operating energy conversion facilities, existing or under construction. The applicant shall provide a list of other major industrial facilities under regulation which may have an adverse effect on the environment as a result of their construction or operation in the transmission site, wind energy site, or siting area.	Sections 10.0, 11.0, 12.0, 13.0, 14.0, 15.0, 17.0, 18.0, 20.0

SDCL	ARSD	Required Information	Location
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:14	**Effect on physical environment.** The applicant shall provide information describing the effect of the proposed facility on the physical environment. The information shall include: (1) A written description of the regional land forms surrounding the proposed plant or wind energy site or through which the transmission facility will pass; (2) A topographic map of the plant, wind energy, or transmission site; (3) A written summary of the geological features of the plant, wind energy, or transmission site using the topographic map as a base showing the bedrock geology and surficial geology with sufficient cross-sections to depict the major subsurface variations in the siting area; (4) A description and location of economic deposits such as lignite, sand and gravel, scoria, and industrial and ceramic quality clay existent within the plant, wind energy, or transmission site; (5) A description of the soil type at the plant, wind energy, or transmission site; (6) An analysis of potential erosion or sedimentation which may 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 plant, wind energy, or transmission site; and (8) An analysis of any constraints that may be imposed by geological characteristics on the design, construction, or operation of the proposed facility and a description of plans to offset such constraints.	Section 11.0 Figures 1, 8a, 8b, 9

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

SDCL	ARSD	Required Information	Location
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:17	**Effect on aquatic ecosystems.** The applicant shall provide information of the effect of the proposed facility on aquatic ecosystems, and including existing information resulting from biological surveys conducted to identify and quantify the aquatic fauna and flora, potentially affected within the transmission site, wind energy site, or siting area, an analysis of the impact of the construction and operation of the proposed facility on the total aquatic biotic environment and planned measures to ameliorate negative biological impacts as a result of construction and operation of the proposed facility.	Section 14.0
49-41B-11(2,11); 49-41B-22	20:10:22:18	**Land use.** The applicant shall provide the following information concerning present and anticipated use or condition of the land: (1) A map or maps drawn to scale of the plant, wind energy, or transmission site identifying existing land use according to the following classification system: (a) Land used primarily for row and nonrow crops in rotation; (b) Irrigated lands; (c) Pasturelands and rangelands; (d) Haylands; (e) Undisturbed native grasslands; (f) Existing and potential extractive nonrenewable resources; (g) Other major industries; (h) Rural residences and farmsteads, family farms, and ranches; (i) Residential; (j) Public, commercial, and institutional use; (k) Municipal water supply and water sources for organized rural water 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.	Sections 15.0, 20.0 Figures 11, 13

SDCL	ARSD	Required Information	Location
49-41B-11(2,11); 49-41B-28	20:10:22:19	**Local land use controls.** The applicant shall provide a general description of local land use controls and the manner in which the proposed facility will comply with the local land use zoning or building rules, regulations or ordinances. If the proposed facility violates local land use controls, the applicant shall provide the commission with a detailed explanation of the reasons why the proposed facility should preempt the local controls. The explanation shall include a detailed description of the restrictiveness of the local controls in view of existing technology, factors of cost, economics, needs of parties, or any additional information to aid the commission in determining whether a permit may supersede or preempt a local control pursuant to SDCL 49-41B-28.	Section 16.0
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:20	**Water quality.** The applicant shall provide evidence that the proposed facility will comply with all water quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.	Section 17.0
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:21	**Air quality.** The applicant shall provide evidence that the proposed facility will comply with all air quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.	Section 18.0
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.	Section 19.0

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

SDCL	ARSD	Required Information	Location
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.	Section 22.0
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:26	**Nature of proposed energy conversion facility.** The application shall contain a description of the operating nature of the proposed facility, the expected source and quantity of its raw materials, and energy requirements. The preceding shall be illustrated by means of an annotated map. The description shall include the following: (1) The proposed on-line life of the facility and its projected operating capacity during its on-line life; (2) A general description of the major components of the proposed facility such as boilers, steam generators, turbine generators, cooling facilities, production equipment, pollution control equipment, and other associated facilities; (3) An identification of materials flowing into the facility, including all materials such as air, water, coal, and chemical compounds that will be utilized by the proposed facility, recorded in accordance with accepted scientific practices regarding their estimated consumption rate; (4) An inventory of all materials flowing out of the proposed facility, including the method of control, treatment, destination, and disposal monitoring programs of each of the materials; and (5) The procedures proposed to avoid or ameliorate the possibility that the discharges, emissions, or solid wastes would do any of the following: (a) Constitute a public nuisance; (b) Endanger the public health and safety; (c) Endanger human, animal, or plant life; or (d) Endanger recreational facilities.	N/A
49-41B-11	20:10:22:27	**Products to be produced.** The applicant shall describe both in general terms and by technical description the products and by-products to be produced by the proposed facility and their destinations.	N/A
49-41B-11	20:10:22:28	**Fuel type used.** The applicant shall provide a description of the type of fuel used, including: (1) Primary proposed fuel types; (2) Anticipated yield and range (BTU or appropriate unit); and (3) Approximate chemical analysis of the proposed design fuel.	N/A

SDCL	ARSD	Required Information	Location
49-41B-11	20:10:22:29	**Proposed primary and secondary fuel sources and transportation.** On a map drawn to scale, the applicant shall provide the location of proposed primary and secondary sources of fuel and method of its transportation. When possible, the map shall show the location of the proposed facility; where distances are too great to show the facility and proposed primary and alternate supply sources, smaller scale inserts showing relative location shall be presented. The applicant shall also describe any additional transportation facilities needed to deliver raw materials and to remove wastes.	N/A; Transportation of construction material described in Section 20.0
49-41B-11; 49-41B-21; 49-34A-97	20:10:22:30	**Alternate energy resources.** The applicant shall provide information concerning the alternate energy resources considered in the construction of the energy conversion facility. The applicant shall also discuss the reasons for selecting the proposed energy resource rather than an alternative resource.	N/A
49-41B-11(2,11)	20:10:22:31	**Solid or radioactive waste.** The applicant shall provide information concerning the generation, treatment, storage, transport, and disposal of solid or radioactive waste generated by the proposed facility and evidence that all disposal of the waste will comply with the standards and regulations of any federal or state agency having jurisdiction. Any variations from these standards shall be indicated.	N/A
49-41B-11	20:10:22:32	**Estimate of expected efficiency.** The applicant shall provide an estimate of the expected efficiency of the proposed energy conversion process and discuss the assumptions on which the estimate is based.	N/A
49-41B-11; 49-41B-21; 49-41B-22; 34A-9-7(2,5)	20:10:22:33	**Decommissioning.** The applicant shall provide a plan or policy statement on action to be taken at the end of the energy conversion facility's on-line life. Estimates of monetary costs, site condition after decommissioning, and the amount of land irretrievably committed shall be included in this statement.	N/A

SDCL	ARSD	Required Information	Location
49-41B-35(3)	20:10:22:33.01	**Decommissioning of wind energy facilities.** Funding for removal of facilities. The applicant shall provide a plan regarding the action to be taken upon the decommissioning and removal of the wind energy facilities. Estimates of monetary costs and the site condition after decommissioning shall be included in the plan. The commission may require a bond, guarantee, insurance, or other requirement to provide funding for the decommissioning and removal of a wind energy facility. The commission shall consider the size of the facility, the location of the facility, and the financial condition of the applicant when determining whether to require some type of funding. The same criteria shall be used to determine the amount of any required funding.	Section 23.0
49-41B-11(2,11)	20:10:22:33.02	**Information concerning wind energy facilities.** If a wind energy facility is proposed, the applicant shall provide the following information: (1) Configuration of the wind turbines, including the distance measured from ground level to the blade extended at its highest point, distance between the wind turbines, type of material, and color; (2) The number of wind turbines, including the number of anticipated additions of wind turbines in each of the next five years; (3) Any warning lighting requirements for the wind turbines; (4) Setback distances from off-site buildings, right-of-ways of public roads, and property lines; (5) Anticipated noise levels during construction and operation; (6) Anticipated electromagnetic interference during operation of the facilities; (7) The proposed wind energy site and major alternatives as depicted on overhead photographs and land use culture maps; (8) Reliability and safety; (9) Right-of-way or condemnation requirements; (10) Necessary clearing activities; (11) Configuration of towers and poles for any electric interconnection facilities, including material, overall height, and width; (12) Conductor configuration and size, length of span between structures, and number of circuits per pole or tower for any electric interconnection facilities; and (13) If any electric interconnection facilities are placed underground, the depth of burial, distance between access points, conductor configuration and size, and number of circuits.	Sections 8.0, 9.0, 13.2, 15.4.3, 15.4.5, 16.0, 20.2.4.2, 22.0, 24.0, 25.0 Figures 3, 4, 5, 11, 13 Appendix C (Attachment B)

SDCL	ARSD	Required Information	Location
49-41B-11(2,11)	20:10:22:34	**Transmission facility layout and construction.** If a transmission facility is proposed, the applicant shall submit a policy statement concerning the route clearing, construction and landscaping operations, and a description of plans for continued right-of-way maintenance, including stabilization and weed control.	N/A
49-41B-11(2,11)	20:10:22:35	**Information concerning transmission facilities.** If a transmission facility is proposed, the applicant shall provide the following information: (1) Configuration of the towers and poles, including material, overall height, and width; (2) Conductor configuration and size, length of span between structures, and number of circuits per pole or tower; (3) The proposed transmission site and major alternatives as depicted on overhead photographs and land use culture maps; (4) Reliability and safety; (5) Right-of-way or condemnation requirements; (6) Necessary clearing activities; and (7) If the transmission facility is placed underground, the depth of burial, distance between access points, conductor configuration and size, and number of circuits.	N/A
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.	Section 26.0

SDCL	ARSD	Required Information	Location
49-41B-7	N/A	**Assessment by local review committee--Factors included.** The local review committee shall meet to assess the extent of the potential social and economic effect to be generated by the proposed facility, to assess the affected area's capacity to absorb those effects at various stages of construction, and formulate mitigation measures. The assessment of the local review committee shall include consideration of the temporary and permanent alternatives in the following areas: (1) Housing supplies; (2) Educational facilities and manpower; (3) Water supply and distribution; (4) Waste water treatment and collection; (5) Solid waste disposal and collection; (6) Law enforcement; (7) Transportation; (8) Fire protection; (9) Health; (10) Recreation; (11) Government; and (12) Energy.	N/A
49-41B-22	N/A	**Applicant's burden of proof.** The applicant has the burden of proof to establish that: (1) The proposed facility will comply with all applicable laws and rules; (2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area; (3) The facility will not substantially impair the health, safety or welfare of the inhabitants; and (4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government	Section 1.0, Section 26.4
49-41B-11; 49-41B-22	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.	N/A

SDCL	ARSD	Required Information	Location
49-41B-11; 49-41B-22	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.	N/A
49-41B-11	20:10:22:39	**Testimony and exhibits.** Upon the filing of an application pursuant to SDCL 49-41B-11, an applicant shall also file all data, exhibits, and related testimony which the applicant intends to submit in support of its application. The application shall specifically show the witnesses supporting the information contained in the application.	Section 27.0

4.0 NAMES OF PARTICIPANTS (ARSD 20:10:22:06)

The Applicant, a Delaware limited liability company, is a wholly owned subsidiary of Wind Quarry, LLC. Wind Quarry, LLC is a privately held Wyoming limited liability company with offices in Montrose, Colorado. Individuals who are authorized to receive communications relating to the application on behalf of the Applicant include:

- John K. O'Meara – Chief Operating Officer, Wind Quarry, LLC
  330 S. 9th Street, Montrose, CO 81401
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- Patrick D. O'Meara, DO – Chief Executive Officer, Wind Quarry, LLC
  330 S. 9th Street, Montrose, CO 81401
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  pat.omeara@windquarry.com

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

The Applicant will be the sole owner of the proposed Project. John O'Meara and Patrick O'Meara are the primary contacts.

6.0 PURPOSE OF, AND DEMAND FOR, THE WIND ENERGY FACILITY (ARSD 20:10:22:08, 20:10:22:10)

The Willow Creek Wind Energy Facility would generate utility scale electric power for residential, commercial, and industrial consumers. Power from the Project would help meet the growing generation needs of the region for several decades and provide a significant economic benefit to the local community and government.

In its Annual Energy Outlook 2007, the U.S. Energy Information Administration (EIA) estimated that U.S. electricity demand would grow by 39 percent from 2005 to 2030, reaching 5.8 billion megawatt-hours (MWh) by 2030. The DOE *20% Wind Energy by 2030* report examined the technical feasibility of using wind energy to generate 20 percent of the nation's electricity demand by 2030 (DOE-EERE, 2008a). To meet 20 percent of that demand, U.S. wind power capacity would have to reach more than 300 gigawatts (GW). This growth represents an increase of more than 290 GW within 23 years.

In March 2015, the DOE released its *Wind Vision* report, which builds on and updates the 2008 *20% Wind Energy by 2030* report (DOE, 2015). The *Wind Vision* report analyzes the benefits of a study scenario based on wind power penetration of 10 percent by 2020, 20 percent by 2030, and 35 percent by 2050, utilizing plausible variations from central values of wind power and fossil fuel costs. The business-as-usual scenario does not prescribe a wind future trajectory, but instead models wind deployment under policy conditions current on January 1, 2014, utilizing demand and cost inputs from the EIA Annual Energy Outlook 2014. The study concludes that the study scenario of 35 percent wind power by 2050 will provide $149 billion (3 percent) lower cumulative electric sector expenditures; 14 percent reduction in cumulative greenhouse gas emissions ($400 billion in avoided global damages); $108 billion savings in avoided mortality, morbidity, and economic damages from cumulative reductions in sulfur dioxide, nitrogen oxides, and particulate matter; 23 percent reduction in water used by energy sector; and over $1 billion in annual land lease payments to landowners.

Load growth for the Dakotas is projected to be at least 2,100 MW over the next ten years. South Dakota’s current electric generation is primarily from hydroelectric and coal-fired power plants, with approximately half derived from each. South Dakota relies on shipments of coal from Wyoming to meet its coal demand, and supplies of fossil fuels such as coal, oil, and natural gas are finite. Implementation of tighter U.S. Environmental Protection Agency (USEPA) regulations on existing coal-fired plants is accelerating retirements of outdated facilities, and construction of new coal, nuclear, or hydroelectric stations in the area is extremely unlikely.

Wind energy is an inexhaustible source of clean, renewable electric power that can fill this capacity shortfall. It does not emit particulates, heavy metals, or greenhouse gases, and does not consume significant water resources. Long-term, fixed-price power purchase agreements (PPAs) for wind generation reduce electric utilities' exposure to fuel price volatility and stabilize energy prices for consumers. Achieving 20 percent wind energy in the nation would reduce carbon dioxide (CO_2) emissions by 825 million metric tons and water consumption by 4 trillion gallons annually.

The Project would provide significant local and regional economic benefits. The Project is located entirely on private ranch land in Butte County and will generate new income for the landowners. Tax revenues will benefit county schools and services. Construction, operations, and maintenance of the facility are expected to create approximately 200 jobs during the peak construction phase and approximately 6 long-term operations and management positions, which will also benefit local businesses. Nationally, the wind industry generates well-paying jobs in the entire supply chain, including engineering, manufacturing, and construction.

Western's Maurine to Rapid City 115-kV transmission line transects the Project Area. A Western transmission study is currently underway, with the feasibility portion of the study complete. The feasibility study confirms that 103 MW of additional transmission capacity is available for the Project with only minor network upgrades.

The Applicant has signed a Large Generator Interconnection Agreement (LGIA) with Western for 103 MW to be interconnected at the Project Area.

6.1 Wind Resources Areas

The DOE's NREL ranks South Dakota as having the fourth highest wind development potential in the United States, but only 803 MW of wind energy generation has actually been installed to date. In 2014, 25 percent of South Dakota's electricity generation was sourced from wind power (AWEA, 2015).

The Project Area was initially identified as a potential development site based upon data obtained from the NREL wind resource map (Figure 2). The Applicant was initially interested in 9,200 acres of Bureau of Land Management (BLM)-managed federal lands approximately 10 miles southwest of the actual Project Area. A site visit in September 2010 confirmed not only an excellent location for potential development based on topography and road access, but also existing high voltage transmission infrastructure. In December 2011, two 60-meter meteorological towers were erected on the BLM property to measure the wind. The met tower data confirmed an excellent wind resource.

In March 2013, after a pre-development meeting with the BLM in Belle Fourche, South Dakota, it was determined that moving the Project northeast off the BLM property and onto private ranch land would be beneficial for two major reasons. First, the southwest extent of the BLM property is approximately 11 miles from Bear Butte, a sacred site for many Native American tribes. The Applicant and the BLM were concerned about potential visual impacts from Bear Butte. Second, the Belle Fourche River is approximately 3 miles from the southwest extent of the BLM land. A helicopter survey showed that raptor nests, including bald eagles, were present along the river but non-existent on the plains to the northeast. Therefore, moving the Project to its current location accomplished two major goals by minimizing potential visual impacts from Bear Butte, as well as greatly reducing the potential for eagles within the Project Area.

After relocating the Project to private ranch land in 2013, four additional met towers and two SODAR units were deployed to assess the wind resource in the current Project Area. The wind resource assessment study conducted in the Project Area projects a net capacity factor in the upper 40 percentile range. Table 6-1 shows the existing and potential wind power development for South Dakota and the surrounding states.

Table 6-1: Existing and Potential Wind Power

State	Existing[a] (MW) as of April 2015	20 Percent Wind Energy by 2030 (MW)[b]	Renewable Portfolio Standards[c]
South Dakota	803	5,000 to 10,000	10 percent by 2015[c1]
North Dakota	1,886	1,000 to 5,000	10 percent by 2015[c2]
Iowa	5,688	Greater than 10,000	1,000 MW by 2010[c3]
Minnesota	3,035	5,000 to 10,000	25 percent by 2025[c4]
Nebraska	812	5,000 to 10,000	None
Wyoming	1,410	Greater than 10,000	None
Montana	665	5,000 to 10,000	15 percent by 2015[c5]

(a) DOE-EERE, 2015
(b) DOE-EERE, 2008a
(c) DOE-EERE, 2008b
(c1) objective, not a standard
(c2) objective, not a standard
(c3) voluntary goal set by governor in 2011, not a standard
(c4) Xcel Energy: 30 percent by 2020; Other utilities: 25 percent by 2025
(c5) 5 percent in 2008; 10 percent in 2010; 15 percent in 2015

6.2 Renewable Power Demand

According to a Gallup national poll in March 2013, no fewer than two in three Americans want the U.S. to put more emphasis on producing domestic energy using solar power (76 percent), wind (71 percent),

and natural gas (65 percent). Far fewer want to emphasize the production of oil (46 percent) and the use of nuclear power (37 percent). Least favored is coal, with approximately one in three Americans wanting to emphasize its domestic production.

States have been active in adopting or increasing renewable portfolio standards (RPSs), and 29 states now have them. These standards require utilities to sell a specified percentage or amount of renewable electricity. The requirement can apply only to investor-owned utilities, but many states also include municipalities and electric cooperatives, though their requirements are equivalent or lower. Twenty-nine states, Washington, DC, and two territories have adopted an RPS, while eight states and two territories have set renewable energy goals.

In South Dakota, an RPS goal was established in 2008, with the objective that 10 percent of all electricity sold at retail within the State will be obtained from renewable energy and recycled energy sources by 2015 (SDCL 49-34A-101). The proposed Project would provide a new source of renewable energy and would help meet the DOE's goal of reaching 20 percent wind energy by 2030 and help South Dakota reach its RPS target.

7.0 ESTIMATED COST OF THE WIND ENERGY FACILITY (ARSD 20:10:22:09)

The estimated capital cost of the Project is approximately $210 million based on the DOE NREL's 2013 installed cost estimates for on-shore wind power. This estimate includes lease acquisition, permitting, engineering, procurement, and construction of turbines, access roads, underground electrical collector system, Project collector substation, interconnection to existing Western 115-kV transmission line, O&M facility, supervisory control and data acquisition (SCADA) system, and meteorological towers.

8.0 GENERAL SITE AND PROJECT COMPONENT DESCRIPTION (ARSD 20:10:22:11, 20:10:22:33:02)

The Project would be located on approximately 40,000 acres of land in Butte County, South Dakota, approximately 10 miles northeast of Newell, South Dakota. The Project Area is not located within an organized township. Table 8-1 shows the sections that intersect the Project Area.

Table 8-1: Sections Within the Project Boundary

County	Township	Range	Sections
Butte	9 N	8 E	2-11, 15-21
	10 N	7 E	1-4, 9-15, 23-25
	10 N	8 E	4-8, 17-23, 27-34
	11 N	7 E	14-16, 19-30, 32-35
	11 N	8 E	15, 20-22, 27-33

Figure 1 shows the locations of the State and county boundaries with respect to the Project Area. Figure 10 shows the locations of water bodies and streams within the Project Area. There are no cities, cemeteries, NRHP sites, transportation facilities other than roads (i.e., railroads, airports), or public facilities (i.e., schools, churches, libraries) within or adjacent to the Project Area.

8.1 Wind Farm Facility

The Project would consist of approximately 45 2.3-MW wind turbines with an aggregate nameplate capacity of 103 MW and a net operating capacity of between approximately 400,000 and 430,000 MWh per year, assuming a capacity factor of 44 to 47 percent. The Project would also include underground electric collector lines, the central collector substation (Willow Creek Substation), an approximately 100-foot-long 115-kV jumper interconnecting to a new Western-owned substation, an O&M facility, access roads connecting to each turbine, one to two permanent meteorological towers, a SODAR unit, and a SCADA system. Figure 3 shows the proposed layout of the Project facilities. Table 8-2 lists the sections within the Project Area containing proposed wind farm facilities.

Table 8-2: Sections Containing Project Facility Components

County	Township	Range	Sections
Butte	9 N	8 E	N/A
	10 N	7 E	1-4, 10-14
	10 N	8 E	5, 7-8

County	Township	Range	Sections
	11 N	7 E	15, 19-22, 26-28, 30, 32, 35
	11 N	8 E	N/A

Figure 3 shows the locations of the proposed 45 wind turbines. Some of the turbine locations shown may not be ultimately utilized as part of the Project, and it is also possible that additional turbine locations may be required. It is anticipated that as many as 10 additional turbines may be installed within the Project Area, depending on the final wind turbine layout and design. The Applicant requests that the permit conditions provide flexibility within the parameters described above to add or delete turbine locations.

The layout shown on Figure 3 may need to be modified. For example, site surveys may determine the presence of sensitive cultural artifacts or biological elements that must be avoided. The onsite surveys will include a buffer sufficient to allow some adjustment of actual turbine or road locations, as necessary to avoid such sensitive areas without requiring additional surveying. However, additional site surveys will be conducted if necessary. Also, ongoing discussions with the landowners, Butte County, and the South Dakota Department of Transportation (SDDOT) may lead to changes in turbine locations or road alignments. As discussed further in Sections 11.0, 13.0, 14.0, and 20.0, other factors that could affect ultimate turbine and road locations include unsuitable soil conditions, as well as biological or cultural resource issues.

The Applicant will coordinate with SDPUC as the final layout is developed for this Project and will submit a final layout to the SDPUC when it is developed. The final layout will adhere to the setbacks described in the Application (such as setbacks from houses, roads, and unleased lands and noise setbacks) as well as the avoidance and mitigation measures. New facility locations that were not surveyed as part of the preliminary layout will be surveyed, and the results of these surveys will be shared with the SDPUC.

8.2 Wind Turbine Generators

The Applicant plans to install approximately 45 Siemens SWT-2.3-108 wind turbines for the Project. Each turbine would have a nameplate capacity output of 2.3 MW. Each turbine would have a hub height of approximately 80 meters (262 feet) and a turbine rotor diameter of 108 meters (354 feet). The total height of each turbine would be approximately 134 meters (440 feet) with a blade in the vertical position (Figure 4). Table 8-3 depicts additional specifications for the turbines.

Table 8-3: Wind Turbine Characteristics

Siemens 2.3-MW Characteristics	
Cut-in wind speed[a]	3 to 4 meters per second (7 to 9 miles per hour)
Rated capacity wind speed[b]	11 to 12 meters per second (25 to 27 miles per hour)
Cut-out wind speed[c]	25 meters per second (56 miles per hour)
Maximum sustained wind speed[d]	59.5 meters per second (133 miles per hour)
Rotor speed	6 to 16 revolutions per minute

(a) Cut-in wind speed = wind speed at which turbine begins operation
(b) Rated capacity wind speed = wind speed at which turbine reaches its rated capacity
(c) Cut-out wind speed (600 second average) = wind speed above which turbine shuts down operation
(d) Maximum sustained wind speed – wind speed up to which turbine is designed to withstand

The Siemens SWT-2.3-108 turbines are active yaw- and pitch-regulated machines with power and torque control capabilities. Each wind turbine has three blades. As the wind passes over the blades of a wind turbine, it creates lift and causes the rotor to turn. The rotor is connected by a hub and main shaft to a gearbox, which is connected to a generator.

Other turbine specifications include:

- Gearbox with three-stage planetary/helical system
- Microprocessor controller
- Asynchronous generator with integrated heat exchanger
- A hydraulic mechanical brake system with dual calipers on high-speed shaft
- Active yaw system with passive friction brake

8.3 Wind Turbine Towers

The tower that supports the wind turbine is a cylindrical and/or tapered monopole, approximately 80 meters (262 feet) in height (Figure 4). The towers would be constructed of high strength tubular steel, approximately 15 feet in diameter at the base, with internal joint flanges. Towers are typically fabricated in three sections and assembled onsite. The steel thickness is highest in the bottom section and progressively decreases in higher sections. The standard tower color is light grey, and all surfaces are multi-layer coated for protection against corrosion. Access to the turbine is through a lockable steel door at the base of the tower. Four platforms are connected with a ladder and a fall arresting safety system for access to the nacelle. An overhead crane system is built into the nacelle allowing easy transfer of tools and components for maintenance. A controller cabinet would be located inside each tower base. Tower lighting is discussed in Section 20.2.4.2.

8.4 Wind Turbine Foundations

The wind turbine foundations would typically be mat foundations (inverted T-foundations) or concentric-ring-shell foundations of reinforced concrete. The actual foundation for each turbine would be specifically designed based on geotechnical analysis of a 50-foot core sample at each turbine location combined with structural loading requirements for the turbine. The pedestal diameter for an 80-meter (262-feet) tower is approximately 5.2 meters (17 feet). In some cases, for step-and-touch voltage compliance, an area around a turbine may be covered in 4 inches of gravel, river rock, or crushed stone. Figure 5 shows a typical foundation design.

The excavated area for the turbine foundations would typically be approximately 70 feet by 70 feet (approximately 0.1 acre). During construction, a larger area (approximately 80 meters by 80 meters) would be used to lay down the rotors and maneuver cranes during turbine assembly (Figure 6). For purposes of calculating temporary impacts in this application, the Applicant has assumed approximately 71 acres of total temporary disturbance from work/staging areas for all 45 turbines. After construction, total permanent disturbance from the 45 turbines would be reduced to approximately 4 acres (20 meters by 20 meters for each turbine), which would remain for the life of the Project.

8.5 Generator Step-up Transformers

A generator step up transformer (GSU) would be installed at the base of each wind turbine to increase the output voltage of the wind turbine to the voltage of the power collection system (34.5-kV). The transformers would be mounted on concrete pads and would be placed next to each wind turbine.

8.6 Access Roads

New access roads would be constructed to facilitate both construction and maintenance of the wind turbines. This road network would include approximately 26 miles of new or upgraded roads. These roads would be designed to minimize length and construction impact. Initially, turbine access roads would be approximately 20 meters (66 feet) in width to accommodate the safe operation of construction equipment. For purposes of calculating temporary impacts in this application, the Applicant has assumed approximately 207 acres of total temporary disturbance from access road construction. Upon completion of construction, the turbine access roads would be reclaimed and narrowed to an extent allowing for the routine maintenance of the facility. Based on an estimated average road width of 10 meters (33 feet), the Applicant has assumed approximately 103 acres of total permanent disturbance from access roads. Select existing State, county, and section line roads may also be improved upon to aid in servicing the turbine sites.

The wind turbines would be accessible from public roads via all-weather Class 5 gravel roads. Access roads would follow fence lines, field lines, and existing field access roads to the extent possible. Siting roads in areas with unstable soil would be avoided wherever possible. Roads would include appropriate drainage controls, including culverts, and would be constructed in a manner to allow farm and/or land owner equipment to cross. The roads would be surfaced with road base designed to allow passage under inclement weather conditions. The access road cross sections would consist of graded soil, overlain by geotextile fabric (if needed), and surfaced with compacted aggregate base course.

8.7 O&M Facility

It is anticipated that an O&M building would be located in the southeast quarter of the southwest quarter of Section 14, Township 11 North, Range 7 East. The existing 3,500-square foot, unfinished, single-family home on the property would be finished to serve as the office, and a 5,000-square foot utility building would be erected for storage and maintenance work. The proposed O&M building would house the equipment to operate and maintain the wind farm. A gravel parking pad would provide the building with a parking area. For purposes of calculating temporary impacts in this application, the Applicant has assumed approximately 0.3 acre of total temporary disturbance from O&M facility construction. After construction, total permanent disturbance from the O&M facility, including parking, would be approximately 0.2 acre.

8.8 Meteorological Towers and Sodar Units

The Applicant has deployed four temporary 60-meter meteorological towers and two SODAR units within the Project Area. These temporary meteorological towers are expected to be removed within 1 year of Project construction. The Applicant anticipates that the Project would include wind measurement equipment, which could consist of a Light Detection and Ranging (LIDAR) or SODAR unit, or one or two permanent 60-meter (197 feet) or 80-meter (262 feet) meteorological towers to house anemometers to measure the wind speed. The permanent towers would not have guy wires and would be lighted as necessary to comply with FAA guidelines. Each meteorological tower would result in a permanent impact of approximately 6.2 meters by 6.2 meters (20.5 feet by 20.5 feet), or 39 square meters (420 square feet).

A LIDAR or SODAR unit is typically located near (within 300 feet) one of the permanent meteorological towers in a small trailer approximately 3 meters (10 feet) high with an attached 6-meter (20 feet) wind sensor boom. The purpose of the unit is to remotely measure the vertical turbulence structure and wind profile up to 200 meters (656 feet) in 9.8-meter (32-foot) increments.

8.9 Temporary Laydown/Stockpile Areas/Batch Plant/Crane Walks

During construction, it is likely that a temporary stockpile or laydown area would be selected within the Project Area. Turbine components may be temporarily stored in an area covering approximately 15 to 20 acres before being moved to the final turbine sites. In addition, one or more concrete batch plants may be necessary during construction in order to prepare concrete for foundations onsite. It has not been determined at this time if onsite batch plants will be necessary for the Project. If they are utilized, each would temporarily impact approximately 3 acres of land, and it is anticipated that they would be located within the temporary laydown area. For purposes of calculating temporary impacts in this application, the Applicant has assumed that one approximately 40-acre laydown/stockpile/batch plant area would be used during construction.

In addition to the approximately 40-acre laydown/stockpile/batch plant area, temporary crane walk disturbances would also be necessary for the Project. Crane walks are estimated to be 40 feet wide and would be located along the approximately 26 miles of access roads. For purposes of calculating temporary impacts in this application, the Applicant has assumed that the temporary disturbance from the crane walks would be within the 20-meter-wide temporary construction disturbance width for the access roads.

8.10 Transmission Interconnection Facilities

This section describes the proposed transmission interconnection facilities for the Project.

8.10.1 34.5-kV Collector System

Each wind turbine within the Project Area would be interconnected by communication and electrical power collection circuit facilities. These facilities would include underground feeder lines (collector lines) that would collect wind-generated power from each wind turbine and deliver it to the collector substation.

8.10.1.1 Underground 34.5-kV Collector System

This system would be used to route the power from each turbine to the Willow Creek Substation (collector substation) where the electrical voltage would be stepped up from 34.5 kV to 115 kV. The underground collector system would be placed in one or more parallel trenches and connect each of the turbines to Willow Creek Substation. The estimated trench length, including parallel trenches, is 139,646 feet (approximately 26 miles). The temporary disturbance associated with the underground collector system is estimated to be 3 meters (10 feet) wide. For purposes of calculating temporary impacts in this

application, the Applicant has assumed approximately 11 acres[1] of total temporary disturbance from underground collector system construction.

The underground collector circuits would consist of three power cables contained in an insulated jacket and buried at a minimum depth of 1.2 meters (4 feet) that would not interfere with farming operations. Access to the underground lines would be located at each turbine site, at junction boxes located at points where the underground collector system cables are spliced and where the cables enter into Willow Creek Substation. Due to the power carrying limits of underground cabling, there would be several segments of underground collector lines or circuits.

The underground electrical collector and communication systems generally would be installed by plowing or trenching the cables. Topsoil would be segregated and temporarily stockpiled prior to trenching. Using this method, the disturbed soils and topsoil are typically replaced over the buried cable within one day, and the drainage patterns and surface topography are restored to pre-existing conditions. In grassland/rangeland areas, the Applicant would re-vegetate the disturbed soils with a weed-free native plant seed mix.

8.10.1.2 Underground Communication System

The fiber optic communication cables for the Project would be installed in the same trenches as the underground electrical collector cables and would connect the communication channels from each turbine to the control room in the Willow Creek Substation.

8.10.2 Collector Substation (Willow Creek Substation)

A new collector substation, Willow Creek Substation, would be constructed at the south end of the Project Area, on private land, where the 34.5-kV electric collection grid and fiber optic communication network would terminate. Willow Creek Substation would include transformers to step up the voltage of the collection grid from 34.5 kV to 115 kV, above ground bus structures to interconnect the substation components, breakers, a control building, relays, switchgear, communications and controls and other related facilities required for delivery of electric power to the proposed adjacent 115-kV Western-owned substation. A list of the anticipated Willow Creek Substation components is shown in Table 8-4.

[1] Assumes that some of the construction disturbance for the underground collector system would be shared with construction disturbance for access roads.

Table 8-4: Anticipated Willow Creek Substation Components

Substation Equipment	Quantity
Control building	1
34.5-kV switchgear	1
34.5-kV capacitor banks	1
115/34.5-kV transformer	2
115-kV circuit breaker	1

The design of Willow Creek Substation is not finalized, but the Applicant expects it would be enclosed by a chain link fence with dimensions of roughly 300 feet by 200 feet. The substation components would be placed on concrete and steel foundations. A preliminary Willow Creek Substation layout is included in Figure 7. For purposes of calculating temporary impacts in this application, the Applicant has assumed approximately 2 acres of total temporary disturbance from substation construction.

Willow Creek Substation will be designed in compliance with Federal, State and local regulations, National Electrical Safety Code (NESC) standards, and other applicable industry standards and will be interconnected to a new Western-owned interconnection substation. It is anticipated that the new Western-owned substation would be located adjacent to Willow Creek Substation, and the proposed transmission interconnection would consist of three jumpers, approximately 100 feet in length, between the two substations. One steel deadend structure, approximately 65 feet in height, would be installed at each substation to connect the jumpers.

8.10.3 Western Substation

This Project proposes an interconnection to a new Western-owned substation, constructed adjacent to Willow Creek Substation. This new substation would be located on or adjacent to the existing Western-owned Maurine to Newell 115-kV line right-of-way and would include 115-kV gas-insulated circuit breakers, associated switches, bus work, and metering equipment. It would not include a transformer.

9.0 ALTERNATE SITES AND SITING CRITERIA (ARSD 20:10:22:12)

In addition to access to transmission and sufficient wind, a wind energy project must be located in an area where landowners are willing to grant various easements and leases on commercially reasonable terms and conditions, and where land use provides sufficient space for optimum turbine spacing. Access to transmission must be such that the power generated by the project can be relatively easily delivered into the grid. The following sections further describe the criteria used in the selection of the Project Area and layout.

9.1 General Project Location Selection

The selected location for the Project fulfills the necessary requirements for a successful wind power development, including increasing electricity demand, an excellent wind resource, land availability, and transmission access. The site is in a low population density area away from airports and other potential interferences, and community interest in the Project is very high. Regional demand for electricity is growing, and load growth for the Dakotas is projected to be at least 2,100 MW over the next ten years. The Project is located immediately adjacent to a Western 115-kV high-voltage transmission line, and the interconnection point would be within the Project footprint at U.S. Highway 212.

9.2 Wind Resource and Land Availability

Utility-scale wind farms require the right kind of wind conditions. The Applicant reviewed large-scale wind resource mapping to identify the highest wind resource areas, and the Project Area was identified as an excellent wind resource through the NREL wind resource map. However, large-scale wind resource maps are not of sufficient detail to locate wind turbines, because they are generated over a large geographic region without detailed verification of the local terrain. In order to make an adequate assessment of the site's suitability for development and forecast annual electricity output, one must directly measure the wind resource. KB Energy, of Cheyenne, Wyoming, was contracted to erect met towers and SODAR units to collect wind data in December 2011. DNV-GL, the leader in wind facility engineering and resource assessment, was contracted to analyze the data, create a wind map of the Project Area, design the turbine array, and calculate annual energy output in 2014.

9.3 Transmission

The third key factor that determines site selection is economically viable access to transmission facilities. Western's Maurine to Rapid City 115-kV line transects the Project Area and provides onsite interconnection to the grid. Western has completed a feasibility study and confirmed interconnection of

103 MW at the Project Area. The system upgrades necessary to achieve this will be specified in Western's facility study, expected to be completed by mid-2015.

9.4 Site Configuration Alternatives

DNV-GL designed an initial 141 turbine (325-MW) layout in December 2014. This layout was based on an initial engineering study completed in 2013 that indicated 325 MW of available capacity if the Western 115-kV transmission line between the Project and Maurine Substation was rebuilt to 230-kV. However, Western's feasibility study showed that 325 MW could not be achieved without major system enhancements. It was decided that connecting 103 MW to the existing 115-kV line at the Project was the best option. The current layout of 45 turbines reflects the optimal configuration to best capture wind energy. This layout will be reviewed for the purpose of eliminating and/or minimizing impacts to the environment and cultural resources. The current layout is shown in Figure 3; however, the layout is subject to change based on current and on-going ecological and cultural resource studies.

The final layout will incorporate the following planned setbacks:

- 500 feet from public roads, distribution power lines, and high voltage transmission lines
- 1,000 feet from the occupied residence within the Project Area
- Clearance of microwave beam paths
- Avoiding wetlands to the extent practicable
- 0.25 mile from Waterfowl Production Areas

In addition, setbacks defined by County and local ordinances, as well as landowner preference setbacks, which help avoid objections to Project component locations, are also planned for incorporation in the final layout.

9.5 Lack of Reliance on Eminent Domain Powers

Because Wind Quarry, LLC is not a public utility, it did not rely on eminent domain powers to acquire easements for the wind energy facility. Use of all required properties for the wind energy facility has been obtained through voluntary leases with property owners. Private land will be used for all facilities. The Applicant will also coordinate with Federal, State, and local agencies to obtain appropriate permits, if necessary.

10.0 ENVIRONMENTAL INFORMATION (ARSD 20:10:22:13)

Sections 11.0 through 14.0 and Sections 17.0, 18.0, and 20.0 provide a description of the existing environment at the time of the Application submittal, potential changes to the existing environment that are anticipated as a result of Project construction and operation, and irreversible changes that are anticipated to remain beyond the operational lifetime of the facility.

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

The following sections describe the existing physical environment within the Project Area and the potential effects of the proposed Project on the physical environment.

11.1 Existing Physical Environment

The following sections describe the existing geology, soil types, and seismic risks within the Project Area.

11.1.1 Geology

This section describes the regional landforms, surficial geology, bedrock geology, and economic deposits within the Project Area.

11.1.1.1 Regional Landforms/Surficial Geology

The topography of the Project Area is generally characterized by smooth hills and ridges with rounded tops. Relief within the Project Area is low to moderate with site elevations ranging from approximately 3,000 to 3,200 feet above mean sea level (AMSL). Within the Project Area, shallow local drainages bisect the terrain. The Project Area is located atop a local topographic high point, from which drainage occurs to the northeast, east, southeast, south, and southwest. A number of the shallow drainages within the Project Area have been dammed to create small stock water ponds.

The Project Area is located within the Pierre Hills division of the Great Plains physiographic region. The Pierre Hills division is an erosional landscape defined by rounded hills and ridges, generally located west of the Missouri River, east of the Black Hills, and between the plateau divisions of northern and southern South Dakota (Johnson et al., 1995).

The physiographic features of the Project Area, including smooth hills and ridges and shallow meandering drainages, were formed as the underlying bedrock was eroded by the action of wind and water. The surficial geology of the Project Area can be described as a thin veneer of residual soils underlain by the Pierre Shale bedrock. Residual soils generally exhibit similar mineralogy to their underlying parent materials, although the high degree of weathering usually causes the overall soil structure to differ. Minor areas of alluvial deposits consisting of sediments derived from the Pierre Shale are mapped within the Sulphur Creek drainages of the northern extents of the Project Area. The following surficial geologic units are mapped within the Project Area (SDGS, 2004):

- **Qal – Alluvium (Quaternary)** – Clay- to boulder-sized clasts with locally abundant organic material. Thickness up to 75 feet (23 meters)
- **Kp – Pierre Shale (Upper Cretaceous)** – Blue-gray to dark-gray, fissile to blocky shale with persistent beds of bentonite, black organic shale, and light-brown chalky shale. Contains minor sandstone, conglomerate, and abundant carbonate and ferruginous concretions. Thickness up to 2,700 feet (823 meters)

Figure 8a illustrates the surficial geology within the Project Area (SDGS, 2004), and Figure 8b is a geologic cross section of the Project Area.

11.1.1.2 Bedrock Geology

The uppermost bedrock unit underlying the Project Area is the Pierre Shale. The Pierre Shale, as described by the South Dakota Geological Survey (SDGS) 2004 Geologic Map of South Dakota, is an Upper Cretaceous-aged blue-gray to dark-gray, fissile to blocky shale with persistent beds of bentonite, black organic shale, and light-brown chalky shale. The Pierre Shale contains minor sandstone and conglomerate beds and abundant carbonate and ferruginous (iron-rich) concretions.

The Pierre Shale bedrock is present at the surface, or is obscured by a thin layer of residual soil, throughout a vast majority of the Project Area, with the exception of minor areas of alluvial deposits in the lower elevations of the northern extents of the Project Area. These alluvial deposits, associated with Sulphur Creek, directly overly the Pierre Shale bedrock and likely exist to depths on the order of 10 to 30 feet. Siting of Project structures is most likely to be within the higher elevations of the Project Area, thus within the Pierre Shale bedrock. Figure 8b depicts the geologic cross section information available for the Project Area.

11.1.1.3 Economic Deposits

Commercially viable mineral deposits within Butte County are limited to sand, gravel and construction aggregates and bentonite. Information from the South Dakota Department of Environment and Natural Resources (SDDENR) Minerals and Mining Program and a review of United States Geological Survey (USGS) 7.5 minute quadrangle mapping indicates no such deposits have been developed within the Project Area. The nearest active gravel quarry is approximately 25 miles northeast of the Project Area (SDDENR, 2015a).

A review of information from the SDDENR Oil and Gas Initiative Program reveals that, although there is current and historic oil and gas development in northwestern South Dakota, the Project Area does not lie within an identified oil and gas field. The nearest oil and gas field to the Project Area is the South Fork

field, which exists approximately 20 miles northwest of the Project Area (SDDENR, 2015b). No other active or historic economic mineral deposits exist within the vicinity of the Project Area.

11.1.2 Soil Type

The soils within the Project Area primarily consist of loams, silty clay loams, and clays derived from the underlying Pierre Shale bedrock. The soils in the Project Area are not highly susceptible to erosion. The soils in the Project Area are generally not conducive to crop production but are typically conducive for range vegetation for livestock grazing (NRCS, 2015).

Nearly all the soils within the Project Area have the potential to be highly corrosive to buried steel and concrete and are interpreted to be expansive based upon indicated soil classifications. The majority of soils in the Project Area are well drained, and only approximately 2 percent of the soils have a significant hydric component. The isolated hydric soils are associated with stock dams and within the bottoms of larger draws. Approximately 9 percent of the soils are considered to have a high potential for frost action (NRCS, 2015). Table 11-1 lists the soil types and characteristics within the Project Area, and Figure 9 illustrates the soil types and distributions within the Project Area.

Table 11-1: Soil Types Within the Project Area

Soil Type	Soil Taxonomy	Soil Texture	Parent Material	Natural Drainage Class	Depth to Restrictive Feature (Inches)	Acres in Project Area	Percent of Project Area
BmA (Bidman loam, 0 to 2 percent slopes)	Fine, smectitic, mesic Ustic Paleargids	Loam	Alluvium derived from shale	Well drained	Greater than 80	65	0.2%
CgD (Cabbart-Scroggin loams, 6 to 25 percent slopes)	Loamy, mixed, superactive, calcareous, frigid, shallow Aridic Ustorthents; Fine-silty, mixed, superactive, calcareous, frigid Aridic Ustorthents	Loam	Residuum weathered from sedimentary rock	Well drained	10 to 40 to paralithic bedrock	22	0.1%
HIB (Hisle loam, 0 to 9 percent slopes)	Fine, smectitic, mesic Leptic Torrertic Natrustalfs	loam	Slope alluvium and/or residuum weathered from shale	Well drained	20 to 40 to paralithic bedrock	10	0.02%
HsB (Hisle-Slickspots complex, 0 to 6 percent slopes)	Fine, smectitic, mesic Leptic Torrertic Natrustalfs	Silt loam, clay	Clayey residuum weathered from clayey shale	Well drained	1 to 4 to natric bedrock, 20 to 40 to paralithic bedrock	40	0.1%
KIA (Kyle clay, 0 to 2 percent slopes)	Very-fine, smectitic, mesic Aridic Haplusterts	Clay	Clayey alluvium derived from shale	Well drained	Greater than 80	317	0.8%
KIB (Kyle clay, 2 to 6 percent slopes)	Very-fine, smectitic, mesic Aridic Haplusterts	Clay	Clayey alluvium derived from shale	Well drained	Greater than 80	744	1.8%

Soil Type	Soil Taxonomy	Soil Texture	Parent Material	Natural Drainage Class	Depth to Restrictive Feature (Inches)	Acres in Project Area	Percent of Project Area
KuB (Kyle-Pierre clays, 0 to 6 percent slopes)	Very-fine, smectitic, mesic Aridic Haplusterts;	Clay	Residuum weathered from clayey shale and/or slope alluvium derived from clayey shale	Well drained	Greater than 80	688	1.7%
LcE (Lismas clay, 10 to 40 percent slopes)	Fine, smectitic, mesic Torrertic Haplustepts	Clay	Clayey residuum weathered from shale	Well drained	10 to 20 to paralithic bedrock	9,611	23.8%
LeD (Lismas-Pierre clays, 3 to 18 percent slopes)	Clayey, smectitic, nonacid, mesic, shallow Aridic Ustorthents	Clay	Residuum from weathered shale	Well drained	10 to 40 to paralithic bedrock	108	0.3%
Mn (McKenzie clay)	Fine, smectitic, frigid Chromic Endoaquerts	Clay	Clayey slope alluvium	Poorly drained	Greater than 80	222	0.6%
PrB (Pierre clay, 2 to 6 percent slopes)	Fine, smectitic, mesic Torrertic Haplustepts	Clay	Clayey residuum weathered from shale	Well drained	28 to 34 to paralithic bedrock	3,479	8.6%
PrD (Pierre clay, 6 to 20 percent slopes)	Fine, smectitic, mesic Torrertic Haplustepts	Clay	Clayey residuum weathered from shale	Well drained	28 to 34 to paralithic bedrock	3,449	8.5%
Sa (Sage-Slickspots complex, 0 to 15 percent slopes)	Fine, smectitic, nonacid, mesic Typic Fluvaquents	Silty clay loam, silty clay, clay	Silty clay and alluvium, residuum and/or slope alluvium	Poorly drained, well drained	40 to greater than 80 to paralithic bedrock	239	0.6%

Soil Type	Soil Taxonomy	Soil Texture	Parent Material	Natural Drainage Class	Depth to Restrictive Feature (Inches)	Acres in Project Area	Percent of Project Area
Sb (Sage silty clay loam, 0 to 3 percent slopes)	Fine, smectitic, nonacid, mesic Typic Fluvaquents	Silty clay loam	Silty and clayey alluvium	Poorly drained	Greater than 80	304	0.8%
Sg (Shale land)	N/A	Weathered bedrock	N/A	Excessively drained	0 to 1 to bedrock	21	0.1%
SIB (Slickspots-Wasa complex, 0 to 6 percent slopes)	Very-fine, smectitic, mesic Aridic Leptic Haplusterts	Clay	Residuum and/or slope alluvium, residuum from weathered shale	Well drained	20 to 60 to paralithic bedrock	2,783	6.9%
Sr (Stetter clay)	Fine, smectitic, nonacid, mesic Torrertic Ustifluvents	Clay	Alluvium	Well drained	Greater than 80	35	0.1%
Ss (Stetter clay, channeled)	Fine, smectitic, nonacid, mesic Torrertic Ustifluvents	Clay (channeled)	Alluvium	Well drained	Greater than 80	202	0.5%
St (Lismas clay, 12 to 45 percent slopes, stony	Clayey, smectitic, nonacid, mesic, shallow Aridic Ustorthents	Clay (stony)	Residuum weathered from shale	Well drained	10 to 20 to paralithic bedrock	109	0.3%
SuA (Swanboy clay, 0 to 3 percent slopes)	Very-fine, smectitic, mesic Aridic Haplusterts	Clay	Clayey alluvium derived from shale	Well drained	Greater than 80	10	0.02%

Soil Type	Soil Taxonomy	Soil Texture	Parent Material	Natural Drainage Class	Depth to Restrictive Feature (Inches)	Acres in Project Area	Percent of Project Area
Sv (Swanboy-Slickspots complex, 0 to 3 percent slopes)	Very-fine, smectitic, mesic Aridic Haplusterts;	Clay, loam	Clayey alluvium derived from shale, sodic silty and clayey alluvium over residuum weathered from shale	Well drained	30 to greater than 80 to paralithic bedrock	1,371	3.4%
ToB (Twotop clay, 0 to 9 percent slopes)	Very-fine, smectitic, mesic Aridic Haplusterts	Clay	Clayey alluvium and/or clayey slope alluvium	Well drained	Greater than 80	1,214	3.0%
WaB (Wasa-Slickspots complex, 0 to 6 percent slopes)	Very-fine, smectitic, mesic Aridic Leptic Haplusterts	Clay	Residuum from weathered shale, Residuum and/or slope alluvium	Well drained	20 to 40 to paralithic bedrock	2,858	7.1%
WnB (Winler clay, 0 to 9 percent slopes)	Very-fine, smectitic, mesic Aridic Leptic Haplusterts	Clay	Clayey residuum weathered from shale	Well drained	24 to 39 to paralithic bedrock	12,238	30.3%

Source: NRCS, 2015

11.1.3 Seismic Risks

The risk of seismic activity in the vicinity of the Project Area is very low. The USGS Earthquake Hazards Program estimates a 0.0 to 1.0 percent probability that a Magnitude 5 or greater earthquake will occur within 50 kilometers of the Project Area within the next 20 years. Further, the USGS 2014 Seismic Hazard Map for South Dakota indicates the peak ground acceleration (PGA) with a 2 percent chance of exceedance in 50 years is 0.04 g to 0.08 g.

According to the SDGS, no earthquakes have been recorded in Butte County, South Dakota from 1872 to 2013 (SDGS, 2013). Available geologic mapping and information from the USGS Earthquake Hazards Program do not indicate any active or inactive faults within the Project Area (USGS, 2009).

11.1.4 Subsidence Potential

The risk for subsidence within the Project Area is considered negligible. The Pierre Shale bedrock is present at the surface, or beneath a thin veneer of residual soil, throughout a vast majority of the Project Area and is not known to exhibit karst topography or contain layers or members susceptible to dissolution by water. No historic underground mining operations, which could lead to subsidence potential, exist within the Project Area.

11.2 Facility Impacts

The following sections describe the potential effects of the proposed Project on geologic and soil resources and the potential geological constraints on design, construction, and operation of the Project.

11.2.1 Potential for Impacts to Geologic and Soil Resources

Due to the lack of developed or potential economic mineral resources within the Project Area, development of the proposed facility poses no impact to economic mineral resources.

Construction of the wind turbine foundations, access roads, collector lines, substation, and O&M facilities would result in approximately 331 acres of temporary disturbance and approximately 109 acres of permanent impacts to soils within the Project Area. During construction, existing vegetation would be removed in the areas associated with the proposed Project components, potentially increasing the risk of erosion, which is discussed in more detail below. Impacts to agricultural soils from the Project are discussed in Sections 13.2 and 20.2.3.

11.2.1.1 Erosion, Slope Stability, and Sedimentation

The Applicant has designed the Project to minimize construction cut and fill work and minimize construction in steep slope areas. Wind turbines are generally located at higher elevations to maximize

exposure to wind and to avoid steep slope areas for foundation installation. The current layout has sited access roads to avoid steep slopes as much as possible, and the underground collector lines similarly avoid crossing steep ravines whenever feasible.

Construction of the Project will require coverage under the General Permit for Storm Water Discharges Associated with Construction Activities issued by the SDDENR. A condition of this permit is the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP will be developed during civil engineering design of the Project and will prescribe BMPs to control erosion and sedimentation. The BMPs may include silt fence, wattles, erosion control blankets, temporary storm water sedimentation ponds, re-vegetation, or other features and methods designed to control storm water runoff and mitigate erosion and sedimentation. The BMPs will be implemented to prevent the impact of drainageways and streams by sediment runoff. During the facility design life, erosion rates are not anticipated to increase from those of pre-development conditions.

11.2.2 Geological Constraints on Design, Construction, and Operation

In general, the geological and geotechnical conditions within the Project Area are favorable and are not anticipated to control or impact development of the Project. Excavation, bearing, and groundwater conditions associated with the shallow Pierre Shale bedrock throughout the Project Area are anticipated to be conducive to construction and operation of the wind turbine tower foundations and access roadways.

Prior to construction, soil borings would be performed at all wind turbine locations to develop the specific design and construction parameters. Laboratory testing of soil samples obtained from the site and geophysical surveys would be performed to determine the engineering characteristics of the site subgrade soils. If necessary, corrections to roadway and foundation subgrade would be prescribed for unsuitable soils.

12.0 EFFECT ON HYDROLOGY (ARSD 20:10:22:14, 20:10:22:15)

The following sections describe the exiting hydrology within the Project Area and the potential effects of the proposed Project on hydrology.

12.1 Existing Hydrology

This section describes the hydrogeology, surface water resources, floodplains, National Park Service (NPS) Nationwide Rivers Inventory (NRI) resources, and impaired waters within the Project Area.

12.1.1 Hydrogeology

The Project Area is located within Northern Great Plains Aquifer System, which includes five major aquifers: (1) lower Tertiary; (2) upper Cretaceous; (3) lower Cretaceous; (4) upper Paleozoic; and (5) lower Paleozoic (USGS, 1996). The Northern Great Plains Aquifer System lies underneath nearly all of South Dakota. The Williston Structural Basin covers much of South Dakota. A confining unit associated with the Northern Great Plains Aquifer System underlies the Project Area. A confining layer is a layer of rock or soil with very low hydraulic conductivity that hampers the movement of groundwater in and out of an aquifer.

Several major and minor aquifers of varying depth and quality are utilized within the broader region of the Project Area (Belle Fourche River Watershed Partnership, 2008). Shallow aquifers in the region tend to be smaller and generally have good water quality but can be more vulnerable to leaching of nutrients, pesticides, organic waste and pathogens. Recharge of shallow aquifers occurs primarily from infiltration of precipitation but also from wetlands, lakes and streams. Deep aquifers often occur between layers of impenetrable bedrock with variable water quality. As a result of the restrictive soil layers protecting these aquifers and the depth at which they occur, these aquifers are less susceptible to leaching and other surface activities and impacts. The aquifers that fall within the Project Area are within the following formations: (1) Fox Hills; (2) Madison; (3) Deadwood Minnelusa; (4) Spearfish; (5) Inyan Kara; (6) Lakota; and (7) pre-Cambrian metamorphic and crystalline bedrock (Belle Fourche River Watershed Partnership, 2008).

12.1.2 Surface Water Resources

The Project Area is located within the Missouri River Basin surface water drainage system. Based on information obtained from the U.S. Army Corps of Engineers' (USACE) Final Environmental Impact Statement, Master Water Control Manual, Review and Update Study for the Missouri River, this drainage system has a total drainage area of approximately 529,350 square miles, including approximately 9,700

square miles in Canada (USACE, 2004). The Missouri River flows from the confluence of the Jefferson, Madison, and Gallatin Rivers in southwestern Montana, a distance of approximately 2,320 miles prior to converging with the Mississippi River directly upstream of St. Louis, Missouri (USACE, 2004). There are six mainstem reservoir system dams (including the major streams and tributaries) associated with the Missouri River Basin: (1) Fort Peck; (2) Garrison; (3) Oahe; (4) Big Bend; (5) Fort Randall; and (6) Gavins Point.

The Missouri River Basin surface water drainage system consists of region, sub-region, basin, and sub-basin drainages. The Project Area is associated with the Cheyenne Sub-Region of the Missouri Region. The Project Area is also located within the Lower Belle Fourche and Cherry Sub-Basins.

12.1.2.1 Lower Belle Fourche Sub-Basin

The southern half of the Project Area is located in the Lower Belle Fourche Sub-Basin. The Belle Fourche River located south of the Project Area is part of the Lower Belle Fourche Sub-Basin drainage system. Drainage generally flows from either the Black Hills or from the northwest to the southeast within this Sub-Basin. At the southeastern corner of the Sub-Basin, the Belle Fourche River flows into the Cheyenne River. Named streams of the Lower Belle Fourche Sub-Basin that extend through the Project Area include South Double R Creek and South Sulphur Creek (Figure 10).

12.1.2.2 Cherry Sub-basin

The northern half of the Project Area is located in the Cherry Sub-Basin. Drainage within the Cherry Sub-Basin generally flows from west to east into the Cherry River, which is generally located east of the Project Area. The Cherry River flows into the Cheyenne River at the southeastern corner of the Sub-Basin. Named streams of the Cherry Sub-Basin that extend through the Project Area include Butte Creek, Eightmile Creek, Elm Creek, Mud Elm Creek, and Station Elm Creek (Figure 10).

12.1.3 Floodplains

Within the Project Area, narrow floodplains exist along major streams, including South Double R Creek, Station Elm Creek, and Mud Elm Creek, as well as along several unnamed tributaries to these streams (Figure 10). Floodplains also exist around several small ponds within the Project Area. All floodplains within the Project Area are mapped as Zone A, indicating no base flood elevations have been determined.

12.1.4 National Park Service Nationwide Rivers Inventory (NRI)

The NRI is a “listing of more than 3,400 free-flowing river segments in the United States that are believed to possess one or more ‘outstandingly remarkable’ natural or cultural values judged to be of more than

local or regional significance. Under a 1979 Presidential Directive, and related Council on Environmental Quality procedures, all federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI segments" (NPS, 2015). There are no NRI-listed rivers within the Project Area. The nearest NRI-listed river is the Belle Fourche River, located approximately 7 miles south of the Project Area.

12.1.5 Impaired Waters

The Clean Water Act (CWA) requires states to publish biannually a list of streams and lakes that are not meeting their designated uses because of excess pollutants. These streams and lakes are considered impaired waters (USEPA, 2008). The list, known as the 303(d) list, is based on violations of water quality standards. States establish priority rankings for waters on the 303(d) list and develop the total maximum daily load (TMDL) of a pollutant that the water can receive and still safely meet water quality standards. There are no 303(d)-listed water bodies within the Project Area or within the Lower Belle Fourche or Cherry Sub-Basins (SDDENR, 2014). The nearest downstream 303(d)-listed water body to the Project Area is the Cheyenne River, located approximately 45 miles southeast.

12.2 Facility Impacts

This section describes the potential effects of the Project on current or planned water uses and surface or groundwater resources.

12.2.1 Effect on Current or Planned Water Use

The proposed Project facilities would not have impacts on either municipal or private water uses in the Project Area. Butte-Meade Sanitary Water District, which supplies rural water to the Project Area, does not currently have facilities or provide services within the Project Area. Water storage, reprocessing, or cooling is not required for either the planned construction or operation of the facilities. The Project facilities would not require deep well injection. The Project operation would not require the appropriation of surface water or permanent dewatering.

It is likely that a connection to the rural water supply would be necessary for the O&M facility. Alternatively, a water supply well may be required if rural water service is not available. Water usage at the O&M facility would be similar to household volume, less than 5 gallons per minute. The Applicant would coordinate with Butte-Meade Sanitary Water District if a rural water supply connection is necessary for the Project.

The construction of wind farm facilities can interrupt the availability of groundwater through construction dewatering. Construction dewatering may temporarily lower the water table such that nearby wells may

lose some of their capacity. However, the Project is not anticipated to require major dewatering; therefore, interruption of groundwater availability caused by dewatering is unlikely. In the event potential temporary dewatering wells are necessary during construction activities, the temporary wells would be installed and decommissioned as required by South Dakota law.

By maintaining a minimum set-back of approximately 1,000 feet from residences, the areas surrounding residential domestic wells would not be impacted by turbine placement or construction dewatering impacts. Regarding other potential water supply well locations (e.g., a livestock water supply well) that may be located near potential dewatering activities; provisions would be made to help ensure that an adequate supply of water is provided until dewatering activities have been completed. The Project would have no impact on surface water availability or use for communities, schools, agriculture, recreation, fish, or wildlife.

12.2.2 Potential for Surface and Groundwater Impacts

Potential impacts to water resources from the construction and operation of wind projects include deterioration of surface water quality through sedimentation, impacts to drainage patterns, impacts to flood storage areas and increased runoff due to the creation of impervious surfaces. The approximate 109 acres of permanent impacts planned within the Project Area is broadly dispersed throughout the Project and represents less than 1 percent of the total acreage in the Project Area. Therefore, the Project is not expected to cause significant changes in runoff patterns or volume of runoff, nor is it expected to have adverse impacts on existing hydrology. During construction, BMPs will be implemented to control erosion and minimize potential for sediment runoff from exposed soils during precipitation events.

12.2.2.1 Groundwater Dewatering

The construction of wind farm facilities can require dewatering of excavated areas as a result of shallow groundwater; particularly for wind turbine foundations or collector line trenches. Construction dewatering may temporarily lower the water table in the immediate area and may temporarily lower nearby surface water elevations depending on the proximity and connectivity of groundwater and surface water and extent of the excavated area.

Groundwater dewatering is not anticipated to be a major concern within the Project Area, because wind turbines are most likely to be placed at higher elevation where the water table tends to be deeper. Should groundwater be encountered that must be dewatered, the necessary permits would be obtained and the duration of dewatering would be minimized to the extent possible. Dewatered groundwater would be

properly handled to allow sediments to settle out and be removed before the water is discharged to minimize soil erosion and sedimentation of surface waters.

12.2.2.2 Deterioration of Water Quality

The excavation and exposure of soils during the construction of wind turbines, access roads, underground collector lines, substations, and transmission lines could cause sediment runoff during rain events. This sediment may increase the total suspended solids (TSS) loading in receiving waters. It is estimated that approximately 331 acres would be temporarily disturbed as a result of construction of turbines, substation, access roads, underground collector lines, O&M facility, meteorological equipment, and temporary laydown areas.

Construction of the Project will require coverage under the General Permit for Storm Water Discharges Associated with Construction Activities issued by the SDDENR. A condition of this permit is the development and implementation of a SWPPP. The SWPPP will be developed during civil engineering design of the Project and will prescribe BMPs to control erosion and sedimentation. The BMPs may include silt fence, wattles, erosion control blankets, temporary storm water sedimentation ponds, re-vegetation, or other features and methods designed to control storm water runoff and mitigate erosion and sedimentation. The BMPs will be implemented to minimize the potential for impacts to drainageways and streams by sediment runoff. Because erosion and sediment controls will be in place for construction and operation of the Project, no impacts to water quality are expected as a result of the Project.

12.2.2.3 Impacts to Drainage Patterns

In general, because wind turbines would be located at higher elevations within the Project Area to maximize wind exposure, impacts to ephemeral streams and drainageways are not anticipated from turbine sites. The underground collection system may temporarily impact surface drainage patterns during construction if the collection system is trenched through drainage ways; however, these impacts would be short-term, and existing contours and drainage patterns are expected to be restored within 24 hours of trenching. Where stream/drainage crossings cannot be avoided for construction of access roads, appropriately designed culverts or low water crossings would be placed to maintain the free flow of water. The permanent disturbances introduced by the wind farm facilities (approximately 109 acres) would be spread throughout the approximately 40,000-acre Project Area and are not expected to change existing drainage patterns.

12.2.2.4 Impacts to Flood Storage Areas

In natural systems, floodplains serve several functions that include storing excess water during high-flow/high-runoff periods, moderating the release of water during high-flow/high-runoff periods, reducing flow velocity, and filtering out sediments and other pollutants. The placement of fill into floodplains reduces the effectiveness of these functions. As noted previously, wind turbines would be located at higher elevations, and the current layout avoids placing the turbines, collector systems, substation, and transmission line in low-lying areas or floodplains.

12.2.2.5 Increased Runoff

The creation of impervious surfaces reduces the capacity of an area to absorb precipitation into the soil and tends to increase the volume and rate of storm water runoff. The Project would create up to 109 acres of impermeable surface through the construction of turbine pads, access roads, meteorological equipment, overhead collection structures, the O&M facility, and the substation. The wind turbine pads, access roads, and O&M facility and substation yards would be constructed of compacted gravel and would not be paved. However, this level of compaction may inhibit infiltration and may increase runoff.

The 109 acres of permanent disturbance represents less than 1 percent of the total within the Project Area. Therefore, the Project is not expected to cause significant changes in runoff patterns or volume. As noted above, appropriate storm water management BMPs would be implemented during the construction and operation of the Project. These BMPs are anticipated to adequately mitigate for runoff due to the increase in impervious surface.

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

The following sections describe the existing terrestrial ecosystem within the Project Area and the potential effects of the proposed Project on these terrestrial systems.

13.1 Existing Terrestrial Ecosystem

Terrestrial ecosystem data were collected from literature searches, Federal and State agency reports, and natural resource databases. Biologists from Marmot's Edge Conservation provided regional and site-specific information for terrestrial resources.

13.1.1 Vegetation

The Project Area is located within the Dense Clay Prairie Level IV Ecoregion of South Dakota (USEPA, 2011). Vegetation communities in this ecoregion are generally very simple, composed largely of western wheatgrass (*Pascopyrum smithii*) stands showing very low understory cover; bare ground cover can be substantial. The area is semi-arid with 13 to 15 inches of annual precipitation (Bryce, et al., 1998). Coupled with low precipitation and the simple habitat structure (i.e., trees and shrubs are rare), vertebrate species richness and diversity are likely low (Tews *et al*. 2004). These monotypic native stands are susceptible to surface disturbance and erosion, leading managers to be cognizant of this feature. Topography is simple with the area comprising rolling hills and shallow drainages leading southward toward the Belle Fourche River.

Land cover types within the Project Area are summarized in Table 13-1 and displayed on Figure 11.

Table 13-1: Summary of Land Cover Types Within the Project Area

Land Cover Type	Area (Acres)	Percentage of Project Area
Barren land	644	1.6%
Cultivated crops	607	1.5%
Developed land	151	0.4%
Hay/pasture	3,623	9.0%
Grassland/herbaceous	32,634	80.9%
Shrub/scrub	2,595	6.4%
Open Water	99	0.2%

As indicated in Table 13-1, the grassland/herbaceous land cover type composes the majority of the Project Area. This land cover type includes areas in which naturally occurring gramanoid or herbaceous species

compose approximately 80 percent or more of the total vegetation (MRLC, 2011). These areas may be grazed.

Shrub/scrub and barren land cover types are interspersed throughout the Project Area. The shrub/scrub land cover type includes areas where shrubs, less than 5 meters tall, are the dominant vegetative cover (MRLC, 2011). The canopy is generally not more than 20 percent of the total vegetation cover. Vegetation may include true shrubs, young trees in early succession, or trees stunted by environmental conditions. The barren land cover type includes areas where vegetation covers 15 percent or less of the surface area (MRLC, 2011). Surface materials can include bedrock, scarps, talus, slides, glacial debris, strip mines, and gravel pits.

Cultivated crops and hay/pasture land cover types are concentrated in the northwestern portion of the Project Area. The cultivated crops land cover type includes all land being actively tilled, particularly cultivated areas producing annual crops such as corn or soybeans (MRLC, 2011). Vegetative cover in the hay/pasture land cover type includes grasses and/or legumes planted for agricultural purposes, typically on an annual basis (MRLC, 2011).

The open water land cover type consists of surface water, generally with less than 25 percent cover of vegetation or soil (MRLC, 2011). Developed land cover types, which generally correspond with U.S. Highway 212 in the Project Area, consist of areas with a mixture of constructed materials (impervious surfaces) and vegetation.

13.1.1.1 Cropland and Pastureland

Approximately 1.5 percent of the Project Area is cultivated cropland (row crop or cover crop) and 89.9 percent is grassland and pastureland. In Butte County in 2012 (the latest available year for the U.S. Department of Agriculture [USDA] Census of Agriculture), approximately 8 percent of the land area was cropland, with forage-land (used for all hay, grass silage, and greenchop) being the most common crop (USDA, 2012). Other common cultivated crops included wheat and corn. Cultivated cropland in Butte County decreased by 28 percent from 163,375 acres in 2007 to 116,836 acres in 2012 (USDA, 2012). Specific acreages of different crops within the Project Area, which change from year to year, are not available. In Butte County in 2012, approximately 71 percent of the land area was pastureland (USDA, 2012). Pastureland increased slightly (1 percent) from 1,003,616 acres in 2007 to 1,016,494 acres in 2012.

Natural Resources Conservation Service (NRCS) farmland classifications include “prime farmland” (land, which has the best combination of physical and chemical characteristics for the production of crops), “farmland of statewide importance” (land other than prime farmland, which has a good

combination of physical and chemical characteristics for the production of crops), and "not prime farmland" (land that does not meet qualifications for prime farmland), amongst other classifications. Over 99 percent of the Project Area is classified as "not prime farmland." A very small percentage 0.1 percent of the Project Area is classified as "farmland of statewide importance," and none of the Project Area is classified as "prime farmland."

13.1.1.2 Easements

Based on a review of publicly available NRCS easement data (USDA, 2015) and correspondence with USFWS (DeVries, 2015), there are no NRCS agricultural land/wetland reserve easements or USFWS grassland/wetland easements within the Project Area.

13.1.1.3 Noxious Weeds

Noxious weeds are regulated by State (SDCL 38-22) and Federal (US CFR 2006) rules and regulations designed to stop the spread of plants that are detrimental to the environment, crops, livestock, and/or public health. According to the South Dakota Department of Agriculture (SDDOA), 12 listed species of noxious weeds have the potential to occur and are regulated within Butte County (SDDOA, 2015). Seven of these species are listed State-wide, and the remaining five species are locally listed for Butte County (Table 13-2).

Table 13-2: State and Local Noxious Weeds of South Dakota

Common Name	Scientific Name	State Weed Status
Canada thistle	*Cirsium arvense*	State noxious weed
Hoary cress	*Cardaria draba*	State noxious weed
Leafy spurge	*Euphorbia esula*	State noxious weed
Perennial sow thistle	*Sonchus arvensis*	State noxious weed
Purple loosestrife	*Lythrum salicaria*	State noxious weed
Russian knapweed	*Centaurea repens*	State noxious weed
Salt cedar	*Tamarix aphylla, T. chinensis, T. gallica, T. parviflora, and T. ramosissima*	State noxious weed
Common Burdock	*Arctium minus*	Local noxious weed
Musk thistle	*Carduus nutans*	Local noxious weed
Phragmites	*Phragmites australis*	Local noxious weed
Plumeless thistle	*Carduus acnthoides*	Local noxious weed
Scotch thistle	*Onopodum acanthium*	Local noxious weed

13.1.1.4 Wetlands

Wetlands perform several important functions within a landscape, including flood attenuation, groundwater recharge, water quality protection, and wildlife habitat. Wetlands are defined in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987), as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands have the following general diagnostic characteristics:

1. **Hydrophytic vegetation –** The prevalent vegetation consists of macrophytes that are typically adapted to areas having hydrologic and soil conditions that are typically inundated or saturated by surface or ground water. Hydrophytic species, due to morphological, physiological, and/or reproductive adaptation(s), have the ability to grow, effectively compete, reproduce, and/or persist in anaerobic soil conditions.
2. **Hydric soil –** Soils are present and have been classified as hydric, or they possess characteristics that are associated with reducing soil conditions.
3. **Wetland hydrology –** Wetland hydrology indicators provide evidence that the site has a continuing wetland hydrologic regime and that hydric soils and hydrophytic vegetation are not relicts of a past hydrologic regime. Wetland hydrology encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some point during the growing season.

Wetlands are defined by the USACE as a subset of waters of the U.S. Other waters of the U.S. include unvegetated waterways and other water bodies with a defined bed and bank, such as tide channels, drainages, ponds, creeks, rivers, and lakes. The USACE has the authority to regulate the discharge of dredged and fill material into jurisdictional waters of the U.S. Table 13-3 includes waters of the U.S. that may be protected by the CWA.

Table 13-3: Waters of the U.S. Protection

Based on the agencies' interpretation of the statute, implementing regulations and relevant case law, the following waters are protected by the CWA: • Traditional navigable waters; • Interstate waters; • Wetlands adjacent to either traditional navigable waters or interstate waters; • Non-navigable tributaries to traditional navigable waters that are relatively permanent, meaning they contain water at least seasonally; and • Wetlands that directly abut relatively permanent waters.

In addition, the following waters are protected by the CWA if a fact-specific analysis determines they have a "significant nexus[a]" to a traditional navigable water or interstate water:

- Tributaries to traditional navigable waters or interstate waters;
- Wetlands adjacent to jurisdictional tributaries to traditional navigable waters or interstate waters; and
- Waters that fall under the "other waters" category of the regulations. The guidance divides these waters into two categories, those that are physically proximate to other jurisdictional waters and those that are not, and discusses how each category should be evaluated.

The following aquatic areas are generally not protected by the CWA:

- Wet areas that are not tributaries or open waters and do not meet the agencies' regulatory definition of "wetlands";
- Waters excluded from coverage under the CWA by existing regulations;
- Waters that lack a "significant nexus" where one is required for a water to be protected by the CWA;
- Artificially irrigated areas that would revert to upland should irrigation cease;
- Artificial lakes or ponds created by excavating and/or diking dry land and used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing;
- Artificial reflecting pools or swimming pools created by excavating and/or diking dry land;
- Small ornamental waters created by excavating and/or diking dry land for primarily aesthetic reasons;
- Water-filled depressions created incidental to construction activity;
- Groundwater drained through subsurface drainage systems and
- Erosional features (gullies and rills), and swales and ditches that are not tributaries or wetlands.

(a) Generally, "significant nexus" is based on the flow characteristics and functions of the tributary and the functions of wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters.

Impacts to waters of the U.S. are reviewed, permitted, and mitigated through the CWA Section 404 permitting process.

Wetlands and other waters of the U.S. within the Project Area were identified by reviewing NWI maps. NWI maps are produced by the USFWS and provide reconnaissance level information including location, type, and size of these resources. NWI maps are produced by review of high altitude imagery, and interpretation is variable based on quality of aerial photographs, experience of the interpreter, and whether ground-truthing was conducted. According to the NWI, approximately 463 acres out of the 40,000-acre Project Area is comprised of freshwater emergent wetlands and ponds (Figure 10). This means that only approximately 1 percent of the Project Area is mapped as wetlands or ponds. Descriptions of the mapped wetlands and ponds are shown on Table 13-4.

Table 13-4: NWI Wetland and Pond Types Mapped Within the Project Area

Wetland Type	Cowardin Classification[a]	Acres within Project Area
Freshwater emergent wetland	PEMA (palustrine, emergent, temporary flooded)	120
	PEMC (palustrine, emergent, seasonally flooded)	35
	PEMCd (palustrine, emergent, seasonally flooded, partially drained/ditched)	7
	PEMAh (palustrine, emergent, temporary flooded, diked/impounded	10
	PEMAd (palustrine, emergent, temporary flooded, partially drained/ditched)	30
	PEMCx (palustrine, emergent, seasonally flooded, excavated)	Less than 1
	PEMCh (palustrine, emergent, seasonally flooded, diked/impounded	31
	PEMFh (palustrine, emergent, semipermanently flooded, diked/impounded	24
Freshwater ponds	PABFh (palustrine, aquatic bed, semipermanently flooded, diked/impounded)	159
	PUSAh (palustrine, unconsolidated shore, temporary flooded, diked/impounded)	3
	PUBFx (palustrine, unconsolidated bottom, semipermanently flooded, excavated	3
	PUSC (palustrine, unconsolidated shore, seasonally flooded)	24
	PUSCh (palustrine, unconsolidated shore, seasonally flooded, diked/impounded)	16
	Total:	463

(a) Cowardin Classification System: Elements of the Cowardin, et al. (1979) classification system used in eastern South Dakota and NWI codes for systems, subsystems, classes, and modifiers. There are no subsystems in the palustrine system.

13.1.2 Wildlife

As discussed in Section 13.1.1, the Project Area is located within the Dense Clay Prairie Ecoregion. Based on the low precipitation and simple habitat structure (i.e., trees and shrubs are rare) in this ecoregion, vertebrate species richness and diversity are likely low (Tews, et al., 2004). Wildlife species inhabiting the dense clay prairies of the Project Area are typical of semiarid grasslands of the western Great Plains, with pronghorn (*Antilocapra americana*) as the primary native ungulate. Mule deer (*Odocoileus hemionus*) and white-tailed deer are present where woody cover is available, although this feature is rare in the ecoregion. Predators, including coyotes (*Canis latrans*), swift foxes (*Vulpes velox)* (a South Dakota state threatened species), red foxes (*V. vulpes*), and American badgers (*Taxidea taxus*), can

be encountered in these habitats. Where cover is available, one would expect to encounter signs of wild felids such as bobcat and mountain lions, especially those of dispersing individuals, but these predators and their sign are rarely observed.

Birds characteristic of prairie landscapes with light to moderate ground cover and little downed and/or standing litter include sharp-tailed grouse (*Tympanuchus phasianellus*), ferruginous hawks (*Buteo regalis*), long-billed curlews (*Numenius americanus*), lark buntings (*Calamospiza melanocorys*), grasshopper sparrows (*Ammodramus savannarum*), chestnut-collared longspurs (*Calcarius ornatus*), and western meadowlarks (*Sturnella neglecta*) (Tallman, et al., 2002). Golden eagles (*Aquila chrysaetos*) forage across the Project Area and nest to the north and south. Reptiles and amphibians may be locally abundant in suitable microsites (i.e., stock water impoundments or ephemeral streams) and include bullsnakes (*Pituophis catenifer*), prairie rattlesnakes (*Crotalus viridus*), plains garter snakes (*Thamnophis radix*), Great Plains toads (*Anaxyrus [Bufo] cognatus*), and tiger salamanders (*Ambystoma tigrinum*), but overall densities are low.

Element Occurrence Records provided by the Wildlife Diversity Program, SDGFP on August 15, 2011, indicate no occurrences of state sensitive or tracked invertebrate and/or vertebrate species within the Project Area.

General wildlife surveys were initiated by Marmot's Edge Conservation in 2011 and continued through the close of 2014. These surveys included specific and targeted assessments designed to produce accurate and reliable estimates of: (1) migratory bird use of the area; (2) raptor distribution, behavior (i.e., flight heights), and nesting within and adjacent to the Project Area; (3) bat diversity near water bodies; (4) upland game bird distribution and lek locations; (5) landbird diversity and relative abundance; (6) amphibian and reptile occurrence; and (7) mammal occurrence. The following procedures were employed as general wildlife and taxon specific procedures: (1) vehicle; (2) pedestrian; (3) aerial (helicopter); (4) 20-minute and 60-minute raptor point counts; (5) 4-hour raptor migration counts; (6) 10-minute passerine point counts; (7) amphibian and reptile visual encounter surveys (VES); (8) active and passive acoustical bat monitoring; and (9) nocturnal spotlight transects. In addition to surveys deployed within the Project Area, inventories were also performed in a 16-kilometer (km) (10-mile) buffer zone surrounding the Project Area. Results from the aforementioned studies will be reported in *Wildlife Inventories, Eagle Conservation Planning, and Bird/Bat Conservation Planning for the Willow Creek Wind Power Facility, Butte County, South Dakota*, in preparation (Atkinson, in prep.).

13.1.2.1 Migratory Birds

The Project Area lies within the central flyway funneling waterfowl and other species between the Gulf Coast and northern breeding grounds. Furthermore, the Project Area is contained within Bird Conservation Region (BCR) 17 (ABC, 2015a). Substantial movements of migratory birds, including waterfowl, sandhill cranes, raptors, and passerines, occur across the area in both vernal and autumnal periods. However, little migratory stopover habitat is provided in the Project Area. Deciduous draws are not present, wetlands are largely anthropogenic in the form of livestock watering ponds with little exposed shorelines, and the little topographical relief present fails to funnel migrants through the area in any concentrated manner. Heretofore, no cereal grains are raised within or near the Project Area, with alfalfa and mixed grass haying operations, as well as livestock grazing, contributing the only agricultural uses. Therefore, no strong attractants are provided for migratory avian species.

Migratory waterfowl, including dabbling and diving ducks, cross the Project Area, but few water bodies are present or ice-free during spring migration. Areas west of the Project Area provide higher quality foraging stops and include Belle Fourche Reservoir and Newell Lake for these birds. Sandhill cranes migrate over the Project Area in the spring but generally at high altitudes (greater than 200 meters).

13.1.2.2 Raptors

Across the Project Area and within a 10-mile buffer zone surrounding the Project Area, raptor seasonal and spatial distribution, abundance, and species richness were assessed through vehicle, pedestrian, and aerial (helicopter) surveys between 2011 and 2014 (Atkinson, 2011 and 2014). Additionally, 20-minute and 60-minute raptor point count surveys well distributed across the area characterized distribution, seasonal timing, abundance, and behavior of raptors. Four-hour migration counts described broad local broad front migration of boreal and temperate species. Table 13-5 lists the raptor species encountered within the 10-mile buffer zone and Project Area.

Table 13-5: Raptor Species Encountered within Project Area and 10-Mile Buffer

Common Name	Scientific Name
Turkey vulture	*Cathartes aura*
Northern harrier	*Circus cyaneus*
Sharp-shinned hawk	*Accipiter striatus*
Cooper's hawk	*Accipiter cooperii*
Broad-winged hawk	*Buteo platypterus*
Swainson's hawk	*Buteo swainsoni*
Red-tailed hawk	*Buteo jamaicensis*

Common Name	Scientific Name
Ferruginous hawk	*Buteo regalis*
Rough-legged hawk	*Buteo lagopus*
Golden eagle	*Aquila chrysaetos*
Bald eagle	*Haliaeetus leucocephalus*
American kestrel	*Falco sparverius*
Merlin	*Falco columbarius*
Peregrine falcon	*Falco peregrinus*
Prairie falcon	*Falco mexicanus*
Short-eared owl	*Asio flammeus*
Great horned owl	*Bubo virginianus*
Snowy owl	*Bubo scandiacus*
Burrowing owl	*Athena cunicularia*

Thirty nests of raptors were identified across the Project Area and 10-mile buffer. Specific to the Project Area footprint, however, only one raptor nest was located, that of a ferruginous hawk. Eight bald eagle nests corresponding to six occupied nesting territories were located during aerial and ground surveys of the 10-mile buffered area. Five occupied golden eagle nests were discovered. Four, eight, and three nests of ferruginous hawks, red-tailed hawks, and Swainson's hawks, respectively, were discovered. Two unidentified and unoccupied raptor nests were also discovered.

Open grassland habitats provide good foraging areas for a variety of raptors, whereas nesting sites are limited or only provided for ground nesting species. In addition to widely distributed white-tailed jackrabbits (*Lepus townsendii*), desert cottontail rabbits (*Sylvilagus audubonii*), rodents (meadow voles [*Microtus pennsylvanicus*], deermice [*Peromyscus maniculatus*], and northern pocket gophers [*Thomomys talpoides*], among others), prairie passerines are in abundance, and black-tailed prairie dog colonies occur within the Project Area and 10-mile buffer. The prairie dog colonies are generally found outside the Project Area to the south.

13.1.2.3 Bats

Bat mortality associated with wind power installations has recently been of concern (Kunz, et al., 2007). Bats may be killed directly through impact by rotors, but recent studies have suggested that barotrauma may be a strong factor leading to the death of flying bats (Kunz, et al., 2007; Arnett, et al., 2008; Baerwald, et al., 2008). Few studies exist in western South Dakota documenting such mortality or basic

habitat and distributional information (Tigner and Stukel, 2003; SDGFP unpubl. data, 2012; 80 FR 17973 18033). Species occurring in South Dakota and potentially in the Project Area are listed in Table 13-6.

Table 13-6: Bat Species Occurring in South Dakota and Potentially in Project Area

Common Name	Scientific Name	Presence in Project Area	Residency
Big brown bat	*Eptesicus fuscus*	Yes	Year-round
Eastern red bat	*Lasiurus borealis*	Not likely	Summer
Evening bat	*Nycticeius humeralis*	Not likely	Migratory
Fringed myotis	*Myotis thysanodes*	Likely	Year-round
Hoary bat	*Lasiurus cinereus*	Potential	Summer
Little brown myotis	*Myotis lucifugus*	Likely	Year-round
Long-eared myotis	*Myotis evotis*	Likely	Year-round
Long-legged myotis	*Myotis volans*	Likely	Year-round
Northern long-eared myotis	*Myotis septentrionalis*	Likely	Year-round
Silver-haired bat	*Lasionycteris noctivagans*	Not likely	Summer
Townsend's big-eared bat	*Corynorhinus townsendii*	Potential	Year-round
Western small-footed myotis	*Myotis ciliolabrum*	Likely	Year-round
Eastern pipistrelle	*Perimyotis (Pipistrellus) subflavus*	Not likely	Year-round

Source: South Dakota Bat Working Group, 2014

13.1.3 Sensitive Terrestrial Species

Federally listed threatened and/or endangered species that could potentially occur in the Project Area are greater sage-grouse (*Centrocercus urophasianus*), red knot (*Calidris canutus rufa*), Sprague's pipit (*Anthus spragueii*), whooping crane (*Grus americana*), and northern long-eared bat (*Myotis septentrionalis*) (USFWS, 2015a). Surveys for these species, if warranted by presence of suitable habitat, were performed.

13.1.3.1 Greater Sage-Grouse

The greater sage-grouse is a candidate species with a listing decision anticipated in 2015 (USFWS, 2015a). A large gallinaceous bird, this grouse was historically tied to great swaths of big sagebrush (*Artemisia tridentata*) throughout much of the western United States and parts of Canada (Connelly, et al., 2004). Once abundant, sage-grouse populations have experienced dramatic declines since EuroAmerican settlement, largely tied to habitat conversion, habitat fragmentation, habitat degradation, climate change, and, recently, West Nile virus (Connelly, et al., 2004; Walker, et al., 2007; Schrag, et al., 2010).

13.1.3.2 Red Knot

In North America, red knots comprise three subspecies: (1) *Calidris canutus islandica* nesting in Greenland and associated islands; (2) *C.c. rufa* nesting in arctic and subarctic Canada and migrating along the Atlantic Coast; and (3) *C. c. roselaari* associated with movements along the Pacific Coast to and from western Alaskan and eastern Siberian breeding locales (Baker, et al., 2013). In 2014, *C. c. rufa* was listed as threatened (79 FR 73705 73748), largely due to loss of coastal migratory stopover sites and severe declines in food resources, namely breeding horseshoe crabs (*Limulus polyphemus*). Members of this subspecies have been noted migrating across the interior of North America, and, therefore, it is a listed species for the Project Area. Wetland borders, especially along large water bodies, are important foraging areas for red knots on both northward and southward migration, with only small numbers migrating inland enroute (Baker, et al., 2013).

13.1.3.3 Sprague's Pipit

A small and relatively nondescript North American endemic, this bird is often heard well before it is ever seen. Sprague's pipits, like other members of the motacillidae, inhabit grass-dominated and vegetatively simple communities. In 2010, this species was designated a candidate species (75 FR 69222-69294), a classification that was reiterated in 2014 (79 FR 72449 7249). Generally, Sprague's pipits prefer to breed in native grasslands of intermediate height and some measure of vegetative structure diversity (Jones, 2010; and the references therein). Such a description is applicable to the Project Area; however, the diversity of the native grasses is quite low (monotypic communities are largely dominated by western wheatgrass [*Pascopyrum smithii*] with occasional codominance by blue grama [*Bouteloua gracilis*] on ridgelines). Pipit breeding habitat exhibits bare ground coverage of less than 10 percent in Montana (Davis, et al., 1999); whereas, across the Project Area, bare ground levels are often higher.

13.1.3.4 Whooping Crane

The whooping crane, a North American endemic, is one of the rarest birds in the world (Urbanek and Lewis, 2015). Efforts to recover this species have been difficult, yielding approximately 400 to 450 birds in the wild. Originally an uncommon or rare species of tall- and mixed-grass prairies, only one self-sustaining population remains in the wild, breeding in and near Wood Buffalo National Park (Northwest Territories and Alberta) and wintering along the Texas Gulf Coast. Whooping cranes are dependent upon freshwater wetlands during breeding and migration, a habitat markedly rare in the Project Area.

Whooping cranes are known to migrate through South Dakota as part of the central flyway. Their flight heights can be quite high (500 to 1000 meters), but most time is spent at less than 600 meters in altitude (Kuyt, 1992), potentially bringing them into risk from wind turbine collision. However, no whooping cranes have been observed in the overall area since 1972 (SDNHP).

13.1.3.5 Northern Long-Eared Bat

Recently federally listed as threatened (80 FR 17973 18033), the northern long-eared bat has suffered dramatic declines through infection by white-nose syndrome (*Pseudogymnoascus destructans*). This fungal disease has moved westward, and, in its wake, it has left reduced populations of bats, including this species (USFWS, 2015a). The Project Area lies at the western edge of northern long-eared bat range (Tigner and Stukel, 2003; 80 FR 17973 18033). Additionally, roosting and high quality foraging habitats are rare or nonexistent in the Project Area. However, several studies have documented substantial numbers of northern long-eared bats moving across sites in central and western South Dakota (see references within 80 FR 17973 18033). Therefore, passive and active monitoring procedures were deployed to determine the presence of this species in and/or adjacent to the Project Area (Atkinson, 2011, 2014, and in prep.).

Northern long-eared bats are described as ‘forest bats’ generally associated with woodland or forested communities in which they forage by foliage gleaning (Amelon and Burhans, 2006). This species is known to reside year round in the Black Hills (Tigner and Stukel, 2003) and has been documented elsewhere in South Dakota but generally in more wooded habitats (see references in 80 FR 17973 18033).

13.2 Impacts to Terrestrial Systems

This section describes the potential impacts of the proposed Project on vegetation, wetlands, wildlife, sensitive terrestrial species, and bird and bat mortality.

13.2.1 Vegetation

Federally or State-listed rare or sensitive plant species are not known to occur in the Project Area. Unmitigated loss of native or unique vegetation or introduction of noxious weeds could result in an impact to vegetation resources. Damage to field crops that occur on cultivated lands during construction would be compensated for by the Applicant. Impacts to agricultural cropland are discussed further in Section 20.2.3.

Construction of the Project would result in temporary and permanent impacts to existing vegetation within the Project Area (Table 13-7). Direct permanent impacts would occur due to construction of the wind turbine foundations, access roads, collector substation, meteorological equipment, O&M facility,

and collector lines. These impacts would result in a loss of production of crops and pasture grasses. Other indirect impacts could include the spread of noxious weed species resulting from construction equipment introducing seeds into new areas, or erosion or sedimentation due to clearing ground in the construction areas. Vegetation communities most sensitive to disturbance are native prairies, rangelands with native plant communities, wetlands, and natural woodlands. The Project has been sited to avoid, to the greatest extent possible, these sensitive populations.

The proposed Project would result in approximately 331 acres of temporary disturbance and 109 acres of permanent disturbance to vegetation (predominantly grassland/pasture and cropland). Impacts that would occur to cultivated lands are not considered biologically significant, because these lands are frequently disturbed by tilling, planting, and harvesting activities associated with crop production.

Turbines, access roads, collector lines, and the collector substation have been sited to avoid sensitive habitats to the extent possible. Where avoidance is not possible, siting would attempt to minimize impacts to these sensitive habitats. Temporary impacts would be mitigated through BMPs, such as re-vegetation and erosion control devices. These measures would minimize any temporary impacts to vegetative communities adjacent to the Project facilities. Noxious weeds would be controlled using weed-free seed mixes and controlled spraying as necessary.

Specific BMPs would be used for any construction within grassland/pasture and would include the following measures:

- Crews will limit ground disturbance wherever possible during construction in rangelands and limit the areas where construction vehicles drive through the Project Area
- Exposed subgrade in areas where the native soil has been removed will be regraded to the original ground contour, and the soil will be replaced to follow the original soil profiles to the extent practicable
- The Applicant will reseed disturbed areas with a weed-free native plant seed mixture at an appropriate application rate

The Project will not involve any major tree clearing activities. Turbines are sited in open upland areas. Whenever feasible, access roads have been sited to avoid crossing tree rows. The collector substation, overhead interconnection jumper lines, and underground 34.5-kV collector line routes were sited to avoid impacts to tree rows and woodlots whenever feasible. Some minor clearing of brush may be required for collector lines and access roads. In areas where access roads may need to cross windrows due to

engineering restrictions or the layout of leased lands, the Applicant will work with the landowner in order to develop an appropriate alignment that will be the least intrusive.

13.2.2 Wetlands

Impacts to wetland resources could occur by directly filling wetlands due to Project construction, or by otherwise negatively altering their quality. Because wetlands within the Project Area are relatively small and widely scattered, the Applicant anticipates that the Project would be able to avoid most wetland areas. Wind turbines would be constructed in the upland areas, avoiding the low-lying wetlands. Wetland areas would also be avoided to the extent possible when routing access roads and collector lines. To further protect wetlands, BMPs for sediment and erosion control would be implemented. In order to minimize the risk of contamination of wetlands due to accidental spilling of fuels or other hazardous substances, construction equipment would be refueled in areas away from wetlands or drainage areas, and a spill kit would be available at the construction site. If the final layout results in unavoidable impacts to wetlands or waters of the U.S., the Applicant will coordinate with the USACE.

13.2.3 Wildlife

Wildlife species richness, including vertebrates and invertebrates alike, observed in and adjacent to the Project Area was relatively low. One-hundred thirty-eight species of vertebrates, consisting of 4 amphibian species, 6 reptiles, 105 avian species, and 23 mammal species, were observed (Appendix B). Terrestrial wildlife species could be impacted at various spatial and temporal scales during the construction phase of the Project. Direct disruption of habitat and potentially direct mortality could occur during the construction phase of the Project. Permanent habitat loss due to construction of wind turbines would be minimal across the Project Area and localized.

Construction crews would be instructed to avoid disturbing or harassing wildlife, and direct mortalities would not likely impact wildlife populations. Following construction, wildlife species are expected to habituate to routine facility operation and maintenance activities in a manner similar to relationships with existing ranching operations. BMPs would be practiced by construction personnel to minimize attractants to scavengers and would-be nest predators, such as red foxes (*Vulpes vulpes*), striped skunks (*Mephitis mephitis*), raccoons (*Procyon lotor*), and American Crows (*Corvus brachyrhynchos*). At this time, common ravens (*Corvus corax*) do not inhabit the Project Area.

As ferruginous hawks and burrowing owls have been the only raptor species documented to nest within the Project Area, efforts to minimize disturbance to these two species would be implemented. As planned turbine locations are far-removed from known burrowing owl locations (black-tailed prairie dog colonies

south of U.S. Highway 212), efforts to reduce impact to the nesting sites of this species are likely not necessary. However, efforts to minimize spatial and temporal disturbance to any nesting ferruginous hawks (maintain a 1,600-meter buffer of no construction activity surrounding any active nest between March 15 and July 31) would be made (USFWS, 2015b).

Potential impacts to sensitive terrestrial species will be evaluated as part of the EA process for the Project.

13.2.4 Sensitive Terrestrial Species

Other than Sprague's pipit, federally listed or candidate species have yet to be confirmed in the Project Area, itself. Within the 10-mile buffer zone surrounding the Project Area, northern long-eared bats have been encountered through passive acoustical monitoring. For raptors, only ferruginous hawks breeding activity has been documented within the Project Area, but both bald eagles and golden eagles fly over, forage within, and perch within the Project Area. As nesting structures (trees, platforms, rocky outcrops, cliffs, and high cutbanks) are nonexistent within the Project Area, it is not anticipated that any nests of these latter two species would be encountered. Construction and maintenance personnel will be asked to report any observations of these two species.

An eagle suitability model was produced to assist in the placement of the wind turbine array with the following model:

> Suitability to eagles = black-tailed prairie dog colony + 4 miles within eagle nests + inverse distance weighted (IDW) smoothing on 12 nearest neighbors of eagle abundances generated from 146 60-minute raptor point counts + IDW smoothing on all eagle observations gathered from 2011-2014

An inverse of this model produced areas most suitable to placement of wind turbines with respect to avoiding areas used by bald and golden eagles (Figure 12).

13.2.4.1 Greater Sage-Grouse

Specific surveys were conducted for both lekking and dispersed greater sage-grouse. During the surveys, no greater sage-grouse were encountered, likely due to the general lack of suitable habitat in the surrounding area, and the Project Area itself. Big sagebrush, when present in the Project Area, is short (i.e., less than 30 centimeters in height) and well dispersed (less than 10 percent ground cover), providing unsuitable habitat for this species (Connelly, et al., 2004). Approximately 6 km northwest of the Project Area, some small stands of big sagebrush are present, but even these provide poor greater sage-grouse habitat. Continued vigilance for the presence of dispersing greater sage-grouse should be continued, but

impacts to this species due to Project construction, installation, and deployment are not likely due to the lack of suitable habitat within the Project Area.

13.2.4.2 Red Knot

No red knots were observed during migration monitoring throughout the Project Area. Suitable stopover habitat is rare in the Project Area, and, excluding vagrants, red knots generally follow coastal migration routes both northward and southward (Baker, et al., 2013). Impacts to this species during construction and operation of the Project would likely not occur.

13.2.4.3 Sprague's Pipit

Breeding of the Sprague's pipit within or adjacent to the Project Area was not confirmed during surveys. However, two individuals were detected during their breeding season during avian point count surveys (May 2014 survey only), and one potential young pipit was observed in 2011. The individuals observed in May 2014 appeared to still be moving northward through the Project Area. During August and October 2014, 43 Sprague's pipits in 17 groups were observed migrating southeasterly through the Project Area. These birds were observed settling in or flushing from grasslands on ridgelines from/to flight heights lower than 20 meters above the ground. There remains the potential for active breeding by Sprague's pipits in the area, but habitat grassland height shows little diversity, and bare ground coverage often exceeds 15 percent (Davis, et al., 2014).

Little information exists to adequately assess the impact of wind power development on Sprague's pipits (Martin, et al., 2009; Jones, 2010; Davis, et al., 2014; ABC, 2015b). Studies of oil and gas development show pipits negatively responding to oil pad and access roads (references within Davis, et al., 2014), but the same has not yet been shown for wind power developments. Therefore, pre-construction surveys targeted at the proposed turbine sites themselves in addition to portions of the overall Project footprint may be implemented in consultation with regulatory agencies to adaptively manage for this songbird, if warranted.

13.2.4.4 Whooping Crane

From 2011 to 2014, no whooping cranes were observed during field surveys of the Project Area and 10-mile buffer. Furthermore, the latest observation tracked by the South Dakota Natural Heritage Program was October 10, 1972, approximately 24 km (15 miles) east of the Project Area. Little suitable stopover habitat is present in the Project Area. Approximately 26 livestock water impoundments exist, but each of these provides little foraging habitat appropriate to whooping cranes (Urbanek and Lewis, 2015). It is

anticipated that the Project would have no impact on whooping cranes due to the lack of habitat and due to the majority of whooping crane migration occurring further east (Urbanek and Lewis, 2015).

13.2.4.5 Northern Long-eared Bat

Roosting and high quality foraging habitats are lacking for northern long-eared bats in the Project Area. Approximately 10 km (6 miles) north of the Project Area, potential roosting and/or hibernacula providing habitat may be present in the form of hardwood draws and caves and/or crevices in rocky outcroppings and faces. Passive acoustical surveys (Anabat) deployed at a permanent water body containing emergent vegetation (*Typha latifolia*) and peach-leaf willows (*Salix amygdaloides*) north of the Project Area detected possible northern long-eared bat calls. Analyses of recordings are ongoing and will be provided in *Wildlife Inventories, Eagle Conservation Planning, and Bird/Bat Conservation Planning for the Willow Creek Wind Power Facility, Butte County, South Dakota*, forthcoming (Atkinson, in prep.). Post-construction mortality monitoring will be performed at the site, as well as beneath deployed wind turbines. Acoustical surveys will be added as appropriate in consultation with regulatory agencies.

13.2.5 Bird and Bat Mortality

Data analyses are in progress to determine relative abundance of various bat species just north of the Project Area. As these data are compiled, specific recommendations for reducing direct bat mortality associated with wind turbine operation will be implemented. Bat abundance is likely quite low across the Project Area, and wind turbines would be placed away from water bodies, where practical, thereby reducing the potential for turbine overlap with more preferred bat foraging areas.

Numbers of prairie passerines have been shown to respond negatively to wind power development at least in Conservation Reserve Program lands (Leddy, et al., 1999). Equivalent assessments have yet to be performed in native prairie grasslands.

Direct avian mortality is difficult to estimate for wind power installations prior to construction. However, preliminary estimates of eagle fatalities per year of operation will be outlined in *Wildlife Inventories, Eagle Conservation Planning, and Bird/Bat Conservation Planning for the Willow Creek Wind Power Facility, Butte County, South Dakota* (Atkinson, in prep.). The turbine design selected is tubular, reducing perching and nesting sites and, thereby, reducing risk of avian mortality. Upon deployment, a mortality monitoring program will be instituted in consultation with USFWS, Western, and SDGFP.

Baseline surveys of the Project Area and a 16-km (10-mile) buffer have been completed to assess pre-construction mammalian and avian diversity, relative abundance, and habitat association. Passive and active acoustical bat monitoring surveys have also been performed. The results of these studies will be accessible in *Wildlife Inventories, Eagle Conservation Planning, and Bird/Bat Conservation Planning for the Willow Creek Wind Power Facility, Butte County, South Dakota* (Atkinson, in prep.). In addition to avian and bat mortality surveys, the Applicant will also complete 1 year of post-construction monitoring to determine avian and bat use of the Project Area, a substantially smaller area than has already been surveyed.

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

The following sections describe the existing aquatic ecosystems within the Project Area and the potential impacts to aquatic ecosystems as a result of the Project.

14.1 Existing Aquatic Ecosystem

Surface waters are described in Section 12.1 and shown on Figure 10. The Project facilities are located in the Lower Belle Fourche and Cherry watersheds. As described in Section 13.1.1.4, there are approximately 463 acres of NWI wetlands within the Project Area (approximately 1 percent of the total Project Area). The wetlands in the Project Area consist of freshwater emergent wetlands and freshwater ponds.

Based on initial Project scoping conducted for the Project on the USFWS Information for Planning and Conservation (IPaC) online review tool, there are no federally listed threatened or endangered aquatic species for Butte County (USFWS, 2015a).

14.2 Impacts to Aquatic Ecosystems and Mitigation

As described in Section 13.2.2, impacts to wetlands would be minimal, because wetlands would be avoided to the extent possible when locating access roads, collector lines, and other Project facilities. The primary potential for impact to aquatic ecosystems would be from increased sedimentation or increased total suspended solids due to soil erosion from the Project construction sites. In general, surficial soils on flat areas are less prone to erosion than soils in sloped areas. Construction on or adjacent to steep slope areas can render soils unstable, accelerate natural erosion processes, and cause slope failure.

The soils in the Project Area are not highly susceptible to erosion; however, care would be taken to avoid or minimize excavation in steep slope areas. Because wind turbines are generally located at higher elevations to maximize exposure to wind, excavation in steep slope areas should be limited to small sections of access roads. Where possible, access roads would be sited to avoid steep slopes. There may also be limited trenching of underground cabling in steep slopes, although that would be minimized as much as possible. During construction, BMPs would be implemented to help ensure that drainageways and streams are not impacted by sediment runoff from exposed soils during precipitation events.

Construction of the Project will require coverage under the General Permit for Storm Water Discharges Associated with Construction Activities issued by the SDDENR. A condition of this permit is the development and implementation of a SWPPP. The SWPPP will be developed during civil engineering design of the Project and will prescribe BMPs to control erosion and sedimentation. The BMPs may

include silt fence, wattles, erosion control blankets, temporary storm water sedimentation ponds, re-vegetation, or other features and methods designed to control storm water runoff and mitigate erosion and sedimentation. The BMPs will be implemented to minimize impacts to drainageways and streams by sediment runoff. Because erosion and sediment control would be in place for construction and operation of the Project, no impacts to aquatic ecosystems are expected as a result of the Project.

15.0 LAND USE (ARSD 20:10:22:18)

The following sections describe the existing land use, noise, and aesthetics within the Project Area and potential land use impacts of the proposed Project.

15.1 Existing Land Use

Land use within the Project Area is agricultural (predominantly rangeland with some cultivated cropland/hayland) (Figure 11). No commercial, industrial, mining, or institutional land uses are located within the Project Area. The Project Area consists of private ranches with some scattered range improvements (e.g., fences, reservoirs, stock tanks, water wells, storage sheds). There is one occupied rural residence within the Project Area and a few other scattered rural residences that are adjacent to, but outside of, the Project Area (Figure 13). The existing Western Maurine to Rapid City 115-kV transmission line extends adjacent to U.S. Highway 212 through the Project Area.

No public lands are located within the Project Area. BLM lands, Bureau of Reclamation lands, and State School and Public Lands managed by the South Dakota Office of School and Public Lands are located adjacent to, but outside of, the Project Area. There are approximately 28,000 acres of privately owned lands within the Project Area that are leased for public hunting access by South Dakota Game, Fish and Parks (referred to as Walk-In Areas).

15.2 Existing Noise

The Project Area is located in Butte County, near U.S. Highway 212. The Project Area contains rangeland, cropland, and very few residences scattered throughout. Farming activities and occasional vehicular traffic would be the largest contributor to noise in an area such as this. An existing sound assessment study has not been conducted for the Project at this time.

The term “sound level” is often used to describe two different sound characteristics called sound power and sound pressure. Every source that produces sound has a sound power level (L_w). The sound power level is the acoustical energy emitted by a sound source and is an absolute number that is not affected by the surrounding environment. The acoustical energy produced by a source propagates through the air as air pressure fluctuations. These pressure fluctuations, also called sound pressure (L_p), are what human ears hear and microphones measure.

Sound energy is physically characterized by amplitude and frequency. Sound amplitude is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 microPascals).

The reference sound pressure corresponds to the typical threshold of human hearing. A 3-dB change in a continuous broadband noise is generally considered "just barely perceptible" to the average listener. A 6-dB change is generally considered "clearly noticeable," and a 10-dB change is generally considered a doubling (or halving) of the apparent loudness.

Frequency is measured in hertz (Hz), which is the number of cycles per second. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. Normally, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the low and high frequencies. As such, the A-weighting scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighting scale has been applied is expressed in A-weighted decibels or dBA. For reference, the A-weighted sound pressure level and subjective loudness associated with some common noise sources are listed in Table 15-1.

Table 15-1: Typical Sound Pressure Levels Associated with Common Noise Sources

Sound Pressure Level (dBA)[a]	Subjective Evaluation	Environment	
		Outdoor	Indoor
80	Moderately loud	Diesel truck (40 miles per hour) at 50 feet	Inside auto at high speed, garbage disposal, dishwasher
70	Loud	B-757 cabin during flight	Close conversation, vacuum cleaner, electric typewriter
60	Moderate	Air-conditioner condenser at 15 feet, near highway traffic	General office
50	Quiet	--	Private office
40		Farm field with light breeze, birdcalls	Soft stereo music in residence
30	Very quiet	Quiet residential neighborhood	Bedroom, average residence (without TV and stereo)
20		Rustling leaves	Quiet theater, whisper
10	Just audible	--	Human breathing
0	Threshold of hearing	--	--

Source: Adapted from Architectural Acoustics, M. David Egan, 1988 and Architectural Graphic Standards, Ramsey and Sleeper, 1994

(a) dBA = A-weighted decibels

As indicated in Table 15-1, agricultural areas such as the Project Area commonly have sound levels in the 30 to 40 dBA range. Ambient noise would increase the closer one gets to roadways, depending on the frequency and types of vehicles passing by.

15.3 Existing Visual resources

Rangeland, cropland, large open vistas, and gently rolling topography visually dominate the Project Area landscape. Vegetation in and near the Project Area is predominantly grassland/pasture, interspersed with shrub/scrub. Existing structures in the Project Area consist of one occupied residence and scattered farm buildings. U.S. Highway 212 extends through the Project Area.

Visual impacts to the landscape attributable to the Project would depend on the extent to which the existing landscape is already altered from its natural condition, the number of viewers (residents, travelers, visiting recreational users, etc.) within visual range of the area, and the degree of public or agency concern for the quality of the landscape. There is one occupied residence within the Project Area and a few other scattered rural residences that are adjacent to, but outside of, the Project Area (Figure 13). Travelers through the Project Area include local or regional traffic along U.S. Highway 212. Recreational users in the Project Area may include hunters accessing Walk-In Areas.

15.4 Land Use Impacts Analysis

The following sections describe the potential Project land use impacts, including displacement, recreational impacts, noise, aesthetics, and electromagnetic interference. Section 20.2.3 discusses impacts to the agricultural land uses within the Project Area.

15.4.1 Displacement

As stated above, there is one occupied residence within the Project Area. Based on the proposed Project layout of turbines, access roads, collector lines, and associated facilities, there would be no displacement of residences or businesses due to construction of the Project facilities. The minimum distance between an occupied residence and a proposed turbine location is approximately 2,000 feet.

15.4.2 Recreational Impacts

Based on the current Project layout, there would be 31 turbines (and associated access roads and collector lines) placed on privately owned Walk-In Areas. During Project construction, there could be temporary access disruptions to these areas, and certain areas could be unavailable for hunting during construction. During operation of the Project, permanent impacts to these lands would result due to placement of

turbines and access roads. The Applicant would coordinate with SDGFP regarding impacts to Walk-In Hunting Areas.

15.4.3 Noise Analysis

Noise concerns may arise during construction, operation, and decommissioning of the Project. Construction and decommissioning would have similar sound level impacts. Operational noise would occur due to the turbines moving and due to the collector substation. The different impacts are described below.

15.4.3.1 Construction and Decommission

There would be noise associated with construction and decommissioning of the Project. Construction and decommissioning of the proposed Project would involve site clearing, excavation, placement of concrete, and the use of typical industrial construction practices. Noise impacts would be minimized by scheduling heavy construction work during daylight hours, to the extent possible. There are certain operations that, due to their nature or scope, must be accomplished in part outside of normal working hours. Such work generally consists of activities that must occur continuously, once begun (such as pouring concrete, filling a transformer with oil, etc.). Construction and decommissioning noise would comply with applicable county and State requirements, regulations, and ordinances.

The impacts that various construction- and decommissioning-related activities might have would vary considerably based on the proximity to the facility. Generic sound data ranges are available for various types of equipment at certain distances. **Error! Reference source not found.** lists generic activities and the associated sound levels at a distance of 50 feet.

Table 15-2: Range of Typical Construction Equipment Noise Levels (dBA)[a]

Generic Construction Equipment	Minimum Noise at 50 Feet	Maximum Noise at 50 Feet
Backhoes	74	92
Compressors	73	86
Concrete mixers	76	88
Cranes (movable)	70	94
Dozers	65	95
Front loaders	77	96
Generators	71	83
Graders	72	91
Jack hammers and rock drills	80	98

Generic Construction Equipment	Minimum Noise at 50 Feet	Maximum Noise at 50 Feet
Pumps	69	71
Scrapers	76	95
Trucks	83	96

(a) Values taken from FHWA Highway Construction Noise and the HEARS database, dBA = A-weighted decibels

The types of equipment listed in Table 15-2 may be used at various times and for various amounts of time. Most activities would not occur at the same time. The Applicant expects that the maximum sound level during any of these activities would be between 85 and 95 dBA at 50 feet for a short duration. However, that sound level would quickly drop, similar to what happens when a car passes by. Sound levels are expected to be quieter for areas where activities are occurring at distances greater than 50 feet from the facility.

15.4.3.2 Operation

The sound commonly associated with a wind turbine is described as a rhythmic “whoosh” caused by aerodynamic processes. This sound is created as air flow interacts with the surface of rotor blades. As air flows over the rotor blade, turbulent eddies form in the surface boundary layer and wake of the blade. These eddies are where most of the “whooshing” sound is formed. Additional sound is generated from vortex shedding produced by the tip of the rotor blade. Air flowing past the rotor tip creates alternating low-pressure vortices on the downstream side of the tip causing sound generation to occur. Older wind turbines, built with rotors which operate downwind of the tower (downwind turbines), often have higher aerodynamic impulse sound levels. This is caused by the interaction between the aerodynamic lift created on the rotor blades and the turbulent wake vortices produced by the tower. Modern wind turbine rotors are mostly built to operate upwind of the tower (upwind turbines). Upwind turbines are not impacted by wake vortices generated by the tower, and, therefore, overall sound levels can be as much as 10 dBA less. The rhythmic fluctuations of the overall sound level are less perceivable the farther one gets from the turbine. Additionally, multiple turbines operating at the same time would create the whooshing sound at different times. These non-synchronized sounds would blend together to create a more constant sound to an observer at most distances from the turbines. Another phenomenon that reduces perceivable noise from turbines is the wind itself. Higher wind speed produces noise that tends to mask (or drown out) the sounds created by wind turbines.

Advancement in wind turbine technology has reduced pure tonal emissions of modern wind turbines. Manufacturers have reduced distinct tonal sounds by reshaping turbine blades and adjusting the angle at

which air contacts the blade. Pitching technology allows the angle of the blade to adjust when the maximum rotational speed is achieved, which allows the turbine to maintain a constant rotational velocity. Therefore, sound emission levels remain constant as the velocity remains the same.

Wind turbines can create noise in other ways as well. Wind turbines have a nacelle where the mechanical portions of the turbine are housed. The current generation of wind turbines uses multiple techniques to reduce the noise from this portion of the turbine: vibration isolating mounts, special gears, and acoustic insulation. In general, all moving parts and the housing of the current generation wind turbines have been designed to minimize the noise they generate.

In addition to the wind turbines, the substation proposed for the Project would create noise when it is energized. A substation consists of transformer(s) that create sound through a process called magnetostriction. The sound associated with a substation is generally referred to as a hum. The transformer(s) would have cooling fans that also create noise at various times, depending on system loading.

Predicted Project sound levels were modeled using industry-accepted sound modeling software. The program used to model the turbines was the Computer Aided Design for Noise Abatement (CadnaA), Version 4.3.143, published by DataKustik, Ltd., Munich, Germany. The CadnaA program is a scaled, three-dimensional program that takes into account air absorption, terrain, ground absorption, and ground reflection for each piece of noise-emitting equipment and predicts downwind sound pressure levels. The model calculates sound propagation based on International Organization for Standardization (ISO) 9613-2:1996, General Method of Calculation. ISO 9613, and therefore CadnaA, assesses the sound pressure levels based on the Octave Band Center Frequency range from 31.5 to 8,000 Hz.

Predictive modeling was conducted using the proposed Project layout. The Applicant intends to install and operate 45 wind turbines and an associated collector substation. No data for the substation is available at this time. Therefore, the substation is not included in the noise model at this time. Attenuation from ground absorption was incorporated into the model. At this time, terrain data around the proposed Project was not incorporated into the model. The terrain around the proposed Project is mostly rural with few minor changes in elevation. The land is primarily used for agricultural purposes. As such, vegetation is mostly low-lying with some small areas of trees. The terrain around the proposed Project would not be expected to have a large impact on the model results.

CadnaA calculates downwind sound propagation using ISO 9613 standards, thus omni-directional downwind sound propagation and worst-case directivity factors. In other words, the model assumes that

each turbine propagates its maximum sound level in all directions at all times. While this likely over-predicts upwind sound levels, this approach has been validated by field measurements.

Atmospheric conditions were based on program defaults. Layers in the atmosphere often form where temperature increases with height (temperature inversions). Sound waves can reflect off of the temperature inversion layer and return to the surface of the earth. This process can increase sound levels at the surface, especially if the height of the inversion begins near the surface of the earth. Temperature inversions tend to occur mainly at night when winds are light or calm, usually when wind turbines are not operating. CadnaA calculates the downwind sound in a manner which is favorable for propagation (worst-case scenario) by assuming a well-developed moderate ground-based temperature inversion such as can occur at night. Therefore, predicted sound level results tend to be higher than would actually occur.

The atmosphere does not flow smoothly and tends to have swirls and eddies, also known as turbulence. There are two basic forms of turbulence: thermal turbulence and mechanical turbulence. Thermal turbulence is caused by the interaction of heated air rapidly rising from the heated earth's surface with cooler air descending from the atmosphere. Mechanical turbulence is caused as moving air interacts with objects such as trees, buildings, and wind turbines. Turbulent eddies generated by wind turbines and other objects can cause sound waves to scatter, which in turn, provides sound attenuation between the wind turbine and the receiver. The acoustical model assumes laminar air flow which minimizes sound attenuation that would occur in a realistic inhomogeneous atmosphere. This assumption also causes the predicted sound levels to be higher than would actually occur.

Wind turbine heights and acoustical emissions were input into the model. The nacelles of each wind turbine are mounted on a tower 80 meters (262.5 feet) high. The expected worst-case sound power levels for the Siemens SWT-2.3-108 wind turbines were obtained in a confidential document provided by Siemens and were based on various wind speeds at heights of 10 meters (32.8 feet) above grade. The expected worst-case sound levels occur at a wind speed of 8 meters per second (17.9 miles per hour). The sound emissions data supplied was determined using IEC 61400-11 acoustic measurement standards. The expected sound power level for each turbine is displayed in Table 15-3. Because sound data was not available for the substation, it was not included in the model at this time.

Table 15-3: Maximum Sound Power Levels

Equipment	dBA at Octave Band Frequency (Hz)[b]									Total Sound Power Level (dBA)[c]
	31.5	63	125	250	500	1000	2000	4000	8000	
SWT-2.3-108[a]	--	85.5	93.0	98.1	102.1	102.1	98.4	91.2	87.2	107.0

(a) Expected worst-case sound power levels based on the standard controller setting at 8 meters/second (17.9 miles/hour) wind speed
(b) Hz = hertz
(c) dBA = A-weighted decibels

A point source at the hub was used to model sound emissions from each wind turbine. This approach is appropriate for simulating wind turbine noise emissions due to the large distances between the turbines and the receivers as compared to the dimensions of the wind turbines. The corresponding sound levels from the table above were applied to every point source. Sound levels were predicted at physical residences (receivers in the model). Each receiver was assumed to have a height of 1.52 meters (5.0 feet) above ground level.

The following assumptions were made to maintain conservativeness in the model and to estimate the worst case modeled sound levels:

- Attenuation was not included for sound propagation through wooded areas, existing barriers, and shielding
- Ground absorption was assumed to be minimal
- All turbines were assumed to be operating at maximum sound levels at all times to represent worst-case noise impacts from the Project as a whole

Sound pressure levels were predicted for the identified receivers in the CadnaA noise model using the manufacturer-specified sound power levels and the assumptions listed above. The maximum model-predicted Leq sound pressure levels at each receiver (the logarithmic addition of sound level impacts of each turbine) show a worst-case impact of 43.3 dBA at the nearest receiver. These values represent only the noise emitted by the wind turbines and do not include any extraneous noises (grain dryers, traffic, etc.) that could be present during physical noise measurements. Because it was not included in the model at this time, noise impacts from the substation are not included in the predicted Leq sound pressure levels.

Figure 14 provides graphical representation of the expected sound pressure levels generated by simultaneous operation of all proposed wind turbines. This figure shows contours of sound levels in 5-dBA increments overlaid onto an aerial to demonstrate how sound is expected to propagate. As can be

seen in the figure, sound from the Project would propagate in approximately circular contours of equal sound pressure from each turbine, and areas where two or more turbines interact are clearly visible.

15.4.4 Visual Impacts

Visual impacts can be defined as the human response to the creation of visual contrasts that result from the introduction of a new element into the viewed landscape. These visual contrasts interact with the viewer's perception, preferences, attitudes, sensitivity to visual change, and other factors that vary by individual viewer to cause the viewer to react negatively or positively to the changes in the viewed landscape.

Construction, operation, and decommissioning of the proposed Project would potentially introduce visual contrasts in the Project Area that would cause a variety of visual impacts. The types of visual contrasts of concern include the potential visibility of wind turbines, electric transmission structures and conductors, and associated facilities such as roads; marker lighting on wind turbines and transmission structures as well as security and other lighting; modifications to landforms and vegetation; vehicles associated with transport of workers and equipment for construction, operations and maintenance, and facility decommissioning; and the construction, operation, maintenance, and decommissioning activities themselves. A subset of potential visual impacts associated with wind turbine generator structures includes blade movement, blade glinting[2], and shadow flicker[3].

The primary visual impacts associated with the proposed Project would result from the introduction of the numerous vertical lines of the 45 wind turbines into the generally strongly horizontal landscape found in the Project Area. The visible structures would potentially produce visual contrasts by virtue of their design attributes (form, color, and line) and the reflectivity of their surfaces and resulting glare. In addition, marker lighting could cause large visual impacts at night.

For nearby viewers, the very large sizes and strong geometric lines of both the individual turbines themselves and the array of turbines could dominate views, and the large sweep of the moving rotors would tend to command visual attention. Structural details, such as surface textures, could become apparent, and the O&M facility and other structures could be visible as well, as could strong specular reflections from the towers and moving rotor blades (blade glint). For viewers close enough to fall within the cast shadows of the turbines, shadow flicker might be observed.

[2] Reflection of sunlight from moving wind turbine blades when viewed from certain angles under certain lighting conditions.
[3] As wind turbine blades spin under sunny conditions, they may cast moving shadows on the ground or nearby objects, resulting in alternating light intensity (flickering) as each blade shadow crosses a given point.

As discussed in Section 15.3, viewers within the Project Area include occupied residences, travelers along U.S. Highway 212, and hunters utilizing Walk-In Area. For these viewers, the magnitude of the visual impacts associated with the proposed Project would depend on certain factors, including:

- Distance of the proposed wind energy facility from viewers
- Weather and lighting conditions
- The presence and arrangements of lights on the turbines and other structures
- Viewer attitudes toward renewable energy and wind power

Scenic resources with sensitive viewsheds can include national parks, monuments, and recreation areas; national historic sites, parks, and landmarks; national memorials and battlefields; national wild and scenic rivers, national historic trails, national scenic highways, and national wildlife refuges; State- or locally designated scenic resources, such as State-designated scenic highways, State parks, and county parks; and other scenic resources that exist on Federal, State, and other non-Federal lands, including traditional cultural properties important to tribes. The nearest scenic resources to the Project Area are Belle Fourche National Wildlife Refuge (NWR) to the west and Bear Butte to the south. Bear Butte, located within Bear Butte State Park, is a geologic formation that is sacred to many Native American tribes who come to the site to hold religious ceremonies. Bear Butte is listed on the NRHP and is a designated National Natural Landmark and National Historic Landmark.

The nearest proposed turbine location to Belle Fourche NWR is approximately 20 miles, and the nearest turbine to Bear Butte is approximately 26 miles. At these distances, adverse visual impacts are not anticipated. Depending on topography and atmospheric conditions, the Project turbines could be visible from these scenic resources. However, the Project would not cause large visual contrasts in the landscape at this distance and would not be noticeably visible, if visible at all.

15.4.5 Electromagnetic Interference

There is the potential for communication systems to experience disturbances from electric feeder and communications lines associated with wind farms. In November 2014, the Applicant conducted a constraints analysis for the Project that included an evaluation of communication systems. No AM, FM, television, or other Federal Communications Commission (FCC)-regulated communication systems were identified within the Project Area. If, after construction, the Applicant receives information relative to communication systems interference potentially caused by operation of the wind turbines in areas where good reception is presently obtained, the Applicant would resolved such problems on a case-by-case basis.

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

The Project would be constructed on agricultural land in Butte County, South Dakota. Land use in Butte County is not regulated by zoning regulations. However, the following minimum setback distances, which are expected to minimize land use impacts from the Project, are planned for Project facilities.

- 1,000 feet from residences outside of Project Area
- 500 feet from residence within Project Area
- 500 feet from property lines of non-leased parcels
- 475 feet from non-residential buildings
- 500 feet from roads
- 213 feet from wetlands and streams

17.0 WATER QUALITY (ARSD 20:10:22:20)

Potential impacts to water quality are addressed in Section 12.0. The excavation and exposure of soils during the construction of wind turbines and access roads may cause sediment runoff during rain events. Erosion control BMPs would contain sediments that might otherwise increase loading in receiving waters.

Construction of the Project will require coverage under the General Permit for Storm Water Discharges Associated with Construction Activities issued by the SDDENR. A condition of this permit is the development and implementation of a SWPPP. The SWPPP will be developed during civil engineering design of the Project and will prescribe BMPs to control erosion and sedimentation. The BMPs may include silt fence, wattles, erosion control blankets, temporary storm water sedimentation ponds, re-vegetation, or other features and methods designed to control storm water runoff and mitigate erosion and sedimentation. The BMPs will be implemented to minimize the potential for impacts to drainageways and streams by sediment runoff. Because erosion and sediment control would be in place for construction and operation of the Project, no impacts to water quality are expected as a result of the Project.

18.0 AIR QUALITY (ARSD 20:10:22:21)

The following sections discuss the existing air quality conditions within the Project Area and the potential air quality impacts of the proposed Project.

18.1 Existing Air Quality

The entire State of South Dakota is in attainment for all NAAQS criteria pollutants (USEPA, 2015). The nearest ambient air quality monitoring site to the Project Area is located in Black Hawk, Meade County, South Dakota, which is south of the Project Area (SDDENR, 2015c). The primary emission sources that exist within the Project Area include agriculture related equipment and vehicles traveling along U.S. Highway 212.

18.2 Air Quality Impacts

During construction of the Project, fugitive dust emissions would temporarily increase due to truck and equipment traffic in the Project Area. Additionally, there would be short-term emissions from diesel trucks and construction equipment. Air quality effects caused by dust would be short-term, limited to the time of construction or decommissioning, and would not result in NAAQS exceedances for particulate matter. Implementation of the proposed Project components would not result in a violation to Federal, State, or local air quality standards and, therefore, would result in less than significant impacts to air quality. The operation of the Project would not produce air emissions that would impact the surrounding ambient air quality. Potential complaints regarding fugitive dust emissions would be addressed in an efficient and effective manner.

19.0 TIME SCHEDULE (ARSD 20:10:22:22)

The Applicant expects to have the Project operational as early as December 2017. A preliminary permitting and construction schedule is included in Table 19-1.

Table 19-1: Preliminary Permitting and Construction Schedule

Milestone	Date
Submit SDPUC application	May 2015
Western NEPA approval	October 2015
PUC permit award	November 2015
Other Federal, State, and local permits	October 2015
Sign wind turbine supply agreement	December 2015
Access road construction	December 2015 to December 2016
Wind turbine foundation construction	March to December 2016
Trenching of underground collector system	March to December 2016
Willow Creek Substation construction	March to December 2017
Western substation construction	March to December 2017
Wind turbine assembly and communication system construction	July 2016 to December 2017
Interconnection to Western's 115-kV line	October 2017
Testing and final assembly	October to December 2017
Commercial operation date (COD)	December 2017

20.0 COMMUNITY IMPACT (ARSD (20:10:22:23)

The following sections describe the existing socioeconomic and community resources within the Project Area and potential community impacts of the proposed Project.

20.1 Existing Socioeconomic and Community Resources

This section describes the existing Project Area socioeconomic resources, including communities, commercial and industrial sectors, transportation, and cultural resources.

20.1.1 Communities

The Project Area is located in western South Dakota in Butte County. Butte County had an estimated population of 10,298 in 2014 (U.S. Census Bureau, 2014). Belle Fourche, with an estimated 2013 population of 5,653, is the largest city in Butte County (U.S. Census Bureau, 2013). Belle Fourche is located approximately 28 miles southwest of the Project Area. Newell, located approximately 10 miles southwest, is the nearest city to the Project Area. The towns of Nisland and Fruitdale, as well as Vale and Union Townships, are also located in Butte County. The populations of these communities and the distance from the Project Area are shown in Table 20-1. The Project Area is not located within an organized township.

Table 20-1: Populations of Communities in Butte County and Distance from Project Area

Community	2013 Population	Distance and Direction from Project Area
City of Belle Fourche	5,653	28 miles southwest
City of Newell	767	10 miles southwest
Town of Nisland	284	18 miles southwest
Town of Fruitdale	61	24 miles southwest
Vale Township	325	12 miles southwest
Union Township	44	2 miles east

Source: U.S. Census Bureau, 2013

The population in Butte County is predominantly white (95 percent), while 1 percent of the population is American Indian and 4 percent is some other race (U.S. Census Bureau, 2013). Three percent of the population is Hispanic (of any race). In the State of South Dakota as a whole, 86 percent of the population is white, 9 percent is American Indian, 5 percent is some other race, and 3 percent is Hispanic.

The median household income in Butte County in 2013 was $41,332, and 10.2 percent of the population was below poverty (U.S. Census Bureau, 2013). By comparison, the median household income for the

State as a whole was slightly higher ($49,495), and the poverty rate was higher (14.1 percent) than the county. In Butte County, the top industries in terms of employment in 2013 were: (1) educational services, health care, and social services (comprising 19.7 percent of employment); (2) agriculture, forestry, fishing and hunting, and mining (14.4 percent); and (3) retail trade (14.3 percent). The unemployment rate in Butte County in March 2015 was 5.0 percent, which was slightly higher than the unemployment rate in South Dakota for the same month (4.3 percent) (SDDLR, 2015).

20.1.2 Commercial, Industrial, and Agricultural Sectors

The Project Area is agricultural (predominantly rangeland). No commercial, industrial, mining, or institutional land uses are located within the Project Area. In 2012, Butte County's 659 farms (totaling 1.1 million acres of land) produced $75.4 million in agricultural products (USDA, 2012). Seventy-seven percent of sales were from livestock, and 23 percent was crop sales. Cattle/calves was the top livestock inventory item in the county, and forage-land (used for all hay and haylage, grass silage, and greenchop) was the top crop in terms of acreage. Butte County ranked 52 out of the 66 South Dakota counties in total value of agricultural products sold.

20.1.3 Transportation

This section describes the existing surface transportation and aviation within the Project Area.

20.1.3.1 Surface Transportation

Table 20-2 lists the roads that intersect the Project Area. The primary access to the Project Area is from U.S. Highway 212, which extends through the central portion of the Project Area. U.S. Highway 212 is the only paved road in the Project Area. Twilight Road and Double R Road provide access to the Project Area from the north, and Old Highway 212 provides access from the south (Figure 3).

Table 20-2: Project Area Roads

Road	Surface Type	Surface Width	Total Lanes
Double R Road	Gravel	22 feet	2
Old Highway 212	Gravel	18-22 feet	2
Twilight Road	Gravel	12 feet	1
U.S. Highway 212	Paved asphalt	24 feet	2
West Fairpoint Road	Gravel	18 feet	2
Wahlfeldt Road	Gravel	16 feet	2

Source: SDDOT, 2015

In 2014, Average Daily Traffic (ADT) volume along U.S. Highway 212 through the Project Area was 580 trips, 15 percent of which were trucks (SDDOT, 2014). ADT along Double R Road through the Project Area was 18 (collected in 2011), and ADT along Old Highway 212 was 79 (collected in 2007) (SDDOT, 2015).

20.1.3.2 Aviation

There are no airports located within the Project Area. The closest airport is Bruch Airfield, which is a private airstrip located in Sturgis, South Dakota, approximately 18 miles south of the Project Area. The closest public airports to the Project Area are Sturgis Municipal Airport, located approximately 23 miles south of the Project Area near Sturgis, and Belle Fourche Municipal Airport, located approximately 28 miles west of the Project Area near Belle Fourche. The nearest U.S. air military installation is Ellsworth Air Force Base, located approximately 45 miles south of the Project Area.

20.1.4 Cultural Resources

Quality Services, Inc. conducted a records search for the Project on October 23, 2013. The records search reported known archeological sites, historic period structures, previous archeological surveys, and other cultural resources data within 1 mile of the Project Area. The NRHP and the National Historic Landmarks online databases were also reviewed.

The area identified for potential wind turbines with a 2-mile buffer and a linear corridor following the existing transmission line were considered the Area of Potential Effect (APE) for this Project, even though this is expected to be reduced once actual Project layout is further developed. This section contains a brief description of cultural resources known or expected within the APE. Information from this record search is in Appendix C. Management recommendations for each cultural resource are also provided.

There are no NRHP-listed or eligible cultural resources or National Historic Landmarks in the Project Area or 1-mile radius records search area. However, it should be noted that unidentified cultural resources and structures may be identified during future field inventory. This potential can be seen on the General Land Office (GLO) 1890s plats. The route of the Bismarck to Deadwood Wagon Trail is depicted on the plats, indicating that trail-related ruts may be present in the APE.

Three road bridges (Resources BU00000181, BU00000182 and BU00000233) are within the Project's APE. All are considered not eligible for the NRHP and would be not be impacted by the proposed Project. A five lithic debitage flake Native American isolated find, considered not eligible for the NRHP, is also located within the APE. This site will also be avoided.

There are also six NRHP unevaluated archeological cultural resources and one unevaluated structure complex within the proposed APE (Table 20-3). These are being treated as if they were eligible for the NRHP; thus, will be avoided by the Project or evaluated further.

Table 20-3: Previously Recorded Eligible or Potential Eligible Archaeological Sites in the Project Area

Resource	Resource Type	NRHP Status	Potential Effects
39BU0014	Stone Circle	Unevaluated	In APE - Evaluate and/or Avoid
39BU0145	Cairn; Isolated Find	Unevaluated	In APE - Evaluate and/or Avoid
39BU0146	Artifact Scatter	Unevaluated	In APE - Evaluate and/or Avoid
39BU0147	Isolated Find &	Unevaluated	In APE - Evaluate and/or Avoid
39BU0148	Stone Circle	Unevaluated	In APE - Evaluate and/or Avoid
39BU0158	Cairn; Stone Circle	Unevaluated	In APE - Evaluate and/or Avoid
BU00000152	Stone Circle & Artifact Scatter	Unevaluated	In APE - Evaluate and/or Avoid

Resource 39BU0014 – According to the site form, this site is 12 stone circles east of Owl Butte. Three lithic tools and firecracked rock were collected in 1979.

Resource 39BU0145 – This site is recorded containing four cairns along the edge of a ridge. A retouched lithic debitage flake was collected from this site.

Resource 39BU0146 – This site is a lithic scatter found in scattered hardpan areas. Artifact density was higher in the southern portion of the site. Artifacts were collected and no subsurface testing was performed.

Resource 39BU0147 – This site consisted of a mano and metate, two lithic debitage flakes, and a stone circle near a stream. The flakes, mano and metate were collected when the site was recorded in 1984.

Resource 39BU0148 – This site contains four cairns and two partial stone circles. No collections or subsurface testing were conducted. The site is described as having a good field of view in all directions.

Resource 39BU0158 – Fifty-seven stone circles, lithic tools, and debitage from stone tool production were found at this site. Lithic artifacts were found at the southern end of the site on both sides of the creek. The lithic tools and debitage were collected. No subsurface testing was conducted.

Resource BU00000152 – This site is an active farmstead and ranch belonging to Elmer and Donald Kivimaki. The ranch house was constructed in 1931 with influences from architecture in Finland.

A survey of sites within the proposed Project footprint is not yet available. The Applicant plans to avoid directly impacting all cultural resources. Avoidance and or mitigation measures identified for the cultural resources by the EA process will be followed by the Applicant. The attached maps depict current cultural resources identified for the Project Area (Appendix C).

20.2 Socioeconomic and Community Impacts

This section describes the potential impacts of the proposed Project on communities, property values, agriculture, and transportation.

20.2.1 Community Impacts

The Project is expected to create both short-term and long-term positive impacts to the local economy. Impacts to social and economic resources from construction activities would be short-term. Local businesses, such as restaurants, grocery stores, hotels, and gas stations, would see increased business during this phase from construction related workers. Local industrial businesses, including aggregate and cement suppliers, welding and industrial suppliers, hardware stores, automotive and heavy equipment repair, electrical contractors, and maintenance providers, would also likely benefit from construction of the Project.

The Project is unlikely to impact social services due to the short-term nature of the construction phase. The Project is not likely to increase the need for public services, including police and fire protection, due to the short-term duration of the construction activities. No significant increase in permanent population of local communities would be expected from construction and operation of the facility, and the construction workforce would not create any measureable impact to the local government, utilities, or community services.

The construction crews would include skilled labor, such as foremen, carpenters, iron workers, electricians, millwrights, and heavy equipment operators, as well as unskilled laborers. This diverse workforce would be needed to install all of the Project components, including wind turbines, access roads, underground collector system, O&M building, Willow Creek Substation, etc. The peak number of

construction jobs is expected to be approximately 200, with an average of approximately 125 over the duration of the construction phase. NREL's Wind Energy Jobs and Economic Development Impact (JEDI) model calculates the construction phase local economic benefit to be approximately $4.2 million.

Only minor changes to population or employment are anticipated as a result of construction and operation of the proposed Project. Any increase in the local population would be limited to the construction phase. The Applicant anticipates that there would not be sufficient trained local labor to fill the number of jobs available. The majority of the non-local construction workforce would probably be located within a 55-mile radius that would include Rapid City and could commute to the Project Area without the need for additional temporary or permanent housing at the Project Area.

Construction and operation of the Project would create long-term beneficial impacts to Butte County's tax base for the life of the Project. The county would also benefit from increased revenues generated from permits and fees during the construction phase, as well as additional real estate taxes. These increased revenues could be used to improve local government or community services, benefitting all local residents. Local spending during the construction and operations periods would result in additional personal income, as well as increased State and local taxes. Landowners who participate in the Project would receive the most direct economic benefit from lease payments for wind turbines and roads located on their property. These payments provide a predictable supplementary source of income and may be a significant benefit during times of adverse weather or other factors that negatively impact their ranching operations.

Construction activities for the Project would be short-term, and any short-term effects to local businesses would most likely be beneficial. No negative long-term impact to the socioeconomics of the Project Area are expected, and no adverse effects on the industrial sector, housing, labor market, health facilities, water and sewer systems, existing energy facilities, solid waste facilities, schools, fire protection, law enforcement, or other community, government, or recreational facilities are anticipated.

The Project would generate approximately six long-term jobs, which would have a positive effect on local income levels. These long-term positions include an O&M supervisor, a lead wind technician, and several wind technicians. Employee salaries and benefits are expected to be approximately $300,000 annually, plus approximately 40 percent for benefits. Salaries are expected to increase by approximately 3 percent annually for cost of living. The Project would have no impact on population or overall occupation distribution in the Project Area.

20.2.2 Property Value Impacts

A 2003 Renewable Energy Policy Project (REPP) study (Sterzinger, et al., 2003) of the effect of wind development on property values found no statistical effects of changes in property values over time due to wind-energy projects. This study examined changes in property values within 5 miles of 10 wind energy projects that came online between 1998 and 2001, looking at the 3-year period before and after each project came on-line and using a simple linear-regression analysis. The study found no major pre-post differences, and it also found no major differences when property-value changes in the 5-mile radius area around the wind energy projects were compared with selected "comparable communities."

20.2.3 Agricultural Impacts

Minimal existing agricultural land would be taken out of crop and forage production by the proposed Project, primarily the area around wind turbine foundations, access roads, and electric collection and interconnection facilities. Landowners would be compensated by the Applicant for losses to crop production during construction. Agricultural activities can occur up to the edge of access roads and turbine pads. The buried underground collection system would not alter agricultural activities.

Approximately 331 acres of agricultural land (including rangeland and cropland) would be temporarily impacted by Project construction. It is estimated that approximately 109 acres of agricultural land would be permanently impacted, which constitutes less than 1 percent of the total land within the Project Area. Areas disturbed due to construction that will not host permanent Project facilities would be re-vegetated with vegetation types matching the surrounding agricultural landscape.

20.2.4 Transportation Impacts

This section addresses the potential impacts of the proposed Project on ground transportation and air traffic.

20.2.4.1 Ground Transportation

The Project Area contains one two-lane, paved highway and several gravel roads. During construction, it is anticipated that several types of light, medium, and heavy-duty construction vehicles would travel to and from the site, as well as private vehicles used by the construction personnel. Construction hours are expected to be from 6:00 a.m. to 9:00 p.m. on weekdays, and possibly on weekends. Some activities may require extended construction hours, and nighttime construction may be necessary to meet the overall proposed Project schedule. The movement of equipment and materials to the site would cause a relatively short-term increase in traffic on local roadways during the construction period. Most equipment (e.g., heavy earthmoving equipment and cranes) would remain at the site for the duration of construction

activities. Shipments of materials, such as gravel, concrete, and water would not be expected to substantially affect local primary and secondary road networks. That volume would occur during the peak construction time when the majority of the foundation and tower assembly is taking place. At the completion of each construction phase, this equipment would be removed from the site or reduced in number.

The Project would not result in any permanent impacts to the area's ground transportation resources. There may be some improvements to gravel roads and temporary impacts to local roads during the construction phase of the Project. The Applicant will work with SDDOT and Butte County to obtain the appropriate access and use permits, and to minimize and mitigate the impacts to area transportation.

20.2.4.2 Air Traffic

The air traffic generated by the airports listed above would not be impacted by the proposed Project. The Applicant would follow FAA guidelines for marking towers and would implement the necessary safety lighting. Notification of construction and operation of the wind energy facility would be sent to the FAA, and steps would be taken to ensure compliance with FAA requirements.

20.3 Cultural Resource Impacts

The Applicant would physically avoid previously recorded resources (identified in Section 20.1.4) during Project construction and operation activities. In addition, in recognition that Project activities may coincide with as yet unidentified archaeological resources, the Applicant is currently sponsoring an evaluation of archaeological properties that may exist within proposed construction limits in the Project footprint. This archaeological investigation will be documented in a technical report that will meet Federal and State technical standards. The Applicant will make every reasonable effort to physically avoid identified potentially eligible resources.

21.0 EMPLOYMENT ESTIMATES (ARSD 20:10:22:24)

See Section 20.2.1.

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

Figure 3 depicts 45 proposed wind turbine locations. As noted in Section 8.1, the Applicant requests that the SDPUC approve the Project based on the preliminary layout shown in this application, with the understanding that some of the turbine locations shown may ultimately be relocated or not be constructed as part of the Project or, alternately, that additional turbine locations may be required. At this time, up to 10 additional turbines may be installed within the Project Area, depending on the final wind turbine layout and design.

23.0 DECOMMISSIONING OF WIND ENERGY FACILITIES (ARSD 20:10:22:33.01)

The Applicant has entered into long-term lease and easement agreements for placement of the wind turbines and associated Project infrastructure with private landowners within the Project Area. The Applicant anticipates that the life of the Project would be no less than 20 years and reserves the right to extend the life of the Project as well as explore alternatives regarding Project decommissioning. One such option may be to retrofit the turbines and power system with upgrades based on new technology, which may allow the wind farm to produce efficiently and successfully for many more years.

Within 12 months from the expiration or earlier termination of the lease (the “decommissioning period”), the Applicant will decommission and remove its wind facilities, including foundations, footings, concrete pads, anchors, guy wires, fences, towers, and other fixtures to not less than 2 feet below grade or such greater depth as otherwise required by local ordinance. The access roads will be removed unless the affected landowner provides written notice that the road or portions of the road will be retained. Additionally, disturbed surfaces will be graded, reseeded, and restored as nearly as possible to its preconstruction condition within 18 months of Project decommissioning.

24.0 RELIABILITY AND SAFETY (ARSD 20:10:22:33.02)

The following sections discuss the reliability and safety of the wind farm facility.

24.1 Reliability

Reliability is defined as the ability of the turbine to generate electricity when sufficient wind is available. In 2014, approximately 1,000 Siemens SWT-2.3-108 turbines were in use worldwide and had reliability of 98 percent.

24.2 Safety

The Project Area is located in an area of low population density; therefore, construction and operation of the Project would have minimal impacts on the security and safety of the local population. The following safety measures will be taken to reduce the chance of physical and property damage, as well as personal injury, at the site:

- The towers will be placed at distances away from existing roadways and residences per the applicable planned setback requirements described in Section 9.4
- Security measures will be implemented during the construction and operation of the Project, including temporary (safety) and permanent fencing, warning signs, and locks on equipment and wind power facilities
- Turbines will sit on solid steel enclosed tubular towers; access to each tower is only through a solid steel door that will be locked and accessed only by authorized personnel
- Tower exteriors are designed to be unclimbable
- Turbines will conform to applicable industry standards
- A professional engineer will certify that the foundation and tower design of the turbines is within accepted professional standards, given local soil and climate conditions

25.0 INFORMATION CONCERNING WIND ENERGY FACILITIES (ARSD 20:10:22:33.02)

The following information requirements concerning wind energy facilities have been discussed in previous sections of this application, as indicated below.

- Configuration of wind turbines – Sections 8.1, 8.2, 8.3, 8.4 and Figures 4 and 5
- Number of wind turbines – Sections 8.1 and 22.0 and Figure 3
- Warning lighting requirements for wind turbines – Section 20.2.4.2
- Setback distances – Section 9.4 and 16.0
- Noise levels during construction and operation – Section 15.4.3
- Electromagnetic interference – Section 15.4.5
- Site and major alternatives – Section 9.0
- Reliability and safety – Section 24.0
- Right-of-way or condemnation requirements – Section 8.0
- Clearing activities – Sections 8.10 and 13.2
- Configuration of towers and poles – Section 8.10
- Conductor and structure configurations – Section 8.10
- Underground electric interconnection facilities – Section 8.10

Please refer to Section 3.0 Completeness Checklist (ARSD 20:10:22:33.02, Information concerning wind energy facilities) for additional requirement details.

26.0 ADDITIONAL INFORMATION IN APPLICATION (ARSD 10:22:36)

The following sections discuss permits and approvals, agency coordination, public and agency comments, and burden of proof.

26.1 Permits and Approvals

The Project must comply with Federal, State, and local laws requiring permits or approvals. Table 26-1 lists the permits and approvals that are anticipated as part of the Project.

Table 26-1: List of Potential Permits or Approvals

Agency	Permit/Approval	Description	Status
U.S. Fish and Wildlife Service (USFWS)	Threatened and endangered species – Section 7 compliance	Determination of effect on federally listed species	To be completed in conjunction with EA
Federal Aviation Administration (FAA)	Form 7460-1, Notice of Proposed Construction or Alteration	Required if construction or alteration is within 6 miles of public aviation facility and for structures higher than 200 feet	Will be completed after final design is complete
U.S. Army Corps of Engineers (USACE)	Section 404 permit	Complete an application under the Clean Water Act for impacts to wetlands and waters of the U.S.	Unlikely, but to be determined once layout is finalized
Native American tribes	Section 106 consultation	Determination of effect on Native American cultural resources	To be completed in conjunction with EA
South Dakota State Historic Preservation Office (SHPO)	Section 106 consultation	Determination of effect on archaeological and historical resources	To be completed in conjunction with EA
South Dakota Public Utilities Commission (SDPUC)	Energy Facility Site Permit	Application required for wind facilities with nameplate capacity greater than 100 megawatts	Submitted May 2015
South Dakota Game, Fish, and Parks Department (SDGFP)	Coordination	Coordination as part of the EA process	Ongoing
South Dakota Department of Environment & Natural Resources	401 Water Quality Certification	Complete an application under the Clean Water Act, only if Individual Permit is required for Section 404	Not anticipated unless individual Section 404 permit is needed from USACE

Agency	Permit/Approval	Description	Status
(SDDENR)	General Permit for Storm Water Discharges Associated with Construction Activities (NPDES)	Storm water permit required for construction activities	SWPPP will be prepared and NOI will be submitted after final design is complete
	Temporary Water Use Permit	Temporary permits for the use of public water for construction, testing, or drilling purposes; issuance of a temporary permit is not a grant of water right	If necessary, will be obtained prior to construction
	General Permit for Temporary Discharges	Temporary permit for the use of public water for construction dewatering	If necessary, will be obtained prior to construction
	Water Rights Permit for Nonirrigation Use	Needed if water will be appropriated for O&M facility	If necessary, will be obtained prior to construction
	Mine License Permit	Required to mine sand, gravel, or rock to be crushed and used in construction	If necessary, will be obtained prior to construction
South Dakota Department of Transportation (SDDOT), Aeronautics Commission	Aeronautical Hazard Permit	Permit lighting plan determined with FAA coordination	Will be completed after final design is complete
SDCL 49-32-3.1	Notice to telecommunications companies	Telecommunication companies review the preliminary electrical layout and may suggest revisions to minimize impact to their systems	Will be completed after final design is complete
South Dakota Department of Transportation (SDDOT)	Highway Access Permit	Permit required for any access roads abutting State roads	If necessary, will be obtained after final design is complete
	Utility Permit	Permit required for any utility crossing or use within State road ROW	If necessary, will be obtained after final design is complete
	Oversize & Overweight Permit	Permit required for heavy equipment transport over State roads during construction	Will be obtained prior to construction
Butte County	Building Permit	Permit required for	To be submitted prior to construction

Agency	Permit/Approval	Description	Status
	Approval to construct an approach to a County road	Required for access roads abutting County roads	Will be obtained after final design is complete
	Approval for occupancy on the ROW of County highways	Required for utility crossing or use within County road ROW	Will be obtained after final design is complete

26.2 Agency Coordination

The Applicant has coordinated with various Federal, State, and local agencies to identify agency concerns regarding the proposed Project in various manners of communication at different stages of the Project as far back as 2010. Following is a list of the agencies that the Applicant has contacted regarding the proposed Project:

- BLM
- Butte County
- SDGFP
- SHPO
- USFWS
- Western
- Crow
- Northern Cheyenne
- Fort Peck
- Lower Brule Sioux
- Rosebud Sioux
- Sisseton Wahpeton Oyate
- Yankton Sioux
- Standing Rock Sioux
- Crow Creek Sioux
- Santee Sioux
- Sisseton Wahpeton
- Mandan
- Hidasta
- Arikara

Additional agency and public coordination will be conducted in conjunction with the scoping process required for the EA. Western will be the lead Federal agency for the EA. The Applicant will continue working with the public and interested Federal, State, and local agencies to address any comments they have regarding the Project. Additional opportunities for public and agency comments will be held as part of the review process for this Application.

26.3 Public and Agency Comments

As discussed in Section 9.0, the Applicant considered several potential Project sites in Wyoming and South Dakota before choosing the existing site. The Applicant considered input from agencies and the public in siting the Project. Factors that were considered included:

- Maximizing Project distance from the Belle Fourche River, where higher populations of many species, including eagles and bats, are present
- Maximizing Project distance from Bear Butte, a sacred site for many Native American tribes

26.4 Applicant's Burden of Proof (49-41B-22)

As described in Section 2.0 and 3.0, the Applicant has addressed the matters set forth in SDCL Chapter 49-41B and in ARSD Chapter 20:10:22 (Energy Facility Siting Rules), related to wind energy facilities.

Pursuant to SDCL 49-41B-22, the information presented in this Application establishes that:

- The proposed wind energy and transmission facilities comply with applicable laws and rules
- The facilities would not pose a threat of serious injury to the environment or to the social and economic condition of inhabitants in or near the Project Area
- The facilities would not substantially impair the health, safety, or welfare of the inhabitants
- The facilities would not unduly interfere with the orderly development of the region, having given consideration to the views of the governing bodies of the local affected units of government

27.0 TESTIMONY AND EXHIBITS (ARSD 20:10:22:39)

The following sections consist of the list the preparers and the Applicant verification.

27.1 List of Preparers

Table 27-1 lists the individuals that contributed to this application.

Table 27-1: List of Preparers

Company	Individual	Title
Wind Quarry	John O'Meara	Chief Operating Officer
Wind Quarry	Patrick O'Meara	Chief Executive Officer
Burns & McDonnell	Paul Callahan	Environmental Project Manager
Burns & McDonnell	Jennifer Bell	Senior Environmental Scientist
Burns & McDonnell	Samantha Clark	Biologist
Burns & McDonnell	Maximillian Jewett	Assistant Environmental Scientist
Burns & McDonnell	Emily Robbins	Noise Specialist
Burns & McDonnell	Brian Parker	GIS Analyst
DNV-GL	Dariush Faghani	Senior Engineer, Development and Engineering Services
FMG Engineering	Alex Fisher	Geotechnical Engineer
Marmot's Edge Conservation	Eric Atkinson	Wildlife Biologist
Quality Services, Inc.	Lance Rom	Cultural Resource Specialist

27.2 Applicant Verification

Mr. Patrick D. O'Meara, being duly sworn, deposes and states that he is the Project Manager of the Project, and as the authorized representative of the Applicant is authorized to sign this application on behalf of the Project Owner/Applicant, Wind Quarry, LLC.

He further states that he does not have personal knowledge of all the facts recited in the Application and Exhibits and Attachments attached hereto, but the information has been gathered from employees and agents of the Owner/Applicant, and the information is verified by him as being true and correct on behalf of the Owner/Applicant.

Dated this ___ day of May 2015.

Mr. Patrick D. O'Meara

28.0 REFERENCES

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