Buffalo Ridge II LLC
Application to the
South Dakota Public Utilities Commission
For a Facility Permit

Buffalo Ridge II Wind Farm and
Associated Collection Substation and
Electric Interconnection System

Prepared for

IBERDROLA
RENEWABLES

Iberdrola Renewables

and

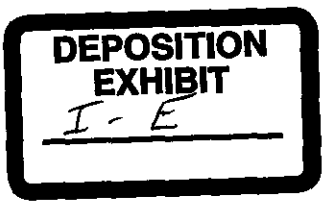
Buffalo Ridge II LLC

Prepared by

HDR

HDR Engineering Inc.
701 Xenia Avenue South
Suite 600
Minneapolis, MN 55416

October 2008



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EXECUTIVE SUMMARY

Buffalo Ridge II LLC (the Applicant), a wholly owned subsidiary of Iberdrola Renewables, Inc.[1], (IBR) proposes to construct and operate the Buffalo Ridge II Wind Farm (Project) on up to 77 acres dispersed throughout portions of up to 77 sections of land in northeastern Brookings County and southeastern Deuel County, South Dakota, north and east of the City of White. The Project will have a nameplate capacity of up to 306 megawatts (MW) and a net operating capacity of between approximately 1,045,000 and 1,152,000 MW hours per year (MWh/yr). The purpose of this Project is to develop the identified wind resource in the Brookings and Deuel counties area to meet a portion of the regional demand for renewable power.

The Project will consist of constructing, operating, and maintaining:

- Up to 204 1.5 MW, 153 2.0-MW, 145 2.1-MW, or 127 2.4 MW wind turbine generators (WTGs)
- Access roads to each WTG
- Underground and overhead 34.5 kilovolt (kV) electric collector lines connecting the WTGs
- A 210MW and a 96MW Project collection substation, identified as BRII-North and BRII-South, respectively.
- A Project Operations and Maintenance (O&M) facility
- An approximately 13-mile long 115 kilovolt (kV) overhead transmission line connecting the BRII-North substation to Xcel Energy's Brookings County substation
- Upgrades to the Brookings County substation
- One to two permanent met towers
- One SODAR unit

The Project proposes an interconnection with Xcel Energy's Brookings County substation. This Application provides information on the existing resources and potential environmental consequences from the Project on the following resources:

- Physical (geology, economic deposits, soils)
- Hydrology (water)

[1] Please note that PPM Energy, Inc. has changed its name to Iberdrola Renewables, Inc.

- 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)

The Project is not expected to have impacts on the existing physical environment (geology, economic mineral resources, or soils).

The 77 acres of new impervious surface is broadly dispersed throughout the project and represents less than half a percent of the total acreage in the Project boundary; 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, the Applicant anticipates that the Project will be able to avoid most wetland areas. Turbines and access roads will generally be constructed in the upland hill areas, avoiding the low-lying wetlands and waterways.

The majority of land proposed to be directly affected by construction of the Project is agricultural—under crops or pasture. The small loss of cropland is not expected to negatively affect terrestrial wildlife resources in the area. Similarly, construction of project facilities in pastures that have vegetation dominated by non-native species is not expected to negatively affect terrestrial ecosystems. A few grazed rangelands with areas of native prairie are within the Project boundary. Care will be taken to avoid or minimize impacts to these resources, thereby minimizing adverse effects.

The Project area overlaps watersheds containing habitat for the federally listed Topeka shiner. The Project will be designed to avoid direct impacts to Topeka shiner streams, and Best Management Practices (BMPs) will be used during construction to avoid indirect impacts such as erosion and sedimentation. Because the Project will avoid and minimize impacts to wetlands and other aquatic resources, we anticipate no adverse effects to aquatic ecosystems.

Existing land uses are not anticipated to change because of implementation of this project. Noise from Project construction activities will 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 50 dBA at sensitive noise receptors (i.e., occupied residences).

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

During Project construction, fugitive dust emissions will increase due to truck and equipment travel in the area. The additional particulate matter emissions will not exceed the National Ambient Air Quality Standards (NAAQS). The Project will produce no air emissions during its operation.

We expect the Project archaeological resources survey currently being conducted to be finalized by late 2008. Every effort will be made to design the placement of Project facilities to avoid or span any archaeologically significant sites. In the event that a site cannot be avoided, the Applicant would coordinate with the South Dakota Archaeological Research Center (ARC) and South Dakota State Historic Preservation Office (SHPO) to devise a treatment plan to address any impacts.

Mitigation measures proposed for the Project include:

- Turbines will not be located in undisturbed (ungrazed) native prairie.
- Turbines will not be illuminated, except as required by Federal Aviation Administration (FAA) regulations.
- Existing roads will be used for construction and maintenance where possible. Road construction will be minimized to the extent possible.
- The Project will comply with Brookings County and Deuel County zoning requirements on setbacks from residences, property lines and roads, turbine spacing, noise, and decommissioning plans.
- Access roads created for the wind farm facility will be located on gentle grades to minimize visible 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 ensure that drainage ways and streams are not impacted by sediment runoff from exposed soils.
- The Project will use solid towers for WTGs instead of lattice tower structures, to minimize potential avian and visual impacts.
- The Applicant will construct any overhead power lines required for the project in accordance with the current Avian Power Line Interaction Committee (APLIC) guidelines for preventing raptor electrocutions.

- A Class III cultural resources survey will be prepared for areas proposed for construction of the wind turbines, associated access roads and staging areas, overhead transmission lines, and other elements proposed for development.

- A wetland delineation was conducted in areas proposed for construction of the wind turbines, associated access roads and staging areas, overhead transmission lines, and other elements proposed for development. The results of the delineation were used to refine the current layout to avoid all permanent impacts to jurisdictional wetlands and waters to the greatest extent practicable.

In this Application, the Applicant has addressed all those matters set forth in SDCL Chapter 49-41B and in ARSD Chapter 20:10:22 (entitled Energy Facility Siting Rules) related to wind energy facilities. Included with this Application is a Completion Checklist (Table 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 and transmission facilities comply with all applicable laws and rules;
- The facilities 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 facilities will not substantially impair the health, safety or welfare of the inhabitants; and
- The facilities 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.

COMPLETENESS CHECKLIST

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

Table 1 Completeness Checklist

SDCL	ARSD	Required Information	Location
49-41B-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.	1.0
49-41B-11(7)	20:10:22:07	**Name of owner and manager.** The application shall contain a complete description of the current and proposed rights of ownership of the proposed facility. It shall also contain the name of the project manager of the proposed facility.	2.0
49-41B-11(8)	20:10:22:08	**Purpose of facility.** The applicant shall describe the purpose of the proposed facility.	3.0
49-41B-11(12)	20:10:22:09	**Estimated cost of facility.** The applicant shall describe the estimated construction cost of the proposed facility.	4.0
49-41B-11(9)	20:10:22:10	**Demand for facility.** The applicant shall provide a description of present and estimated consumer demand and estimated future energy needs of those customers to be directly served by the proposed facility. The applicant shall also provide data, data sources, assumptions, forecast methods or models, or other reasoning upon which the description is based. This statement shall also include information on the relative contribution to any power or energy distribution network or pool that the proposed facility is projected to supply and a statement on the consequences of delay or termination of the construction of the facility.	3.0
49-41 B-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.	5.0, Figures 1, 11a, 11b
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	6.0

SDCL	ARSD	Required Information	Location
		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.	
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 affect of the environment as a result of their construction or operation in the transmission site, wind energy site, or siting area	7.0, 8.0, 9.0, 10.0, 11.0, 12.0, 14.0, 15.0, 17.0
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 site or through which the transmission facility would pass; (2) A topographic map of the transmission site or siting area; (3) A written summary of the geological features of the siting area or transmission site using the topographic map as a base showing the bedrock geology and surficial geology with sufficient cross-sections to depict the major subsurface variations in the siting area; (4) A description and location of economic deposits such as lignite, sand and gravel, scoria, and industrial and ceramic quality clay existent within the plan or transmission site; (5) A description of the soil type at the plant site; (6) An analysis of potential erosion or sedimentation which may result from site clearing, construction, or operating activities and measures which would be taken for their control; (7) Information on areas of seismic risks, subsidence	8.0, 9.0

SDCL	ARSD	Required Information	Location
		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.	
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; (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.	9.0
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	10.0

SDCL	ARSD	Required Information	Location
		construction and operation of the proposed facility.	
49-41B-11(2, 11); 49-41B-21; 49-41B-22	20:10:22:17	**Effect of aquatic ecosystems.** The applicant shall provide information of the effect of the proposed facility on aquatic ecosystems, and including existing information resulting from biological surveys conducted to identify and quantify the aquatic fauna and flora, potentially affected within the transmission site, 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.	11.0
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 districts; and (l) Noise sensitive land uses; (2) Identification of the number of persons and homes which would 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.	12.0, 17.0
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 would comply with the local land use zoning or building rules, regulations or ordinances. If the proposed facility violates local land use	13.0, Appendix E

SDCL	ARSD	Required Information	Location
		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.	
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 would comply with all water quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.	14.0
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 would comply with all air quality standards and regulations of any Federal or state agency having jurisdiction and any variances permitted.	15.0
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.	16.0
49-41B-11(11); 49-41B-22	20:10:22:23	**Community impact.** The applicant shall include an identification and analysis of the effects the construction, operation, and maintenance of the proposed facility would 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.	10.2.2, 17.0

SDCL	ARSD	Required Information	Location
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 10 years of commercial operation in 1-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 would remain within the county and the township in which the facility is located after construction is completed.	17.0, 18.0
49-41B-11(5)	20:10:22:25	**Future additions and modifications.** The applicant shall describe any plans for future modification or expansion of the proposed facility or construction of additional facilities which the applicant may wish to be approved in the permit.	19.0
49-41B-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	5.0

SDCL	ARSD	Required Information	Location
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.	5.0
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
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 17.0
49-41B-11; 49-41B-21; 34A-9-7(4)	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.	20.0
49-41B-11(2, 11)	20:10:22:30	**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.	5.0
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.	21.0
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	21.0

SDCL	ARSD	Required Information	Location
		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.	
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.	Figure 3a, 5.1, 5.2, 5.3, 5.4, 5.5, 5.11, 6.0, 10.2, 12.2, 12.4.3, 12.4.5, 13.0, 17.2.2, 22.0
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.	5.2
49-41B-11 (2,	20:10:22:35.	**Information concerning transmission facilities.** If a	5.2, 5.11,

SDCL	ARSD	Required Information	Location
11)		transmission facility is proposed, the applicant shall provide the following information as it becomes available to the applicant: (1) Configuration of the towers and poles, including material, overall height and width; (2) Conductor configuration and size, length of span between structures and number of circuits per pole or tower; (3) The proposed transmission site and major alternatives as depicted on overhead photographs and land use culture maps; (4) Reliability and safety; (5) Right-of-way or condemnation requirements; (6) Necessary clearing activities; and (7) If the transmission facility is placed underground, the depth of burial, distance between access points, conductor configuration and size and number of circuits.	6.3, 6.4
49-41B-7; 49-41B-22	20:10:22:36.	**Additional information in application.** The applicant shall also submit as part of the application any additional information necessary for the local review committees to assess the effects of the proposed facility pursuant to SDCL 49-41B-7. The applicant shall also submit as part of its application any additional information necessary to meet the burden of proof specified in SDCL 49-41B-22.	23.0
49-41B-7	–	**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 but not be limited to consideration of the temporary and permanent alternatives in the following areas: (1) Housing supplies; (2) Educational facilities and manpower; (3) Waste 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; (12) Energy.	N/A

SDCL	ARSD	Required Information	Location
49-41B-22	–	**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.	Executive Summary, 23.4
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 would be followed during construction and operation of the proposed transmission facility.	N/A,
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. Such filing would be made consistent with the prehearing conference order.	23.0

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

The Applicant (Participant) is Buffalo Ridge II LLC, an Oregon entity and wholly owned subsidiary of Iberdrola Renewables, Inc. Listed below are the names and contact information for the owner and manager of the proposed Project. The owner contact (Mr. Tim Seck) is the person authorized to receive communications relating to the Application on behalf of the Applicant.

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

The Owner of the proposed Project is Buffalo Ridge II LLC, a wholly owned subsidiary of Iberdrola Renewables. Contact person for the Owner is Tim Seck.

Tim Seck
Iberdrola Renewables, Inc.
2221 Riverwood Place
St. Paul, MN 55104
Phone: (612) 214-0358
Timothy.Seck@iberdrolausa.com

The Manager of the Project is Buffalo Ridge II LLC, a wholly owned subsidiary of Iberdrola Renewables. Contact person for the Manager is Tim Seck.

Tim Seck
Iberdrola Renewables, Inc.
2221 Riverwood Place
St. Paul, MN 55104
Phone: (612) 214-0358
Timothy.Seck@iberdrolausa.com

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

Buffalo Ridge II LLC (Applicant) proposes to construct and operate the Buffalo Ridge II Wind Farm, a wind energy electricity generating facility and ancillary facilities (Project), in Argo, Oak Lake, Lake Hendricks, Sherman, and Richland Townships in Brookings County, and Scandinavia and Blom Townships in Deuel County, South Dakota (Figure 1). The 115-kilovolt (kV) transmission line will be located in Oak Lake, Sherman and Richland Townships. The Applicant, Buffalo Ridge II LLC, is wholly owned by Iberdrola Renewables, Inc (IBR). The Applicant has applied to the Midwest Independent System Operator (MISO) for interconnection with Xcel Energy's transmission system at the existing Brookings County substation. The Applicant is planning to begin construction as early as May 2009 and anticipates an in-service date as early as December 31, 2010. The 115 kV transmission facility will be constructed as part of the Project, and will deliver the energy produced by the wind farm to Xcel Energy's transmission system.

The purpose of this Project is to develop the identified wind resource in the Brookings and Deuel counties area to meet a portion of the regional demand for renewable power. The following sections outline 1) the regional demand for renewable power, 2) the identified regional wind resource, and 3) the transmission capacity available to provide an outlet for renewable power to serve the demand. These three elements combine to create the need for this Project; no one element is sufficient in and of itself.

3.1 WIND RESOURCE AREAS

Wind-powered electric generation is entirely dependent upon the availability of the wind resource at a specific location. The energy available from the wind increases at the third power of the wind speed. In other words, a doubling of the wind speed would increase the available energy by a factor of eight times.

Cost-effective designs of wind turbine generators (WTGs) optimize wind and land resources. Therefore, they operate when sufficient wind speeds are available. The financial viability of the WTGs also greatly depends on the frequency, duration, and timing of sufficient wind speed. These factors have led to the defining and mapping of wind resources.

The American Wind Energy Association (AWEA) has ranked South Dakota as having the fourth highest wind potential in the country. Approximately 98 megawatts (MW) of wind generation were installed and in operation in the state as of June 2008 (AWEA, 2008). The National Renewable Energy Laboratory (NREL) has rated the wind resources in the Project area (Buffalo Ridge in Minnesota and South Dakota) as Class 5, or excellent (Figure 2).

Table 2 shows the existing and potential wind power development for South Dakota and the surrounding states.

Table 2 Midwest Wind Power

	Existing[1] (MW)	20% Wind Energy by 2030[2] (MW)	Renewable Portfolio Standard[3]
Illinois	699	>10,000	25% by 2025
Iowa	1,273	>10,000	None
Minnesota	1,299	5,000-10,000	25% by 2025
Nebraska	73	5,000-10,000	None
North Dakota	345	1,000-5,000	None
South Dakota	98	5,000-10,000	10% by 2015 [4]
Wisconsin	53	1,000-5,000	10% by 2015
Total	**3,840**	**37,000 - >60,000**	

Source: 1. AWEA, 2008a. 2. U.S. DOE, 2008, 3. AWEA 2008b 4. SL 2008. Ch 244, § 1

3.2 RENEWABLE POWER DEMAND

Deregulation of the electric industry and current energy supply issues have emphasized the need for new and diverse energy sources. State and federal policies, combined with the declining costs of wind generation, have made wind power more attractive to utilities seeking to diversify their generation portfolios. Total installed U.S. wind power capacity exceeded 16,800 MW in 2007, and wind was the second largest source of new electrical capacity in the nation, behind only natural gas, for the past three years. In 2007, more than 5,200 MW of wind energy were installed. A comparison of utility generation by fuel type shows that wind generation is now the fastest growing segment of electric power generation.

Several states have implemented Renewable Energy Standards (RES) policies that encourage the development of wind energy projects. As of June 2007, 24 states and the District of Columbia have RES laws (EERE, 2007), including Minnesota, Iowa, and Wisconsin (Table 2). In South Dakota, an RES 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 (SL 2008, CH 244, § 1).

In Minnesota, each electric utility's direct retail energy sales, or energy sales to distribution utilities selling energy to Minnesota retail customers, must meet the standards of 12 percent by 2012, 17 percent by 2016, 20 percent by 2020, and 25 percent by 2025.

In addition, an agreement between Xcel Energy and the state of Minnesota for the Minnesota service area calls for 30 percent by 2020. The result is an estimated 12,051,152-megawatt hours (MWh) of renewable energy required by 2025 for Xcel Energy to meet the RES[2].

The federal government has provided, and will continue to provide, production tax credits (PTCs) for wind power to encourage investment and provide some financial stability to allow projects to develop.

These mandates and related agreements have led regulated utilities to increase wind power as a percentage of their generation portfolio. Typically, this need is met when unregulated wind energy developers respond to resource requests issued by utilities. Successful developers typically develop, own, and operate the wind farm and sell the wind power to a given utility through a long-term power purchase agreement (PPA).

The combination of policy and market drivers is creating an increased demand for wind power. Transmission is needed because high-potential wind resources are not coincident with areas of high electric load. This is demonstrated in a number of regional transmission planning studies that cover Minnesota and South Dakota. These studies are all consistent in forecasting that the wind resource in the Project area (Buffalo Ridge in Minnesota and South Dakota) would be the primary source of wind power to meet regional demand. The planning studies include:

- Midwest Independent System Operator (MISO) Northwest Exploratory Study, which forecasts 500 MW of wind power in the Project area (Grivna, 2005);
- MISO Transmission Expansion Plan 2006, which forecasts the addition of 2,810 MW of wind power in the Midwest by 2011 (MISO, 2007)
- Xcel Energy will add 2,600 MW of wind power in Minnesota and surrounding states by 2020 (Xcel, 2007), and CapX 2020 anticipates a load increase of 6,300 MW between 2009 and 2020 (CapX, 2005);
- Buffalo Ridge Incremental Generation Outlet Transmission Study, which forecasts more than 400 MW of wind power in the Project area (Gonzalez, 2005);
- Western Area Power Administration's Dakotas Wind Transmission Study, which forecasts an additional 500 MW of wind energy in the Project area (Weber, 2005).

[2] From CapX 2020 Certificate of Need, Submitted to Minnesota Public Utilities Commission on August 16, 2007, page 6.42.

3.3 TRANSMISSION CAPACITY

The final element leading to defining a potential wind resource is electrical transmission access. The most economical developments occur where large numbers of WTGs may be located to achieve economies of scale; this correspondingly requires an adequate transmission outlet. Although there are several areas with excellent wind resource in the Buffalo Ridge area, transmission access is constrained. The availability of transmission access improves the suitability of the Project area for large-scale wind projects.

Wind farm developers must determine if capacity exists near a given wind resource by working with the transmission owners and regional transmission operators such as MISO. The Federal Energy Regulatory Commission (FERC) rules require that a developer must also make a request to the interconnecting utility for any available capacity, which is weighed by MISO against the other competing demands. There are two MISO queue numbers for this project: G-349, for a 210 MW interconnect, and G-634, for a 96 MW interconnect. Finally, the developer must ensure that any interconnection where capacity is reserved meets stringent interconnection design standards to ensure reliability on the transmission grid for all users.

The Buffalo Ridge II Project has been in the MISO interconnection queue for several years waiting for the completion of the requisite studies. More importantly, the Project has been waiting for the identified transmission upgrades to be completed allowing the interconnection of the project. The required upgrades will be completed in time for this project to be interconnected in the 2010 timeframe.

All of these factors lead to a very limited number of viable locations to support economic and logistic development of a given wind resource. The Applicant selected Xcel Energy's Brookings County substation because it provides the Project with access to high voltage transmission lines in proximity to the high wind energy resource site. The Applicant expects to sign an Interconnection Agreement with MISO and Xcel Energy by the end of 2008 for the 210 MW interconnection. The Applicant does not have a signed Interconnection Agreement for the 96 MW interconnection at this time. However, MISO has completed the facility study and the Applicant anticipates MISO to tender a Large Generator Interconnection Agreement in late 2008, at which point final negotiations will commence.

4.0 ESTIMATED COST OF THE WIND ENERGY FACILITY AND TRANSMISSION FACILITY (ARSD 20:10:22:09)

The estimated capital cost of the Project is expected to be over $620 million, based on 2010 price estimates. This cost includes planning, easement acquisition, permitting, and construction. Of the total cost, the 115 kV transmission line would account for approximately $9 million, and the other Project facilities (WTGs, access roads, electrical collection system, Project substations, O&M facility, SCADA system, meteorological towers, and SODAR unit) would account for the remainder of the cost, approximately $611 million.

5.0 GENERAL SITE DESCRIPTION (ARSD 20:10:22:11, 33.02, 34 AND 35)

The Project will be located on approximately 77 acres dispersed throughout portions of up to 77 sections of land in northeastern Brookings County and southeastern Deuel County, South Dakota, near the City of White, and containing portions of the towns of Astoria and Toronto (Figure 1). The Project boundary encompasses approximately 77 mi^2 in Richland, Lake Hendricks, Sherman, Oak Lake, and Argo townships in Brookings County, and Scandinavia and Blom Townships in Deuel County. Table 3 shows the sections contained within the Project boundary.

Table 3 Sections within the Buffalo Ridge II Wind Farm Project Boundary

County	Township Name	Township	Range	Sections
Brookings	Richland	111 N	47 W	6, 7, 18, 19, 30
	Lake Hendricks	112 N	47 W	30, 31
	Sherman	111 N	48 W	1- 4, 12, 13, 24, 25
	Oak Lake	112 N	48 W	1-11, 14-23, 25-30, 32-36
	Argo	112 N	49 W	1-4, 10-14, 23-26
Deuel	Blom	113 N	49 W	25-28, 33 - 36
	Scandinavia	113 N	48 W	26 - 35

The Applicant is planning to begin construction as early as May 2009 and anticipates an in-service date as early as December 31, 2010.

There are no active railroads, or known historic sites within the Project boundary. Figures 12a and 12b show the locations of cemeteries, towns, public lands and other sensitive land uses near the Project.

5.1 WIND FARM FACILITY

The Project will consist of up to 204 1.5-MW, 153 2.0-MW, 145 2.1-MW, or 127 2.4-MW WTGs with a nameplate capacity of up to 306 MW and a net operating capacity of between approximately

1,045,000 and 1,152,000 MW hours per year (MWh/yr), assuming a capacity factor of 39 to 43 percent. The Project will also consist of constructing, operating, and maintaining electric collector lines, two Project substations, an approximately 13-mile 115 kV transmission line with an interconnection to the Xcel Energy Brookings County substation (discussed in further detail below), a Project O&M facility, access roads connecting to each WTG, one to two permanent meteorological towers, SODAR unit, and SCADA system. See Figure 3a (Proposed Wind Farm Project Layout) for the current layout of the wind farm facilities. Table 4 lists the sections within the Project boundary containing proposed wind farm facilities.

Table 4 Sections Containing Proposed Wind Farm Project Facilities

County	Township Name	Township	Range	Sections
Brookings	Richland	111 N	47 W	7, 18, 19, 30
	Sherman	111 N	48 W	1-4, 12, 13, 25
	Oak Lake	112 N	48 W	2-10, 15-22, 26-30, 32-36
	Argo	112 N	49 W	1-3, 11-13, 24, 25

Figure 3a contains 161 turbine locations. Depending on which turbine type is selected for the Project, some of the turbines may not be constructed. If the GE 1.5 MW turbine is used, up to 204 turbines will be constructed. If the Gamesa 2.0 MW turbine is used, up to 153 turbines will be constructed. If the Suzlon 2.1 MW turbine is used, up to 145 turbines will be constructed. If the Mitsubishi 2.4 MW turbine is used, up to 127 turbines will be constructed. 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 ultimately may not be constructed as part of the Project; or, alternately, that additional turbine locations may be required, particularly if the 1.5 MW machine is selected.

Additionally, it should be noted that depending on the final turbine type selected for use in this Project, the layout shown in this application may need to be modified. For example, due to the 2.4 MW WTG's larger rotor diameter (RD), a wider internal spacing than what is shown in the preliminary layout may need to be used in order to maintain acceptable efficiency (see Section 6.2 for further discussion of internal spacing). If this 2.4 MW WTG is ultimately selected and the layout needs to be modified, the majority of the turbines would simply be shifted horizontally (east-west) within the existing strings shown on the current layout, in order to obtain the appropriate internal spacing. Alternatively, if the 1.5 MW WTG is selected, up to an additional 43 turbines may be required in order to achieve 306 MW. If additional turbine sites are necessary, the Applicant would likely shift the turbines within the existing strings (the smaller RD of the 1.5 MW machine would give the opportunity to place the turbines closer together), and add on turbines to the ends of the strings

wherever possible. By shifting within already surveyed corridors, the Applicant will be able to place turbines such that sensitive biological and cultural features are avoided, similar to the current layout. However, it is possible that some turbine sites may be placed outside of corridors that were surveyed as part of the current layout. Additional site surveys will be conducted, if needed due to layout changes.

Other factors besides turbine type may also necessitate changing the layout from what is shown in Figure 3a. Ongoing discussions with the landowners, with Brookings and Deuel County Zoning, Brookings and Deuel County Highway, the Townships, and South Dakota Department of Transportation may lead to changes in turbine locations, road alignments, and overhead electrical line pole locations. As discussed further in Sections 8, 10, 12, and 17, other factors that could affect ultimate turbine and road locations include unsuitable soil conditions, or cultural or biological resources.

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

The Applicant does not currently anticipate any additions of MW within the Project boundary within the next five years (as stated above, if the 1.5 MW turbine is used, additional turbines above what is shown in the current layout would be necessary). However, it is possible that not all of the turbine locations shown in the current layout will be built at the same time. The Applicant is currently in the early development phase of another wind project, adjacent to and north of the Buffalo Ridge II Project, and it is possible that some of the turbine locations shown in this application will ultimately be built as part of that northern project. If that is the case, those turbines would be permitted for that future project through the SD PUC, and through the appropriate county permitting processes.

5.2 TRANSMISSION FACILITY

See Figure 3b (Proposed 115 kV Transmission Line Route) for the route of the proposed 115 kV transmission line. The particular transmission facilities for which the permit is being requested include:

- A new 115 kV Project substation (BRII-North) located in the northeast quarter of Section 19 in Oak Lake Township for the 210 MW interconnection;
- A new 115 kV line running approximately 13 miles between the proposed BRII-North Project substation to Xcel Energy's Brookings County substation;

- A second new Project substation (BRII-South) located in the eastern half of Section 25 in Sherman Township for the 96 MW interconnection;
- Improvements to the Brookings County substation to accommodate the two interconnections, for 210 MW and 96 MW.

Table 5 identifies the proposed transmission line location.

Table 5 Sections crossed by Proposed 115 kV Transmission Line

County	Township Name	Township	Range	Sections
Brookings	Richland	111 N	47 W	7, 18, 19, 30
	Sherman	111 N	48 W	1-4, 12, 13, 25
	Oak Lake	112 N	48 W	19, 20, 21, 27, 28, 34
	Argo	112 N	49 W	1-3, 11-13, 24, 25

5.3 WIND TURBINE GENERATORS

The Applicant anticipates using 1.5, 2.0, 2.1, or 2.4-MW WTGs, although exact turbine models are subject to change to ensure selection of a turbine that is cost-effective and optimizes land and wind resources. The application uses the GE 1.5 MW machine as a representative turbine for the 1.5 MW Class, the Gamesa 2.0 MW machine as a representative turbine for the 2.0 MW class, the Suzlon 2.1 MW machine as a representative turbine for the 2.1 MW class, and the Mitsubishi 2.4 MW machine as a representative turbine for the 2.4 MW class. Table 6 compares the specifications of these four turbine types.

Table 6 Wind Turbine Characteristics

Characteristic	Turbine			
	GE 1.5 MW	Gamesa 2.0 MW	Suzlon 2.1 MW	Mitsubishi 2.4MW
Nameplate capacity	1,500 kW	2,000 kW	2,100 kW	2,400 kW
Hub height	80 m (262 ft) to 100 m (328 ft)	80 m (262 ft) to 100 m (328 ft)	80 m (262 ft) to 100m (328 ft)	80 m (262 ft) to 100 m (328 ft)
Rotor Diameter	78 m (256 ft)	83 m (272 ft) or 87 m (285 ft)	88 m (289 ft)	95 m (312 ft)
Swept Area	4,778 m^2 (51,470 ft^2)	5,411 m^2 (58,107 ft^2) or 5,945 m^2 (63,990 ft^2)	6,082 m^2 (65,597 ft^2)	7,088 m^2 (76,295 ft^2)
Total height[1]	119 m (390 ft) to 139 m (456 ft)	121.5 m (398 ft) to 143.5 m (471 ft)	124 m (407 ft) to 144 m (472 ft)	126.2 m (414 ft) to 147.5 m (484 ft)

Characteristic	Turbine			
	GE 1.5 MW	Gamesa 2.0 MW	Suzlon 2.1 MW	Mitsubishi 2.4MW
Cut-in wind speed[2]	3 m/s (6.7 mph)	4 m/s (9 mph)	4 m/s (8.9 mph)	3 m/s (6.7 mph)
Rated capacity wind speed[3]	11.8 m/s (26.4 mph)	15 m/s (34 mph)	14 m/s (31.3 mph)	12.5 m/s (27.96 mph)
Cut-out wind speed[4]	25 m/s (45 mph)	25 m/s (56 mph)	25 m/s (45 mph)	25.0 m/s (45 mph)
Maximum sustained wind speed[5]	Over 45 m/s (100 mph)	Over 45 m/s (100 mph)	Over 45 m/s (100 mph)	Over 45 m/s (100 mph)
Rotor speed	10.1 to 20.4 rpm	9.0 to 19.0 rpm	15.1 to 17.7 rpm	9.0 to 16.9 rpm
Distance to 50 dBA noise level	75 m (246 ft)	100 m (328 ft)	115 m (377 ft)	160 m (525 ft)

1 Total height = the total turbine height from the ground to the tip of the blade in an upright position

2 Cut-in wind speed = wind speed at which turbine begins operation

3 Rated capacity wind speed = wind speed at which turbine reaches its rated capacity

4 Cut-out wind speed = wind speed above which turbine shuts down operation

5 Maximum sustained wind speed = wind speed up to which turbine is designed to withstand

Each WTG is mounted on a single steel tower, approximately 80 to 100 m high, and approximately 5 m in diameter at the base and secured by a concrete foundation. The four turbine types being considered are all active yaw- and pitch-regulated machines with power and torque control capabilities. Each WTG has three blades. The length of the blades is dependent upon the turbine model chosen, but the Applicant anticipates that blades will be between 38 and 46.2 m long. 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. Figure 4 shows a representative WTG with a tower of 80 m and a blade length of between 39 and 46.2 m; actual turbine dimensions for this Project may vary.

Other turbine specifications include:

- Gearbox with three-step planetary spur gear system;
- Double fed three-phase asynchronous generator (1.5 MW), an asynchronous 4-pole generator with a wound rotor (2.0 MW, 2.1 MW and 2.4 MW);
- A braking system for each blade and a hydraulic parking brake (disc brake); and
- Yaw systems that are electromechanically driven.

Some of the turbines being considered also incorporate new technology compared to turbines currently in the landscape, including:

- Force-flow bedplates (nacelle components joined on a common structure to improve durability);
- Permanent magnet generators (providing higher efficiency at lower wind speeds); and
- New gearbox bearing designs (improving reliability by reducing bending and thrust).

5.4 WIND TURBINE TOWERS

The tower that supports the wind turbine is expected to be a tapered monopole, shown in Figure 4, ranging in size from approximately 80 m (262 ft) to 100 m (328 ft) in height, depending on the selected vendor. Welds are made in automatically controlled power welding machines and ultrasonically inspected during manufacturing per American National Standards Institute (ANSI) specifications. All surfaces are sandblasted and multi-layer coated for protection against corrosion. The towers are uniformly painted a neutral color. 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. A controller cabinet will be located inside each tower base. Towers typically are fabricated in three or four sections and assembled on-site.

5.5 WIND TURBINE FOUNDATIONS

The tower is supported by a reinforced concrete foundation, ranging from 15 to 24 m (48 to 80 ft) in diameter. The foundation could be either a spread-foot or a caisson-type concrete foundation. Figure 5 shows a typical foundation design. The actual foundation design for each turbine will be determined based on site-specific geotechnical information and structural loading requirements of the selected turbine model. The pedestal is the portion of the foundation that is attached to the tower. The bottom of the pedestal is typically 3 ft below grade and the top of the pedestal is about one-half a foot above grade. The pedestal ranges in diameter from 5 m (16 ft) for 80-m (262-ft) towers to 6 m (20 ft) for 100-m (328-ft) towers.

The majority of the turbine foundation will be underground, and only a 17.8-m (58-ft) diameter portion of it will be covered with gravel for fire protection. The area permanently disturbed during operations will be a circular area with a radius of approximately 7.0 m (23 ft), or up to 249 m^2 (2,640 ft^2). These dimensions include a turbine tower with a radius of up to 2.4 m (8 ft) and surrounding gravel area with a radius of up to 4.6 m (15 ft), which represent the largest tower diameter and maximum graveled area.

During construction, a larger area will be used to lay down the rotors and maneuver cranes during turbine assembly. Turbine assembly will require a 15 m by 152 m (50 ft by 150 ft) compacted earth or

gravel crane pad extending from the end of the access road to the turbine foundation. Also required will be an approximately 79 m by 79 m (260 ft by 260 ft) to 102 m by 102 m (335 ft by 335 ft) area for component laydown and rotor assembly centered close to the turbine foundation. To calculate temporary impacts for this application, the Applicant used a worst-case scenario of 335 ft by 335 ft for a temporary laydown area, for approximately 10,426 m^2 (112,225 ft^2) at each of the turbine locations. Although it is likely that the maximum number of turbines constructed will be 153 (if the 2.0-MW machine is used), for purposes of the impacts calculations for this application a worst-case scenario, assuming that all 161 turbines are constructed, was used. As noted above, if the 1.5 MW machine is used, up to 204 turbines may be constructed. The additional 43 turbine sites that would be necessary for a 306 MW project using 1.5 MW machines have not been determined at this time and therefore are not part of the overall impact calculations. However, the temporary and permanent impacts per turbine would be smaller for the 1.5 MW machine than what has been assumed for the impacts analysis; therefore, the overall acreage of impacts are expected to be similar to what is listed in this application, even with the additional turbine sites.

5.6 GENERATOR STEP-UP TRANSFORMER AND TRANSFORMER FOUNDATIONS

For some turbine types (GE 1.5MW and Suzlon 2.1MW), a generator step up transformer (GSU) will 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 (typically 34.5 kV). Other turbines (Gamesa 2.0MW and MHI 2.4MW), the GSU is located in the nacelle. If external transformers are used, then small concrete slab foundations will be constructed to support the transformers within the gravel area. The transformer is a rectangle measuring approximately 2.3 m by 2.6 m (7.5 ft by 8.5 ft). Support for the transformer is provided by a concrete pad or foundation approximately 8 inches thick, which is placed over 0.6 m (2 ft) of concrete fill. The concrete fill will measure 2.3 m by 4.1 m (7.5 ft by 13.5 ft) and will be placed under the transformer pad and between the transformer and the tower pedestal.

5.7 ACCESS ROADS

Each WTG will be accessible via all-weather Class 5 gravel roads, providing access to the turbines via public roads. The layout shown in Figure 3a shows approximately 34 miles of access roads. Access roads will follow fence lines, field lines, and existing field access roads to the extent possible. Siting roads in areas with unstable soil will be avoided wherever possible. All roads will include appropriate drainage and culverts while still allowing for the crossing of farm equipment. The access roads will be approximately 4.9 m (16 ft) wide and will be covered with road base designed to allow passage under inclement weather conditions.

The access roads will consist of graded dirt, overlaid with geotechnical fabric (if needed), and will be covered with compacted earth or gravel. To facilitate crane movement and equipment delivery during

construction of the Project, an additional 2.5 m (8 ft) of compacted earth or gravel roadway will be temporarily installed on either side of the permanent roadway for a total width of 9.7 m (32 ft).

5.8 O&M FACILITY

The proposed O&M facility is in the northeastern quarter of Section 12 of Argo Township, on approximately three to five acres within private land leased by the Applicant (Figure 3a). The buildings used for this purpose are approximately 448 m^2 (4,800 ft^2), and house the equipment to operate and maintain the wind farm. A gravel parking pad will surround the building. The parking lot adjacent to the building is typically 280 m^2 (3,000 ft^2).

5.9 METEOROLOGICAL TOWERS AND SODAR UNITS

The Applicant has constructed three temporary meteorological towers within the Project boundary, and three more within one mile of the Project boundary. These temporary meteorological towers are expected to be removed within one year of Project construction. The Applicant anticipates that the Project will include one or two permanent 60 m (197 ft) or 80 m (262 ft) meteorological towers to house anemometers to measure the wind. The permanent towers will be un-guyed and lighted as necessary to comply with Federal Aviation Administration (FAA) guidelines. Each meteorological tower will result in a permanent impact of approximately 6.2 m by 6.2 m (20.5 ft by 20.5 ft), or 39 m^2 (420 ft^2). Figure 3a shows four potential locations for the permanent meteorological towers; selection of the two final locations will depend on the final turbine type selection, and therefore how many of the 161 potential turbine locations are ultimately constructed.

The Applicant also anticipates installing one sonic detection and ranging (SODAR) unit within the Project boundary. The SODAR unit is typically located near (within 300 ft) one of the permanent meteorological towers in a small trailer approximately 3 m (10 ft) high with an attached 6 m (20 ft) wind sensor boom. The purpose of the unit is to remotely measure the vertical turbulence structure and wind profile up to 200 ft (656 ft) in 9.8 m (32-ft) increments. The SODAR unit will result in a permanent impact of approximately 3.6 m by 3.6 m (12 ft by 12 ft), or 13 m^2 (144 ft^2).

5.10 TEMPORARY LAYDOWN/STOCKPILE AREAS AND BATCHPLANT

During construction, it is likely that a temporary stockpile or laydown area will be selected within the Project boundary. Turbine components may be temporarily stored in this 15- to 20-acre site before being moved to the final turbine sites. Figure 3a shows the location of the temporary laydown/stockpile/batchplant area, in the southeast quarter of Section 21, Oak Lake Township.

One or more concrete batchplants may be necessary during construction in order to prepare concrete for foundations on site. It has not been determined at this time if on-site batchplants will be necessary

for the Project. If they are utilized, each will temporarily impact approximately 3 acres of land, and it is anticipated that they will be located within the temporary laydown area.

For purposes of calculating temporary impacts in this application, the Applicant has assumed that one 20-acre laydown/stockpile/batchplant area will be used during construction.

5.11 ELECTRIC COLLECTOR SYSTEM, COLLECTION SUBSTATION AND INTERCONNECTION FACILITIES (ARSD 20:10:22:34 AND 35)

The WTGs will be interconnected by communication and electrical power collection circuit facilities within the wind farm. These facilities will include a combination of underground and overhead feeder lines that will deliver wind-generated power to the Project substation.

5.11.1 34.5 KV COLLECTION SYSTEM

Underground 34.5 kV System

Approximately 51 miles of underground 34.5 kV collection lines will be constructed. Each underground collector circuit will consist of three power cables contained in an insulated jacket and buried at a minimum depth of 1 m (3.5 ft) that will not interfere with farming operations. A single circuit of the 34.5 kV collection system will consist of three 1-0 to 1000 kcmil ACSS conductors in a triplex configuration. Access to the underground lines will be located at each turbine site and at junction boxes located at points where the underground collector system cables are spliced, where the cables connect to the overhead transmission system, and where the cables enter into the Project substations. Due to the power carrying limits of underground cabling, there are several segments of underground collection lines where more than one circuit will likely be necessary. The current preliminary layout, assuming a full build-out of all turbine sites, will consist of approximately 40 miles of single circuit, 4.5 miles of double circuit (two circuits in parallel), 4 miles of triple circuit (three circuits in parallel), 1 mile of quadruple circuit (four circuits in parallel) and 1 mile of quintuple circuit (five circuits in parallel) 34.5 kV line.

The underground electrical collection and communication systems generally will be installed by plowing or trenching the cables. Vehicles used to trench-in the underground cabling typically has treads approximately 8 ft apart, resulting in an 8-ft wide corridor of temporary impacts to soils and vegetation per single circuit. Each additional circuit along the same corridor will result in an additional 8 ft width of temporary impacts. If the underground collector system crosses rangelands with prairie plant populations, the Applicant may modify the trenching technique so that the width of temporarily impacted vegetation and soil is minimized. In cropped areas, segregated topsoil will be 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 order to minimize disturbance to the native seedbank, topsoil will not be

stockpiled where the underground collector system crosses rangelands with native prairie plant populations (as defined below in Section 10.1.1.3). In rangeland prairie areas, the Applicant will revegetate the disturbed soils with a weed-free native plant seed mix.

If the underground collector system crosses streams with Topeka shiner habitat (discussed further in Sections 10.2 and 11), the Applicant will use directional boring to install the collector lines. Directional boring will result in no temporary or permanent impacts to the waterway or adjacent wetlands. For one type of directional boring, a surface-operated drilling device is angled into the ground and directed to its endpoint by a radio-controlled cutter head. Another option is to dig a pit at each end of the bore location and push a conduit from one pit to another.

Overhead 34.5 kV System

The approximately 4-mile long overhead 34.5 kV collector system starts at the northern portion of the Project, just south of the Deuel County border. The line runs south along the east side of 478th Avenue for approximately two miles to the intersection with 198th Street, where it crosses to the west side of the road in order to avoid an occupied residence on the east side. The line will continue south along the west side of 478th Street for approximately 1,550 ft, where it will cross back to the east side and continue south for 0.6 miles to 199th Street where it will turn east. The line will run east along the north side of 199th Street for one mile to the BRII-North Project substation in the northeast quarter of Section 19 of Oak Lake Township.

The Applicant is currently considering several options for the 34.5 kV overhead structures. One potential structure type would be to use standard overhead distribution lines consisting of wooden poles approximately 65 ft tall and spaced approximately 150 to 200 ft apart just outside the road right-of-way (ROW). Figures 6a and 6b show two types of typical 34.5 kV structures, single circuit and double circuit, respectively. This structure type would require a 40 to 50 foot ROW, with up to 25 ft on each side of centerline. The conductor type would be up to 1272 kcmil aluminum conductor steel reinforced (ACSR).

However, since it is possible that the 34.5 kV overhead route built for the Buffalo Ridge II Wind Project may be used to carry 115 kV lines from a separate IBR wind project north of the Project boundary currently in the early development stage, the Applicant may choose to use 115 kV structures with 34.5 kV underbuild for this portion of the Project (Figure 6c). If this option is used, the 34.5 kV conductors would be installed for the Buffalo Ridge II Project, and the 115 kV line associated with the separate northern project would either be installed concurrently (if both projects receive permits and construction occurs at the same time) or at a later date once the northern project is permitted. These structures would be approximately 85 ft tall, with an average span of approximately 250 ft. This structure type would require an approximate 75-foot ROW, 37.5 ft each side of centerline. The 115 kV

conductor type would be 795 kcmil 26/7 ACSR, and the 34.5 kV conductor type is expected to be 1272 kcmil ACSR.

Temporary impacts for construction of this overhead line would occur within the width of the ROW, as well as approximately 1,000 ft^2 per pole for temporary laydown impacts. Permanent impacts for this line would be approximately 7 ft^2 per pole if the wooden 34.5 kV structures were used, and approximately 50 ft^2 per pole if the 115 kV/34.5 kV underbuild structures were used. For purposes of the impacts calculations for this application, a worst-case assumption was made of 75 ft of ROW and 50 ft^2 per pole. The overhead line is expected to span wetlands and waterways, thereby avoiding impacts. As described further in Section 10, in areas where the overhead transmission line crosses rangeland with prairie communities, the Applicant will minimize temporary construction impacts to the greatest extent possible. Additionally, care will be taken during construction of the transmission line to avoid erosion and sedimentation near Topeka shiner habitat. All overhead collector lines will be designed to comply with the Avian Power Line Interaction Committee (APLIC) raptor-safe designs.

5.11.2 115 KV TRANSMISSION LINE

The approximately 13-mile 115 kV transmission line will exit the southeast side of the BRII-North Project substation and proceed southward along the west side of 479th Avenue to the intersection of 200th Street/479th Avenue. The line will proceed east for two miles along 200th Street and then cross to the southeast corner of the intersection of 200th Street/481st Avenue, where it will turn south. For the majority of this segment the line will be on the north side of 200th Street, although it does cross to the south side for approximately 0.5 miles because the Applicant does not have leases on the north side of the road in that area. The line will proceed south along the east side of 481st Avenue for approximately three miles before turning east at State Highway 30. The line will run along the north side of State Highway 30 for approximately two miles, where it will cross the highway and continue east.

The transmission line will follow parcel lines on the south side of State Highway 30 for approximately 0.5 miles; the line will then continue east cross-country for approximately 0.5 miles, generally running on top of a ridgeline. The line will then turn south and run along public ROW along the section line between Section 12 of Sherman Township and Section 7 of Richland Township, continuing along public ROW to the intersection with 204th Street/484th Avenue. The line will continue south along the east side of 484th Avenue for approximately 4,350 ft, where it will turn east to avoid an occupied residence. The line will run cross-country east of the residence for approximately 2,300 ft before returning to 484th Avenue. The line will continue south along the east side of 484th Avenue for approximately 0.5 miles, until 484th Avenue turns west. The transmission line will continue straight south, cross-country along the section line, for approximately 0.3 miles, until 484th Avenue returns to the Section line. The transmission line will continue south along the east side of 484th Avenue for

another 0.5 miles, where it will turn west, and head along a field line for approximately 1,000 ft before entering the Brookings County substation.

The Applicant proposes to use single-pole, wood or steel structures with a height of approximately 50 to 75 ft and average spans of approximately 250 ft between poles for the 115 kV route. This segment will require a 75-foot ROW, 37.5 ft each side of a centerline. The poles will be placed inside private land leased to the Applicant just outside of road ROW, except in the cross-country segment where the line will be placed within public ROW along the section line. Similar to the 34.5 kV overhead route, the Applicant is considering two options for pole type. It is anticipated that a 115 kV line from a subsequent wind project north of the Project boundary may extend through the Project area, then follow the 115 kV line built for the Buffalo Ridge II Project. Therefore, the Applicant may use double circuit 115 kV/115 kV structures for the proposed Project in order to accommodate both 115 kV lines(Figure 6d). As the northern project may not interconnect at the Brookings County substation, and therefore may not overlap completely with the 115 kV transmission route for the Buffalo Ridge II Project, portions of the 115 kV line may use single circuit 115 kV structures (Figure 6e). The conductor type for all 115 kV line segments is expected to be 795 kcmil 26/7 ACSR.

In some instances, the 115 kV transmission structure may also be used to carry 34.5 kV collector lines from turbines in the southern portion of the Project north to the BRII-North Project substation, rather than burying the collector line. If this option is used, the Applicant may choose to use double circuit 115 kV/115 kV structures with 34.5 kV underbuild (Figure 6f). These structures would be approximately 85 ft tall, with an average span of approximately 250 ft. This structure type would require an approximate 75-foot ROW, 37.5 ft each side of centerline. The 115 kV conductor type would be 795 kcmil 26/7 ACSR, and the 34.5 kV conductor type is expected to be 1272 kcmil ACSR.

Temporary impacts for construction of this overhead line will occur within the width of the ROW, as well as approximately 1,000 square foot per pole for temporary laydown impacts. Permanent impacts for this line will be approximately 50 ft^2 per pole for both the single circuit 115 kV and double circuit 115 kV/115 kV structures. The 115 kV line is expected to span wetlands and waterways, thereby avoiding impacts. As described further in Section 10.2, in areas where the 115 kV transmission line crosses rangeland with prairie populations (as defined below in Section 10.1.1.3), the Applicant will minimize temporary construction impacts to the greatest extent possible. Additionally, care will be taken during construction of the transmission line to avoid erosion and sedimentation into Topeka Shiner habitat. All overhead 115 kV transmission lines will be designed to comply with the APLIC raptor-safe designs.

The Applicant does not anticipate significant deviations from the proposed alignment described in this application. However, the Applicant requests that flexibility be granted for deviations from the proposed route in order to accommodate changes based on landowner preferences and changes in site

control, requirements of township, county and state road departments, and engineering requirements. The final preconstruction design plans will be submitted to the SDPUC no later than 45 days before the start of construction.

5.11.3 PROJECT SUBSTATIONS

For the 210 MW interconnection, a new Project substation (BRII-North) will be constructed in the center of the Project area, in private land in the northeast quarter of Section 19 of Oak Lake Township on the southwest corner of 199th Street and 479st Avenue. For the 96 MW interconnection, a second new Project substation (BRII-South) will be constructed to the north of the Brookings County substation, on private land in either or both of the southern portion of the northeast quarter or the northern portion of the southeast quarter of Section 25 of Sherman Township.

For each interconnection, the 34.5 kV wind farm collection grid and fiber optic communication network will terminate at the new Project substations. Each facility will include a transformer to step up the voltage of the collection grid to 115 kV. Additional facilities located within the new substations include above ground bus structures to interconnect the substation components, breakers, a building for relays, switchgear, communications and controls, and other related facilities required for delivery of electric power to the proposed 115 kV transmission line. The new Project substations will have a gravel surface within surrounding chain-link security fences, and the substation components will be placed on concrete and steel foundations. A list of anticipated substation components is shown in Table 7.

Table 7 Anticipated Project Substation Components

Substation	Equipment	Installation (Total)
BRII - North	Control House	1
	115/34.5-kV Transformer	2
	115-kV Circuit Breaker (SF6 gas-insulated)	1
	34.5-kV Circuit Breaker (SF6 gas-insulated)	6-7
	34.5-kV Capacitor Banks	1-2
BRII - South	Control House	1
	115/34.5-kV Transformer	1
	115-kV Circuit Breaker (SF6 gas-insulated)	1
	34.5-kV Circuit Breaker (SF6 gas-insulated)	2-3
	34.5-kV Capacitor Banks	1

Design of the proposed Project substations is not finalized, but the Applicant expects the facilities will each require a site of between 3 to 5 acres, with approximately 0.5 acres of impervious surfaces for

each substation. A preliminary collection substation layout is included in Figures 7a and 7b for the BRII-North substation and the BRII-South substation, respectively.

The facilities will be designed in compliance with Federal, state and local regulations, NESC standards and any other applicable industry standards. The BRII – North Project substation will be interconnected to Xcel Energy's Brookings County substation via the proposed overhead 115 kV transmission line. The BRII – South project substation will be interconnected to the Brookings County substation via a short (200 – 300 ft) 115 kV line.

5.11.4 IMPROVEMENTS TO BROOKINGS COUNTY SUBSTATION

This Project incorporates two separate interconnections to Xcel Energy's Brookings County substation. One would interconnect 210 MW via the proposed 115 kV transmission line. For this 210 MW interconnection, it is anticipated that one 115 kV/345 kV transformer, a 115 kV circuit breaker and a 345 kV circuit breaker (SF6 gas-insulated) and associated switches, bus work and metering would be installed at the Brookings County substation.

The second interconnection would be for 96 MW. For this interconnection, the 34.5 kV collection system would be routed to the Brookings County substation, and stepped up to 115 kV within the substation. It is anticipated that four 115 kV circuit breakers (SF6 gas-insulated) and associated switches, bus work and metering would be installed at the Brookings County substation for this 96 MW interconnection.

All of these improvements are anticipated to occur within the existing footprint of the Brookings County substation and no increases in impervious surfaces would occur.

5.12 CONSTRUCTION, SITE STABILIZATION, AND MAINTENANCE PROCEDURES

5.12.1 CONSTRUCTION METHODOLOGY

Construction methods will be similar for both the proposed 34.5 kV and 115 kV overhead transmission lines.

Site Clearing

Because the majority of both the proposed 34.5 kV and 115 kV overhead lines will be constructed in cultivated agricultural fields and pastures, minimal vegetation clearing will be required. The proposed overhead lines will be constructed at-grade for the majority of the ROW. In some isolated cases, limited grading could be required at structure locations if there is sloping or uneven ground. Grading may be necessary in that situation to level an access route and/or provide a working area. Equipment used for this grading will likely consist of a front-end loader or a small dozer.

Equipment Delivery and Transportation

Most of the material required for construction of the transmission line (e.g. poles, conductor cable, insulator bells) and substations likely will be delivered to the same laydown areas used for the wind turbine components. These and other needed materials and equipment, including concrete, will be transported to the construction sites along the route as construction progresses. Poles will be delivered to the structure locations (within the ROW and away from designated roadways or pathways).

Excavation, Foundations and Structure Erection

Insulators and other hardware will be attached to each structure while on the ground. Foundations for steel pole structure, if required, would will require excavating or auguring a hole approximately 15 to 20 ft deep and approximately 5 to 7 ft in diameter. Excavation dimensions will depend upon soil conditions, whether the structures are designed for single or double-circuits, and whether the structures will support an angle.

The pole will then be lifted, placed, and secured on the foundation by a crane or similar heavy-duty equipment. The holes will be back-filled with concrete. Concrete trucks will deliver the concrete from a local batch plant. Excess soil will be removed from the site unless otherwise requested by the landowner. Most poles will be directly buried and not require a separate foundation.

Conductor Stringing

Conductors will be installed by establishing stringing setup areas within the ROW, typically every two miles, which will store the spools of conductor cable. Temporary guard or clearance poles will be installed as needed over existing distribution or communication lines, streets, roads, highways, railways, or other obstructions after any necessary notifications are made and permits obtained. This ensures that conductors will not obstruct traffic or contact existing energized conductors or other cables. Once the structures have been erected, crews will drive along the ROW, securing the conductor line through the insulators on the poles and installing shield wire clamps once final sag is established. The structures will be accessed by a cherry picker or similar vehicle with a hydraulic bucket system.

Access Roads

Where the transmission line parallels existing county or township roads, access to the structures can be obtained from existing roads. On cross-country segments, access will be along the ROW for the transmission line. Access to these cross-country portions of the transmission line will require limited, if any, grading, but will not require construction of temporary access roads along the length of the ROW.

Right-of-Way Restoration Procedures

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

ROW Maintenance Procedures

The ROW defines the area where the proposed transmission line can be operated safely and reliably. Maintenance crews will perform inspections, maintain equipment, and make repairs over the life of the transmission line. Inspection will occur by aerial or ground patrol. Routine maintenance will be performed approximately every five years, or more frequently if necessary, to remove vegetation that may interfere with the safe and reliable operation of the proposed transmission line.

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

In selecting a location for a wind project, including the proposed Buffalo Ridge II Wind Project, the Applicant uses many criteria in order to ensure an economically viable product. In general, a project must be located near a utility service area that desires to enter into a Power Purchase Agreement with a renewable energy-producing facility or be located in a liquid market like MISO that allows project owners to sell into the market and receive a nodal price. Furthermore, the wind energy potential must provide a sufficient amount of energy in an area where landowners are amenable to entering into lease agreements, and where land use provides sufficient space for optimum turbine spacing. Finally, the transmission capacity must be such that the power generated by the project can be relatively easily interconnected into the utility grid. The following sections further describe the criteria used in the selection of the Project boundary and layout.

6.1 GENERAL PROJECT LOCATION SELECTION

IBR is responding to the specific opportunities in the market. Regional demand for all forms of electricity is growing. Furthermore, there are state standards in the region that require the purchase of certain amounts of renewable energy including wind. In addition, wind projects need to be located in areas with high-voltage transmission lines, particularly lines that are part of MISO, which is a regional power pool that stretches from the Dakotas to Indiana to the east. Utilities in the east end of this power pool where wind resources are not as robust can purchase wind from the west side of the power pool where the wind resource is more robust. As described above, many utilities in MISO are subject to state renewable requirements that can be met from wind farms in other states.

The Project is located immediately adjacent to MISO high-voltage transmission lines and interconnection points. For example, The Buffalo Ridge I Wind Farm is located directly east and south of the proposed Buffalo Ridge II Wind Farm and sells its output via a long-term power purchase agreement to a utility located in Indiana. The MinnDakota Wind Farm is located less than two miles south and east of the Project boundary and sells its power to Xcel Energy under a long-term power purchase agreement. For this Project, IBR limited their search for a new wind farm to the Buffalo Ridge area on the Minnesota/South Dakota border, in order to take advantage of the opportunity to sell the output into MISO and take advantage of the robust wind resource.

Criteria: Location in or near MISO utility service areas.

6.2 WIND RESOURCE AND LAND AVAILABILITY

Utility-scale wind farms require the right kind of wind conditions. IBR reviewed large-scale wind resource mapping to identify the highest wind resource areas. A prominent feature on the wind resource maps is the Buffalo Ridge geographic feature, which runs northwest to southeast from South

Dakota into Minnesota. This feature, which is shown on Figure 2 as an "Excellent" wind resource, is due to Buffalo Ridge's elevation difference from the surrounding landscape. For this reason, coupled with resource demand from Minnesota utilities, Buffalo Ridge has been home for much of the existing wind generation development. As discussed above, IBR has already had success in developing wind farms on Buffalo Ridge. The Buffalo Ridge I and MinnDakota wind farms have resulted in a nameplate capacity of 200 MW in the area, with 105 MW constructed in South Dakota.

Large-scale wind resource maps, however, are not sufficient for actually locating a wind turbine, since they are generated over a large geographic region, without detailed verification of the local terrain. In order to make adequate projections of annual electricity output, one must go to the prospective site, verify the resource, and locate obstacles such as buildings and trees.

Meteorologists already collect wind data for weather forecasts and aviation, and that information is often used to assess the general wind conditions for wind energy in an area. However, wind speeds are heavily influenced by the surface roughness of the surrounding area, by potential obstacles (such as trees or other buildings), and by the contours of the local terrain. Therefore, specific sites within a proposed project area are selected to establish a meteorological tower for detailed analysis based on the professional experience of the wind developer.

IBR has six years of wind data in the general Project vicinity from their meteorological towers in the Buffalo Ridge I and MinnDakota projects, and used their previous experience to analyze the data to help identify appropriate locations for meteorological towers for this Project. IBR currently has six meteorological towers within the Buffalo Ridge II Project boundary that have collected at least one year of data.

The next step is land availability and determining where leases could be secured with landowners. Wind-powered projects must be contained within a relatively compact area for economic and performance viability reasons. A widely spread project would require a costly collector system, which in turn would create electrical losses, and thus decrease its economical feasibility, while increasing operational risk. As a result, the Project boundary, as shown in Figure 1, was developed to define the extent of an economically viable 306 MW project.

Wind-powered projects typically enter into 30- or 40-year leases with landowners, which, for the most part, are farmers. These leases require a series of commercial and legal obligations between the parties. Most landowners in the Project vicinity are comfortable with those obligations, but not every landowner chooses to participate in such projects. Out of the approximately 77 sections selected to be included in the Project boundary, approximately 20 square miles were not available for various reasons, most for lack of agreement with the landowner, which is typical in most wind projects. The percentage of leased land within the Project boundary is high enough to be economically viable.

Typically, each wind-powered generator, the associated access road, and other small infrastructures use less than 1 acre of land. On a site with the specific roughness and wind resources such as that found on the Buffalo Ridge, the typical spacing between turbine strings is 4 to 5 RD in line with the prevailing wind direction, and 2.5 to 5 RD within turbine strings perpendicular to the prevailing wind direction. Further, Brookings and Deuel Counties have siting ordinances (i.e. setbacks) restricting the location of WTGs near residences and public roads.

As discussed in this section, the issues of available land, need for legal land use obligations (leases), spacing requirements for turbines, and local setback requirements significantly reduce the number of sites available for the operation of a wind-powered project.

Criteria:

- Available area of undeveloped highest wind resource comparable to wind resource captured by existing facilities on Buffalo Ridge;
- Suitable site-specific conditions based on wind developer meteorological tower data; and
- Ability to secure a sufficient number of landowner leases within the proposed site development area.

6.3 TRANSMISSION

The third key factor that determines the selection of the site is access to economically viable transmission facilities. Existing wind generation facilities on the Buffalo Ridge in Minnesota were initially developed in and around Lake Benton to take advantage of transmission access through Xcel Energy's Buffalo Ridge substation located southeast of Lake Benton. In 2007, Xcel Energy built the Brookings County substation and the Yankee substation (in Lincoln County, Minnesota), in order to provide more transmission capacity in the Buffalo Ridge area. The Brookings County substation provides a viable transmission interconnection opportunity, and is conveniently located on the Buffalo Ridge in the area of high wind resources as discussed above. The location of the Brookings County substation provided another criterion that helped define boundaries of the Project. This criterion helped refine the Project to include only viable alternative locations that met the project purpose and demand for the facility.

The Buffalo Ridge II Project has been in the MISO interconnection queue for several years awaiting the requisite studies to be completed and for the necessary transmission upgrades to be completed to allow for the interconnection and export of the power to market. The necessary transmission upgrades are scheduled to be completed in time to allow for the Project to be interconnected in the 2009/2010 timeframe.

Criteria:

- Availability of cost-effective transmission access and
- Availability of adequate transmission capacity.

6.4 SITE CONFIGURATION ALTERNATIVES

An initial turbine layout was developed by IBR in early 2008. This initial layout was based on an optimal configuration to best capture wind energy. This layout was then adjusted to avoid environmental impacts and to reflect landowner preferences. The current adjusted layout is shown in Figure 3a.

Specific changes that have occurred to the layout include:

- The initial layout assumed that 2.0-MW machines would be used and that the Project would be 210 MW. Additional turbine strings were added in order to provide a total of 161 turbine sites, which would result in up to 306 MW if the 2.0 MW or larger WTG is selected, and would provide the majority of the necessary turbine sites if the 1.5 MW WTG is used.
- In order to accommodate the larger 306 MW project, the boundary of the original Project area was expanded to the north by two miles into Deuel County. The current layout does not include any project infrastructure in Deuel County.
- The initial 34.5 kV overhead line route was proposed to start on 479th Avenue just south of the Deuel County border. The route was shifted west to 478th Avenue in order to avoid the higher number of residences located close to the road on 479th Avenue.
- Updates to available mapping of occupied residences and public roads resulted in turbines moved to comply with setback requirements.
- Turbine strings and access road alignments were shifted wherever possible to comply with many landowners' preference that facilities be placed in straight lines across cultivated fields.
- Access road alignments were shifted in order to avoid impacts to waterways, jurisdictional wetlands, and cultural resources.
- Several turbines were shifted from their initial location in order to avoid impacts to wetlands, select avian habitat, higher quality prairie rangelands and cultural resources.
- The BRII-North substation was initially located in Section 21, but was relocated to Section 19 in order to accommodate the larger Project boundary. This move shortened the 34.5

kV overhead line by 3 miles and lengthened the 115 kV transmission line by a corresponding 3 miles.

The current layout incorporates setbacks, as provided for in the Brookings and Deuel County ordinances, which help avoid placement of WTGs near roads and homes.

Criteria:

- Minimize environmental impact;
- Incorporate landowner preference whenever feasible; and
- Comply with local setback ordinances.

6.5 LACK OF RELIANCE ON EMINENT DOMAIN POWERS

Since IBR 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, with two possible exceptions for the electrical collection and transmission system. These possible exceptions include:

- A 1.2-mile segment of overhead 115 kV transmission line running cross-country from State Highway 30 to 204th Avenue is proposed to be placed in public ROW along the section line (there is no road along this section line); and
- A 0.3-mile segment of overhead 115 kV transmission line running along the section line between Section 24 of Sherman Township and Section 19 of Richland Township (the road curves to the west for approximately a third of a mile and the Applicant only has leases on the eastern side of the section line).

However, it is possible that the 115 kV transmission structures may be placed in private land adjacent to public ROW along these sections; the Applicant is coordinating with the landowners. The Applicant is also coordinating with the County and townships to obtain appropriate permits before constructing these facilities in public ROW, if necessary.

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

Sections 8.0 through 11.0 and Sections 14.0, 15.0 and 17.0 provide a description of the existing environment at the time of the application submission, estimates of changes to the existing environment that are anticipated to result from construction and operation of the proposed Buffalo Ridge II Wind Farm, and irreversible changes that are anticipated to remain beyond the operating lifetime of the facility.

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

This section provides background on the geology within the Project boundary to give the reader an understanding of the Project's geologic setting and soil resources.

8.1 EXISTING PHYSICAL ENVIRONMENT

8.1.1 GEOLOGY

8.1.1.1 Surficial Geology

The Project is located on a landform known as Buffalo Ridge in eastern South Dakota. Buffalo Ridge is a part of the Bemis Moraine that runs diagonally northwest to southeast from roughly Watertown, South Dakota, across southwestern Minnesota, and into Iowa. The South Dakota Geological Survey (SDGS) 15-minute geologic map of the White Quadrangle describes the Project area (for both the wind farm facility and the 115 kV transmission line) as being covered by glacial sediment deposits (glacial till) of early Wisconsin age. The surficial deposits in the area consist mainly of Tazewell Ground Moraine and Iowan Ground Moraine, with alluvium deposits located in the drainage valleys. The Tazewell deposits are described as gray to brownish and yellowish-gray pebbly-clay till. It is somewhat fissile and blocky with ferruginous sandy pebble till near the top. The Tazewell is exposed at elevations higher than the Iowan and has a well-developed drainage system with stratified sand lenses that are present locally. The Iowan Ground Moraine is a gray to brownish-gray to somewhat bluish-gray pebbly-clay glacial till. The deposits are mostly oxidized, with a well-integrated drainage pattern and undulating topography. Stratified sand lenses are located locally within the deposits. The alluvium deposits consist of silt, sand, and gravel that are located along creeks and their tributaries. The thickness of glacial deposits throughout the Project area range from 500 to 700 feet.

8.1.1.2 Bedrock Geology

The SDGS bedrock map indicates that the uppermost bedrock unit underlying the Project area (both the wind farm facility and the 115 kV transmission line) consists of Upper Cretaceous age shales of the Pierre Shale and Niobrara Formation. The younger Pierre Shale is described as blue-gray to dark-gray, fissile to blocky shale, with persistent beds of bentonite, black organic shale, and light-brown chalky shale. The unit contains minor sandstone, conglomerate, and abundant carbonate and

ferruginous concretions. Thicknesses in this unit are up to 1,000 ft in the area, but the unit is absent in the eastern portion of the Project boundary. The Niobrara Formation, which directly underlies the glacial drift throughout most of the site, is described as a white to dark-gray argillaceous chalk, marl, and shale. It weathers yellow to orange and contains thin, laterally continuous bentonite beds, chalky carbonaceous shale, minor sand, and small concretions. Unit thickness for this formation is up to 150 ft. Figure 8 shows the bedrock geology in the general Project area.

8.1.1.3 Economic Deposits

The primary economic geologic deposits in the Project area consist of sand and gravel. Lignite, scoria, and clay are not economic deposits in the Project area. The main economic uses for sand and gravel resources are in construction, primarily road base and concrete aggregates. Review of United States Geological Survey (USGS) 7.5 minute quadrangle mapping, aerial photography and a field review of the Project area revealed gravel pits in or near the Project boundary (Table 8).

The field review also attempted to ascertain whether the pits are currently active, based on observed factors such as obvious signs of activity, or vegetative regrowth of the excavated pit; however, it should be noted that landowners have not verified the status shown in Table 8. Gravel pits within the wind farm Project boundary and in the vicinity of the 115 kV transmission line are shown on Figures 10a and 10b, respectively.

Table 8 Gravel Pits

County	Gravel Pit Location	Status	Within Project Area
Deuel	NW ¼, S34, T113, R48	Active	Yes
Brookings	NW ¼, S12, T112, R48	Inactive	No
Brookings	SE ¼, S13, T112, R48	Inactive	No
Brookings	NE ¼, S30, T112, R47	Inactive	No
Brookings	SW ¼, S8, T111, R47	Active	No
Brookings	NW ¼, S36, T111, R48	Active	No
Brookings	SW ¼, S5, T111, R48	Inactive	No
Brookings	NW ¼, S6, T112, R48	Active	Yes
Brookings	SW ¼, S2, T112, R48	Active	Yes
Brookings	NE ¼, S11, T112, R48	Inactive	Yes
Brookings	SE ¼, S18, T112, R48	Inactive	Yes
Brookings	NE ¼, S6, T111, R47	Active	Yes
Brookings	NW ¼, S12, T111, R48	Active	Yes
Brookings	NE ¼, S7, T111, R47	Inactive	Yes
Brookings	SW ¼, S18, T111, R47	Inactive	Yes

County	Gravel Pit Location	Status	Within Project Area
Brookings	NE ¼, S30, T111, R47	Active	Yes
Brookings	SW ¼, S30, T111, R47	Inactive	Yes
Deuel	SE & SW ¼, S26, T113, R48	Active	Yes

8.1.2 SOIL TYPE

Soils in the Project area primarily consist of a variety of loams, silt loams, silty clay loams and sandy loams derived from underlying glacial tills (USDA, 1959). The loamy soils in the Project area are not highly susceptible to erosion. Most of these soils are conducive to agricultural activities including crop production and livestock grazing (for additional information regarding the agricultural nature of the soils in the Project area, see Section 12.0). Some of the soils in the Project area exhibit hydric characteristics; these hydric soils are isolated and generally associated with small prairie pothole-type wetlands or drainageways.

8.1.3 SEISMIC RISKS

Seismic activity in South Dakota is low, especially in the eastern portions of the state. No earthquakes have been reported in Brookings or Deuel Counties. Two earthquakes have been recorded approximately 25 miles south of the Project in Moody County. One of these earthquakes occurred in 1935 and registered approximately 2.5 on the Richter scale; the other earthquake was a 3.5 to 4 magnitude earthquake in 1982 (Hammond, 1993).

8.2 FACILITY IMPACTS

8.2.1 POTENTIAL FOR IMPACTS TO GEOLOGIC AND SOIL RESOURCES

Potential impacts to geologic and soil resources generally are limited to potential inaccessibility of sand and aggregate resources, loss of soil resources through displacement, erosion and slope instability.

8.2.1.1 Inaccessibility of Sand and Aggregate Resources

Construction of any infrastructure over sand and aggregate resource areas can limit or eliminate the potential for development of such areas. In general, construction of the wind farm Project facilities should not interfere with the active sand and aggregate excavation pits within the Project boundary. WTGs, access roads, and collector lines have been sited to avoid these resource areas, and no effects to this land use activity are anticipated due to construction or operation of the Project. There are no active gravel pits along the route of the 115 kV transmission line; the proposed route does span one inactive excavation area in Section 18 of Richland Township.

8.2.1.2 Loss of Soil Resources

Construction of wind turbine foundations and associated access roads alters the ground surface and removes certain soils in the construction zone. In addition, construction of the 115 kV transmission line structures will result in some minor removal of soils within private rights of way. Construction of the Project will preclude the use of soil resources that are suitable for agricultural purposes where permanent project facilities are located. Impacts to agricultural soils from the Project are discussed in Section 12.0.

8.2.1.3 Erosion, Slope Stability and Sedimentation

The potential for erosion is often a concern in construction projects. 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/or cause slope failure.

The Applicant has designed the Project to minimize construction cut and fill work and minimize construction in steep slope areas. The WTGs are generally located at higher elevations to maximize exposure to wind and 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. In general, the overhead lines (both 34.5 kV collection line and 115 kV transmission line) are routed parallel to roadways in areas that have gently rolling to flat topography. An exception is the cross-country area of the 115 kV transmission line (along the section line between Section 12 of Sherman Township and Section 7 of Richland Township) where there are relatively steep slopes and rolling hills.

The South Dakota Department of Environment and Natural Resources (DENR) has issued a General Storm Water Permit for Construction Activities; an application for coverage under this permit will be needed for the Project. One of the conditions of this permit is the development of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP will be developed once more detailed engineering information on grading and final design is determined for the Project, and will mandate Best Management Practices (BMPs) to control erosion and sedimentation. BMPs may include silt fencing, erosion control blankets, re-vegetating side slopes, temporary storm water sedimentation ponds, or other methods of controlling storm water runoff and minimizing erosion and sedimentation. The SWPPP and National Pollution Discharge Elimination System (NPDES) Notice of Intent (NOI) will be developed after final civil design is completed. The NOI will be submitted to the DENR and the SWPPP will be submitted to Brookings and Deuel Counties for review and approval prior to construction.

During construction, BMPs will be implemented to control erosion and ensure that drainage ways and streams are not impacted by sediment runoff from exposed soils during precipitation events. In

steeper areas, such as along the cross-country segment of the 115 kV transmission line, particular care will be taken to minimize cuts and/or fills, and to employ appropriate erosion prevention measures. During operation, the wind farm facilities and 115 kV transmission line are not expected to increase soil erosion rates, and the relatively small amount of additional impermeable surfaces (77 acres over the 49,482-acre Project boundary) are not expected to impact the soil resources of the area.

8.2.2 GEOLOGICAL CONSTRAINTS ON DESIGN, CONSTRUCTION AND OPERATION

There are no geological constraints to construction of the Project. Soil characteristics may change the design requirements of individual wind turbine tower foundations. Prior to construction, soil borings will be performed at all turbine locations to insure that the foundation design is suitable for the physical conditions. If unsuitable soils are found, the center point of the foundation may be shifted or the turbine may be dropped from construction. It is anticipated that soil borings will be taken at proposed WTG locations in Spring 2009.

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

9.1 EXISTING HYDROLOGY

9.1.1 HYDROGEOLOGY

Groundwater is present at varying depths across the Project area. Buried quaternary sand and gravel outwash deposits (referred to as the Big Sioux Aquifer) comprise the primary aquifer within the Project boundary (both for the wind farm facility and in the vicinity of the 115 kV transmission line); bedrock formations generally are not a major source of groundwater (Schultz, 2004). Regional groundwater flow is generally to the south and west; local groundwater flow is variable and often driven by topography.

9.1.2 SURFACE WATER RESOURCES

The Project lies in the Upper Big Sioux and Lac Qui Parle watersheds (Figure 9a). Within the southern and western portions of the Project area, surface water flows generally south and west toward the Big Sioux River, although water in the northeastern portion of the Project boundary in the Lac Qui Parle watershed generally flows northeast, ultimately to the Minnesota River. Surface water resources within and adjacent to the Project area include Oak Lake, Lake Hendricks, Six Mile Creek, Deer Creek, and several ephemeral stream tributaries. Oak Lake and Lake Hendricks are located less than one mile east of the Project area and ephemeral streams drain into both lakes from the northeast and east-central portions of the Project area. Six Mile Creek runs southwest through the north-central portion of the Project area, and Deer Creek runs south through the southern portion the Project area. Six Mile Creek, Deer Creek, and the majority of the ephemeral streams have generally been left in their natural, meandering condition.

The proposed 115 kV transmission line is within the Upper Big Sioux watershed, and water flows generally south and west. As Figure 9b shows, the transmission line route crosses several streams:

- An unnamed tributary to Six Mile Creek in Section 28 of Oak Lake Township
- The main channel and an unnamed tributary of Six Mile Creek in Section 19 of Oak Lake Township
- An unnamed tributary to Six Mile Creek in Section 34 of Oak Lake Township
- An ephemeral portion of an unnamed tributary to Six Mile Creek in Section 3 of Sherman Township
- Two unnamed tributaries to Deer Creek in Section 2 of Sherman Township
- An unnamed tributary to Deer Creek along the section line between Section 12 of Sherman Township and Section 7 of Richland Township

- An unnamed tributary to Deer Creek in Section 25 of Sherman Township

Additionally, there are two Brookings-Deuel Rural Water District water towers located within the Project (shown on Figures 12a and 12b) that supply drinking water to residences within the Project boundary, including the towns of Toronto and Astoria.

9.1.3 FLOODPLAINS

Federal Emergency Management Agency (FEMA) floodplain mapping shows that the 100-year floodplain of Deer Creek, Six Mile Creek, and the ephemeral streams is present within the Project boundary. However, the floodplain is generally confined to the streambed and adjacent low-lying areas. The floodplain areas within the Project generally range from 200 to 500 ft wide. Figure 9a identifies FEMA 100-year floodplains in the Project boundary.

The 115 kV transmission line crosses FEMA-mapped 100-year floodplain in four areas: the main channel of Six Mile Creek in Section 19 of Oak Lake Township, an unnamed tributary to Six Mile Creek in Section 34 of Oak Lake Township, and two unnamed tributaries to Deer Creek in Section 2 of Sherman Township. Figure 9b shows the FEMA 100-year floodplains near the 115 kV transmission line route.

9.1.4 NPS NATIONWIDE RIVERS INVENTORY

The National Park Service (NPS) describes the Nationwide Rivers Inventory (NRI) as "a listing of 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 (CEQ) procedures, all federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI segments." There are no NRI-listed rivers within the Project area or near the 115 kV transmission line (NPS, 2004).

9.1.5 IMPAIRED WATERS

The Clean Water Act 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. The list, known as the 303(d) list, is based on violations of water quality standards. The nearest listed 303(d) waters are more than 10 miles west of the Project (both the wind farm facilities and the 115 kV transmission line); West and East Oakwood Lakes are listed for Trophic State Index, meaning that at least two years of data showed the lakes receiving "impaired" scores based on Secchi transparency depth measurements and chlorophyll-a measurements (DENR, 2008). Surface water within the Project boundary would not drain into these lakes.

9.2 FACILITY IMPACTS

9.2.1 EFFECT ON CURRENT OR PLANNED WATER USE

The facility will have no impact on either municipal or private water uses in the Project area. The proposed 115 kV overhead line will be routed between the roadway and the Brookings-Deuel Rural Water District water tower in Section 27 of Oak Lake Township. There is adequate space to site the proposed overhead transmission structures between the roadway and the water tower, and no impacts to the use or operation of the water tower are anticipated. No water storage, reprocessing, or cooling is required for either the construction or operation of the facility. No aquifer will be used as a source of potable water and no off-site pipelines or channels will be required for water transmission. The facility will not require deep well injection. Construction and operation of the proposed Project will not significantly impact the water supply. No installation or abandonment of any wells is anticipated for the Project. In the event wells are abandoned, they will be capped as required by South Dakota law. The Project will not require the appropriation of surface water or permanent dewatering. It is likely that rural water supply will be necessary for the O&M facility. Water usage at the O&M facility will be similar to household volume: less than 5 gallons per minute. Buffalo Ridge II LLC will coordinate with Brookings-Deuel Rural Water to avoid impacts to their water lines in the Project area during construction.

The O&M facility will require that a septic system be installed as well. The septic system will be engineered to comply with all state and local requirements, and all necessary permits will be obtained from the appropriate agencies prior to construction. Installation of the septic system will not affect groundwater quality.

The construction of wind farm facilities and transmission line structures 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. WTGs will be located at least 1,100 ft from any residence (the current layout shows that the closest turbine is 1,205 ft from an occupied residence), and the 115 kV transmission line is located adjacent to roads and parcel lines for the majority of its length. Additionally, the majority of the rural residences in the Project boundary receive residential water supplies through rural water district systems rather than private wells. No residential wells will be permanently impacted by turbine placement.

In the unlikely event that construction dewatering impacts a water supply well not located at or near a residence (e.g., a livestock water supply well), provisions will be made to ensure that an adequate supply of water is provided until dewatering activities have been completed.

The Project will have no impact on surface water availability or use for communities, schools, agriculture, recreation, fish, or wildlife.

9.2.2 POTENTIAL FOR SURFACE AND GROUNDWATER IMPACTS

Potential impacts to water resources from the construction and operation of the Project 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. No impacts to groundwater quality are expected from the Project.

9.2.2.1 Groundwater Dewatering

The construction of wind farm and transmission line facilities can require dewatering of shallow groundwater, especially during excavation for WTG foundations or transmission line poles. Construction dewatering temporarily lowers the water table in the immediate area and may temporarily lower nearby surface water elevations depending on the proximity and connectivity of the groundwater and surface water.

Groundwater dewatering is not anticipated to be a major concern with the Project since WTGs are most likely to be placed at higher elevation where the water table tends to be deeper. Similarly, it is anticipated that the 115 kV transmission line structures will be placed to span all wetlands and water features, thereby generally avoiding low areas where the water table may be closer to the surface. Should groundwater be encountered that must be dewatered, all necessary permits will be obtained, and the duration of dewatering will be minimized to the extent possible. Dewatered groundwater will 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.

9.2.2.2 Deterioration of Water Quality

The excavation and exposure of soils during the construction of wind turbines, access roads, underground collector lines, and overhead transmission lines could cause sediment runoff during rain events. These sediments may increase the total suspended solids (TSS) loading in receiving waters.

However, since the Project will disturb more than 1 acre a NPDES permit will be required. It is estimated that approximately 960 acres will be temporarily disturbed as a result of construction of turbines, electric collection system, access roads, Project substation, O&M facility, meteorological towers and SODAR unit, temporary laydown areas and batchplant, and approximately 122 acres of land temporarily disturbed for construction of the 115 kV transmission line). In addition, the South Dakota DENR has issued a General Storm Water Permit for Construction Activities; an application for coverage under this permit will be needed for the Project. One of the conditions of this permit is the development of an SWPPP. The SWPPP will mandate BMPs to control erosion and

sedimentation. BMPs may include silt fencing, erosion control blankets, temporary storm water sedimentation ponds, or other methods of controlling storm water runoff and minimizing sedimentation. In addition, Brookings and Deuel counties will require a soil erosion and sediment control plan. Since erosion and sediment control will be in place for construction and operation of the Project, no impacts to water quality are expected as a result of the Project.

9.2.2.3 Impacts to Drainage Patterns

In general, because WTGs will be located at higher elevations within the Project area to maximize wind exposure, impacts to ephemeral streams and drainage ways are not anticipated from the turbine sites. The underground collection system may temporarily impact surface drainage patterns during construction if the collection system is trenched through streams or drainageways; however, these impacts will be short-term, and existing contours and drainage patterns are expected to be restored within 24 hours of trenching. If the underground collection lines cross streams with Topeka shiner habitat, the Applicant will either trench during dry periods or directional bore the crossing. There is the potential for access roads to permanently impact ephemeral streams and drainageways; however, roads have been sited to avoid crossing or paralleling streams wherever feasible. Where stream/drainageway crossings cannot be avoided, appropriately-designed culverts will be placed to maintain the free flow of water. The additional impermeable surfaces introduced by the wind farm facilities (77 acres) will be spread throughout the 49,482-acre Project boundary, and is not expected to change existing drainage patterns.

The 115 kV transmission line will be designed to span surface water stream features, and the small area of impermeable surfaces resulting from the transmission structures (0.30 acres) is not expected to change existing drainage patterns.

9.2.2.4 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, WTGs will be located at higher elevations, and the current layout avoids placing turbines in FEMA-mapped floodplains. To the extent possible, access roads have been placed to avoid FEMA-mapped floodplains, and additional surveys are underway to confirm that access roads are out of the 100-year floodplain elevation. One crossing of a FEMA-mapped floodplain is proposed between two turbines in Section 22 of Oak Lake Township. Because the permanent access road between these turbines will be built at grade, and will be designed to allow for adequate surface flow and drainage during precipitation events it will not result in any loss of flood storage volume. If a situation arises

where additional floodplain impacts cannot be avoided, a floodplain analysis will be conducted to quantify impacts and determine appropriate mitigation requirements.

It is anticipated that the 115 kV transmission line structures will be placed to span the FEMA 100-year floodplains crossed by the proposed route. Therefore, no impacts will result from the 115 kV transmission facility.

9.2.2.5 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 will create up to 77 acres of impermeable surface through the construction of turbine pads, access roads, meteorological towers, overhead collection and transmission line structures, SODAR unit, O&M facility, and the Project substation. Although the turbine pads, access roads, and yards of the O&M facility and Project substation will be constructed of compacted gravel and will not be paved, this level of compaction generally inhibits infiltration and could increase runoff.

However, the 77 acres of new impervious surface (of which 0.3 acres will occur from construction of the 115 kV transmission line) represents less than 0.5 percent of the total acreage in the Project area; therefore, the Project is not expected to cause significant changes in runoff patterns or volume. However, as noted above, appropriate storm water management BMPs will be implemented during the construction and operation of the wind farm and transmission line facilities. These BMPs are anticipated to adequately mitigate the effects of any increases in runoff volume due to the increase in impervious surface.

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

10.1 EXISTING TERRESTRIAL ECOSYSTEM

10.1.1 NATURAL COMMUNITIES

10.1.1.1 Vegetation

Vegetation resources, along with other biological resources, are discussed in detail in the Site Characterization Study (Appendix B). Vegetative resources are summarized in Table 9.

Table 9 Summary of Land Cover Types within Project Area

Land Cover Type	Area (acres)	Percentage of Project Area
Cultivated cropland	29,866	60.3
Pasture	10,012	20.2
Planted grassland (i.e., Conservation Reserve Program)	2,480	5.0
Wetlands	2,122	4.3
Hayland	1,719	3.5
Farmsteads (with maintained yards)	1,377	2.8
Rangeland	680	1.4
Woodland	856	1.7
Stock Ponds	46	<1.0
Lakes	47	<1.0
Gravel Pits	71	<1.0
Roads	29	<1.0
Utilities	27	<1.0
Cemetaries	0.7	<1.0
Commercial/Industrial	28	<1.0
Residential (Toronto and Astoria)	173	<1.0
Total	49,534[1]	100

[1] Acreage of total land cover types varies from the total project site acreage by 1 percent

Along the 115 kV transmission line route, the majority of the route is in cultivated cropland (57.3 percent). In addition to cultivated cropland, other types of vegetative cover along the route are: pasture (20.4 percent), planted grassland (2.8 percent), wetlands (4.5 percent), hayland (6.8 percent), the maintained yards of farmsteads (1.4 percent), rangeland (2.1 percent), and woodland (6.6 percent). Unvegetated areas such as gravel pits (1.3 percent), roads (less than 0.1 percent), and utilities (0.2 percent) make up small percentages of the landcover along the route.

Figure 10a shows the landcover within the wind farm Project boundary, and Figure 9b shows the landcover along the proposed 115 kV transmission line route. A more detailed description of the vegetation resources within the Project area follows (note that wetlands are discussed in Section 10.1.1.7).

10.1.1.2 Cropland

The majority (60 percent) of the area within the Project boundary, and 57 percent of the land along the 115 kV transmission line, is cropland. In Brookings County in 2002 (the latest available year for the USDA Census of Agriculture), 65 percent of the land area was cropland, with soybeans and corn being the most common crops (AGSS, 2002). Other common cultivated crops included wheat and oats. Cultivated cropland decreased slightly (by 2,255 acres) in Brookings County from 1997 to 2002 (AGSS, 1997).

In Deuel County in 2002, 67 percent of the land area was cropland, with soybeans and corn being the most common crops (AGSS, 2002). Other common cultivated crops included forage (hay, silage), and wheat. Cultivated cropland increased by 6,419 acres in Deuel County from 1997 to 2002 (AGSS, 1997. Specific acreages of different croplands within the Project area are not available, and change from year to year.

10.1.1.3 Planted Grassland/Hayland/Pasture/Rangeland/Undisturbed Native Prairie

The "Planted Grassland" vegetation type covers approximately 5 percent of the Project area, and 2.8 percent of the land along the 115 kV transmission line. Planted Grasslands consist of previously cropped or disturbed parcels in the Project area that have been planted with grasses and enrolled in the Conservation Reserve Program (CRP) or other similar programs. CRP land is removed from crop production for a specific period (usually 10 years) and is planted with cover designed to conserve soil and water. Haying and livestock grazing are not permitted on CRP land unless specifically allowed during droughts. In Brookings County, approximately 43,000 acres (8.5 percent of the County) is enrolled in the CRP (FSA, 2005). Approximately 38,760 acres (0.1 percent) of Deuel County is enrolled in the CRP (FSA, 2008). The CRP program allows for removing land from contract, without penalty, for WTGs.

Areas of what is classified as "Hayland" (3.5 percent of the Project area, and 6.8 percent of the land along the 115 kV transmission line) include what appeared during the site visit to be untilled areas (relatively steep areas, grassed fringes of streams and wetlands) that have reverted to grass cover such as smooth brome, and that appeared to be harvested by the landowner. Additionally, parcels that appeared to be planted to cover used for hays such as alfalfa are included in this classification. The hayland parcels are commonly harvested annually.

The "Pasture" classification (20.2 percent of the Project area, and 20.4 percent of the land along the 115 kV transmission line) applies to areas that are regularly grazed and are relatively degraded by non-native species such as smooth brome grass.

"Rangeland" (1.4 percent of the Project area, and 2.1 percent of the land along the 115 kV transmission line) applies to non-tilled areas with native vegetation (at least 5 to 10 native species present, regardless of dominance) being used for grazing. Most of these areas were found on steep hillsides in grazed pastures, where topography prevented the areas from being tilled, and discouraged substantial grazing.

"Undisturbed native grasslands" (or undisturbed native prairies) are areas with native prairie plant species that have not been disturbed by cropping or grazing and show no signs of invasive plants or noxious weeds. No areas of undisturbed (ungrazed, with no invasive species) native grasslands were noted during the site visit.

The USFWS has approximately 540 acres of grassland easements within the Project area (USFWS, data from Mr. Tom Tornow). No Project facilities will cross USFWS grassland easements. The 115 kV transmission line will be located in the public right of way adjacent to a grassland easement along the section line between Section 12 of Sherman Township and Section 7 of Richland Township.

10.1.1.4 Farmsteads

Farmsteads (2.8 percent of the Project area, and 1.4 percent of the land along the 115 kV transmission line) are classified as the maintained yards around rural residences, usually planted with Kentucky blue grass or other lawn grasses. This land cover does not include the tree rows that are discussed in the forest/woodlot section, although it may include an isolated tree located in the midst of a farmstead yard.

10.1.1.5 Forest/Woodlot

Shelterbelts and small woodlots are associated with farm buildings and cropped fields throughout the Project area. Trees are planted in cultivated areas to reduce wind erosion and provide wildlife habitat. A variety of native and non-native shrubs and trees are used for these plantings, according to the Brookings County Farm Service Agency (FSA, 2005). One larger wooded area (approximately 75 acres of oak forest) occurs in the eastern portion of the Project area, in Section 36 of Oak Lake Township. Overall, the forest/woodlot cover type accounts for approximately 1.7 percent of the total Project area, and 7.1 percent of the land along the 115 kV transmission line.

10.1.1.6 Noxious Weeds

Noxious weeds (as designated by the Code of Federal Regulations, Title 7, Section 360.200 and South Dakota Codified Laws 38-22) are regulated by state and federal rules and regulations designed to stop the spread of plants that are detrimental to the environment, crops, livestock and/or public health.

Table 10 lists state and local noxious weeds that may be found within the Project area, and the County in which each species has been found.

Table 10 Noxious Weeds

Category	Noxious Weed Species	County
State Listed	*Cirsium arvense* (Canada thistle) *Euphorbia esula* (leafy spurge) *Sonchus arvensis* (perennial sow thistle)	Brookings, Deuel
	Lythrum salicaria (Purple loosestrife)	Deuel
Local Listed	*Artemisia absinthium* (absinth wormwood) *Carduus acanthoides* (plumeless thistle) *Carduus nutans* (musk thistle)	Brookings, Deuel

Source: State of South Dakota, SDCL 38-22. http://www.state.sd.us/dow/das/noxious.htm

10.1.1.7 Wetlands

Wetlands perform several important functions within a landscape, including flood attenuation, ground water recharge, water quality protection and wildlife habitat production. In eastern South Dakota (including the Project area) the prairie pothole wetlands are particularly integral in providing waterfowl breeding and foraging habitat. Wetland resources for the Project area were identified by reviewing USFWS National Wetland Inventory (NWI) mapping (USFWS, 2005, National Wetlands Inventory) and by field delineations. NWI Wetlands in the Project boundary and in the vicinity of the 115 kV transmission line are shown in Figures 11a and 11b, respectively.

Regulatory Environment

Wetlands are defined by the United State Army Corps of Engineers (USACE) as "Waters of the U.S." and are subject to jurisdiction under Section 404 of the Clean Water Act (1973). Waters of the U.S. include both wetlands and non-wetlands that meet USACE criteria. USACE has determined that a jurisdictional wetland must have a predominance of hydrophytic vegetation, hydric soil, and wetland

hydrology. Any impacts to jurisdictional wetlands will be reviewed and permitted through the Section 404 Wetland permit process.

The Natural Resource Conservation Service (NRCS) oversees the Wetland Reserve Program where landowners sell conservation easements or enter into a cost-share restoration agreement with the U.S. Department of Agriculture (USDA). Any impacts to these wetlands could affect farm benefits to landowners. The Applicant has notified the NRCS Field Office of the proposed Project location and activity. At the time of this application, the NRCS has not responded to the Applicant's request for comment.

The USFWS has been purchasing wetland easements in the prairie pothole region since 1958 and grassland easements (see Section 10.1.1.3) since 1989 for waterfowl habitat management. These easements provide perpetual protection of the wetlands and grasslands within the easement lands. There are 569 acres of wetland easements and 619 acres of conservation easements within the Project area. The conservation easement lands within the Project area provide protection of wetlands but have no restrictions on use of uplands (Tom Tornow, USFWS, 2008, personal communication).

Wetland Resources

Within the Project area, there are 900 NWI wetlands totaling 791 acres; lacustrine (4.5 percent), palustrine emergent (83.7 percent), palustrine forested/scrub-shrub (2 percent), and palustrine freshwater pond (9.8 percent) type wetlands make up the majority of the area (USFWS, 2005, National Wetlands Inventory). Table 11 shows the NWI-mapped wetland resources for the Project site.

Table 11 NWI Wetlands

Project Site		
Wetland Type	**No. of Basins**	**Area (Acres)**
Lacustrine	2	35
Palustrine		
Emergent	664	661
Forested/Scrub-Shrub	20	17
Freshwater Pond	214	78
Total	900	791

Please note that the NWI wetland acreage shown above (791 acres) is smaller than the overall wetland landcover acreage listed in Section 10.1.1.1. The USFWS developed the NWI maps for the Project

area in the 1980s using older aerial photographs. Therefore, the NWI maps only provide guidance in determining areas to be evaluated for wetland characteristics, and should not be used as the sole basis for wetland determinations. The 2,122 acres of wetlands in the site-specific landcover data incorporates data gathered from 2008 aerials, multiple site visits, and field wetland delineations.

Wetland delineations and field verifications were conducted in May, June and July 2008 within 200-500 ft of all proposed WTG locations, access roads, underground electric lines, overhead transmission lines and Project substations. The delineation showed that the majority of wetlands present within the Project area are associated with drainage and stream features (both ditched and meandering), with some isolated pothole wetlands interspersed. Almost all wetlands in the Project area have been degraded by agricultural practices and grazing.

There are wind facilities proposed within one USFWS conservation easement in Section 33 of Oak Lake Township that will avoid wetland resources (Figure 12a). As stated above, the USFWS has jurisdiction over wetlands but not uplands within this easement.

10.1.2 WILDLIFE

In general, species present within the Project area are those typically found in agricultural landscapes, pasture grasslands and wetland habitats. Common mammals for these habitats include raccoon, mink, skunk, weasel, white-tailed deer, coyote, red fox, badger, and rabbit. Common birds include songbirds, waterfowl and game birds such as pheasant and turkey. Additionally, there are approximately 540 acres of USFWS grassland easements within the Project site (USFWS, 2005, Map of Easements), and 611 acres of South Dakota Game Fish and Parks (GFP) walk-in areas. There are also two USFWS Waterfowl Production Areas (WPA) located within the Project boundary, totaling approximately 97 acres. Both the USFWS easement and WPA lands and the GFP walk-in areas can provide grassland and/or wetland habitat for wildlife. A summary of the wildlife resources detailed within the Site Characterization Summary (Appendix B) follows.

10.1.2.1 Migratory Birds

The Project area is located within the Prairie Pothole Region (that portion of western Canada and the western United States characterized by grassland covered with large shallow depressions, or "potholes," created long ago by retreating glaciers that have subsequently filled with water) and as such contains important habitat for waterfowl production. The 1918 Migratory Bird Treaty Act protects most species of migratory birds. The Project area contains both wetland and upland bird habitat.

A field review concluded that birds migrate through the Project boundary, including passerines, raptors, and waterfowl. Woodlots, wetlands, and riparian areas scattered throughout the Project may provide stopover habitat for migrants or individuals during post-breeding dispersal. Harvested grain

crops, such as the corn that was observed during the site visit, could serve as a feeding area that could attract migrating and wintering waterfowl. However, these types of habitats are found throughout the region and therefore their presence in the Project should not concentrate bird use as compared to adjacent areas (Derby, 2008).

10.1.2.2 Raptors

Although no cliff or rock outcrops were identified, potential raptor nesting sites in the form of trees (scattered and in planted shelterbelts and woodlots) occur throughout the Project area. The topography of the site, which consists of flat to rolling areas, is not expected to support dense raptor populations, due to a lack of steep ridges and rims.

The following raptor species could occur in or near the Project area: bald eagle, northern harrier, sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*A. cooperii*), northern goshawk (*A. gentilis*), broad-winged hawk (*Buteo playpterus*), Swainson's hawk (*B. swainsoni*), ferruginous hawk *(Buteo regalis),* red-tailed hawk, rough-legged hawk (*B. lagopus*), American kestrel (*Falco sparverius*), and merlin (*F. columbarius*). Other species often grouped with raptors that could be found in the Project area include the great-horned owl (*Bubo virginianus*), eastern screech owl (*Otus asio*), burrowing owl (*Athene cunicularia*), and turkey vulture (*Cathartes aura*). Six of these species are confirmed or suspected breeding birds in the Project area: northern harrier, Swainson's hawk, red-tailed hawk, eastern screech owl, great-horned owl, and American kestrel (Peterson 1995). During the site visit, red-tailed hawks and American kestrels were observed in the Project area (Derby, 2008).

No raptor nests were observed during the site visits but potential nest structures for above ground nesting species were present in the form of living and dead trees. Farmsteads observed during the site visit usually had tree rows or woodlots associated with them. Grassland areas could provide nesting habitats for ground-nesting raptors, such as the northern harrier (Derby, 2008).

10.1.2.3 Bats

Bats are a concern in proposed wind farm projects, due to the potential for increased bat mortality associated with wind turbines. The site visit did find potential roosting habitat (trees and buildings) within the Project site. No caves were noted on the site visit, and neither the GFP or USFWS has informed the Applicant of bat caves within the site boundary. No bats were directly observed during the site visit, but the site visit report concluded that bats likely to be found within the Project area include the big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), eastern red bat (*Lasiurus borealis*), little brown bat (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*), and silver-haired bat (*Lasionycteris noctivagans*) (Derby, 2008).

A site review of the Project area was unable to determine whether the Project is within a bat migration corridor (Derby, 2008). The Applicant is currently surveying for bats in the Project area, using Anabat

units to record the number of bat calls in several areas within the Project boundary. The bat survey will be concluded by December 2008.

10.1.3 SENSITIVE SPECIES

The USFWS Office in Pierre, South Dakota identified one federally-listed threatened species, the Western Prairie Fringed Orchid (*Platanthera praeclara*), and one federally-listed endangered species, the Topeka Shiner (*Notropis topeka*) as known to potentially occur in Brookings County (USFWS Conference Call, July 31, 2008, Appendix C). According to the USFWS South Dakota Field Office website, the Topeka Shiner is the only federally-listed species in Deuel County. The Dakota Skipper (*Hesperia dacotae*) is a candidate species under the ESA, and has been documented in Brookings County. The whooping crane (*Grus americana*), an endangered species, has been observed in counties adjacent to Brookings County and therefore may occur in the Project area, although it is unlikely (Derby, 2008); the GFP also indicated that whooping cranes may pass through the Project area (GFP Response Letter, June 3, 2008, Appendix C). The GFP identified two state-listed threatened species, the bald eagle (*Haliaeetus leucocephalus*) and the northern red-belly dace (*Phoxinus eos*) that could occur within the Project area.

The GFP identified several area-sensitive species as being found in the Project area or having the potential to occur in the Project area. These grassland birds included the sedge wren (*Cistothorus platensis*), clay-colored sparrow (*Spizella pallida*), grasshopper sparrow (*Ammodramus savannarum*), bobolink (*Dolichonyx oryzivorus*), dickcissel (*Spiza americana*), song sparrow (*Melospiza melodia*), northern harrier (*Circus cyaneus*), upland sandpiper (*Bartramia longicauda*), field sparrow (*Spizella pusilla*), Vesper sparrow (*Pooecetes gramineus*), Savannah sparrow (*Passerculus sandwichensis*), and Henslow's sparrow (*Ammodramus henslowii*).

In addition to the Dakota Skipper, discussed above, the state of South Dakota expressed concern regarding another rare butterfly, the Ottoe Skipper (*Hesperia ottoe*). The Ottoe Skipper requires relatively undisturbed native grasslands with nectar sources; the State suggests that suitable habitat might exist within the Project area in the eastern and southeastern portions. Records show that the Skipper has not been noted in the Project area but has been found nearby on contiguous grasslands (Derby, 2008).

Since these species of concern could potentially be found within the proposed Project site, a Site Characterization Study was conducted by Derby to evaluate the potential impacts to threatened and endangered species. Additionally, a survey for the Dakota skipper was conducted in suitable habitat in July 2008, in the vicinity of proposed Project facilities under the current layout. The results of the studies are summarized below.

10.1.3.1 Bald Eagle

Bald eagles are present in South Dakota throughout the year, and are a state-listed and federally protected species (under the U.S. Bald and Golden Eagle Protection Act of 1940). Wintering bald eagles are often associated with lakes, rivers and reservoirs where they feed primarily on fish. During migration and winter periods, they may also be found in areas away from major rivers if sufficient food is available.

Bald eagles nest in areas with mature forest, typically along major waterways, lakes and reservoirs. However, with increasing bald eagle populations, nesting eagles are also being found in areas away from "major" water bodies. The USFWS and GFP both stated in their correspondence that there are no known bald eagle nests in the vicinity of the Project, but that current surveys have not been completed by these agencies. There are no large water bodies in the Project area, and limited potential nesting habitat is present within the Project area in the form of scattered mature cottonwood trees. A site visit to the Project area in March 2008 did not observe any potential bald eagle nests in mature trees, and follow up field visits in May, June and July also did not observe eagles or eagle nests. Although there is no evidence of nesting bald eagles in the Project area, bald eagles may occur within the area either during migration or during the breeding season (Derby, 2008).

10.1.3.2 Whooping Crane

The whooping crane is an endangered bird with a peak 2007-08 winter population of 262 birds (Derby, 2008). Whooping cranes typically migrate from their breeding grounds in Wood Buffalo National Park, Canada to their wintering areas in Aransas National Wildlife Refuge, Texas. During the migration, most birds pass through central South Dakota. Based on observations from Austin and Richert (2001), the Project area would appear to be on the very eastern edge of whooping crane migration. The Project area is outside of the 200-mile wide migration corridor identified by the USFWS (Derby, 2008) as containing 95 percent of sightings of whooping cranes. Most documented observations of whooping cranes within South Dakota have occurred along the Missouri River valley. Although there have been confirmed observations in other areas of South Dakota, none have been documented in Brookings or Deuel Counties and the great majority of historic use is west of the Project area.

10.1.3.3 Topeka Shiner

The Topeka shiner is a small, silvery minnow (typically less than 3 inches in length) that occurs primarily in clear pools in small streams within prairie or former prairie streams. Most streams containing Topeka shiners are perennial, but some may be ephemeral. In the small ephemeral streams, the shiners would survive in small pools maintained by groundwater seepage (GFP, 2005). Declines in Topeka shiner abundance could be related to habitat degradation, sedimentation, impoundments of tributaries, and water quality problems (Derby, 2008).

The Topeka shiner is known to occur in at least two of the streams in the Project area (Deer Creek and Six Mile Creek). The GFP and USFWS have developed maps showing streams with low, moderate and high potential for Topeka shiners (Appendix C). There are several streams that have been mapped as having low potential within the wind farm Project boundary. In the southern portion of the Project boundary, near the Brookings County substation, there are several tributaries that have been mapped as having "low to moderate" and "moderate to high" potential. The 115 kV transmission line crosses mapped Topeka shiner streams in four locations: two "low potential" tributaries in Section 2 of Sherman Township, a portion of Six Mile Creek, which is ranked as "low potential, in Section 19 of Oak Lake Township, and one "low potential" tributary on the cross-country segment between Section 12 of Sherman Township and Section 7 of Richland Township.

10.1.3.4 Northern Redbelly Dace

Northern redbelly dace (*Phoxinus eos*) is a minnow found in numerous drainages across the northern U.S. and southern Canada. It is generally found in streams and ponds with cool, clear, sometimes stained water with sand or silt bottoms with areas of aquatic vegetation in habitats similar to Topeka shiner's habitats. The state, in its project review, stated that there is a record of this species just outside the eastern edge of the Project boundary (Derby, 2008).

10.1.3.5 Dakota Skipper

The Dakota skipper is a butterfly found in northern prairies, extending from Manitoba south through Minnesota into Iowa and west to the Dakotas. The Dakota skipper has one adult generation per year. Adults are active for only three to five weeks from late June to mid-July. Eggs are usually laid on grasses, although broadleaf plants such as vetches can also be used, and hatch in seven to 20 days. The larvae build a silken tube lined with several blades of grass; the tubes grow with the larvae, and both are underground by fall. The partially grown larvae over-winter in these tubes and resume feeding in the spring.

This species is a prairie obligate species requiring undisturbed native prairie, particularly those areas with abundant mid-height grasses and purple coneflower (*Echinacea angustifolia*). Because the GFP recommended surveys for this species (and the Ottoe species) if any suitable habitat was found in the vicinity of the proposed Project facilities, a survey was conducted in July 2008. Dr. Jerry Selby conducted the survey at three sites containing potential habitat within the Project area (Appendix D). Neither the Dakota skipper nor the Ottoe skipper was found during the survey, and only one area of suitable habitat was documented, along the approximately one-third-mile cross-country segment of the 115 kV transmission line that runs along the section line between Section 24 of Sherman Township and Section 19 of Richland Township.

10.1.3.6 Western Prairie Fringed Orchid

The western prairie fringed orchid is a perennial orchid of tall grass prairies and wet meadows and is commonly associated with big and little bluestem, switchgrass, and Indiangrass. Although the species is listed on the USFWS county list as potentially occurring in Brookings County, it is believed to be extirpated from South Dakota, possibly due to conversion of prairie to cropland and habitat fragmentation, competitive exotic plants, and chemical applications associated with agriculture (USFWS, 2008). In most areas within the Project site, potential habitat has been strongly impacted by past and current haying, herbicide spraying and occasional tilling. This fact, combined with the fact that there are no known populations of Western prairie fringed orchid in South Dakota, makes it unlikely that the orchid occurs within the Project boundary. In a July 31, 2008 telephone conversation, USFWS agreed that a species-specific survey for the orchid was not necessary for the Project, because there are no areas of potential habitat within the vicinity of the current layout (Appendix C).

10.2 IMPACTS TO TERRESTRIAL SYSTEMS

10.2.1 VEGETATION

Any unmitigated loss of native or unique vegetation or introduction of noxious weeds could result in an impact to vegetation resources. Impacts to croplands are discussed further in Section 17.2.4.

Construction of the Project (both the wind farm facility and the 115 kV transmission line) will result in temporary and permanent impacts to existing vegetation within the Project area (Table 12). Direct permanent impacts will occur due to construction of the WTG foundations, access roads, overhead collection and transmission lines, SCADA, meteorological towers, SODAR unit, O&M facility, and Project substations, and will be confined mainly to areas in agricultural use. These impacts will 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 undisturbed native prairies (not present within the Project area), rangelands with native plant communities, wetlands, and natural woodlands. Turbines, access roads, collection lines and the 115 kV transmission line have all been sited to avoid sensitive habitats to the extent possible. Where avoidance is not possible, siting will attempt to minimize impacts to these sensitive habitats. Temporary impacts will be mitigated through BMPs such as re-vegetation, and erosion control devices. These measures will minimize any temporary impacts to vegetative communities adjacent to the turbine and road sites. Noxious weeds will be controlled using weed control measures such as revegetating as soon as possible after construction with certified weed-free seed mixes, and controlled spraying as necessary.

The Project will have temporary impacts to approximately 25.1 acres of CRP land, and will permanently convert approximately 1.4 acres of current CRP land to wind energy uses. Approximately 100 square feet of CRP land will be permanently affected by the 115 kV transmission line.

The wind farm facility has been sited to avoid, to the greatest extent possible, rangeland areas that contain native prairie populations. The 115 kV transmission line has been routed to avoid these areas as well, with one exception: an approximately 0.3-mile cross-country segment of the route, along the section line between Section 24 of Sherman Township and Section 19 of Richland Township. The road (484th Ave.) curves to the west in this area, and the Applicant has not been able to obtain a lease along the private land in this area. Because the structures must be placed in private right of way, the transmission line is routed through the private land leased to the Applicant just to the east side of the section. This parcel is rangeland, and has native prairie plants on the slopes. The highest quality habitat is located east of the proposed 115 kV transmission line, and the Applicant will place the structures as close to the section line as possible, where the habitat is not as high quality. However, it is anticipated that approximately 3.4 acres of rangeland will be temporarily disturbed during construction, and five poles will be placed in this parcel resulting in 250 ft^2 of permanent impact.

Specific BMPs will be used for any construction within rangeland, including the 115 kV transmission line, and will include the following measures:

- During construction in rangelands, crews will limit ground disturbance wherever possible, and limit the areas where construction vehicles drive to the transmission line right of way.
- Areas where the native soil has been removed and the subgrade is exposed will be regraded to the original ground contour and soil replaced following 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.

Construction of the Project will not permanently impact any parcels currently under USFWS grassland easements. It is possible that temporary construction impacts could occur to the grassland easement located along the cross-country section of the 115 kV transmission line. Due to the topography of this section, it may be necessary to temporarily store transmission line components in the grassland easement parcel to the east, just outside of the public right of way during construction (the Applicant does not have a lease on the private land to the west). The USFWS is responsible for the review and regulation of grassland easement impacts, and the Applicant will coordinate with this agency to obtain temporary construction access, if necessary, and determine appropriate mitigation. Because the access will only be temporary, no Special Use Permit process will be necessary. However, a Right of Way

access permit will be required if the USFWS grassland easement will be used for temporary construction access (Tom Tornow, 2008, personal communication).

The Project will not result in any major tree clearing activities. Turbines are sited in open fields. Whenever feasible, access roads have been sited to avoid crossing tree rows. Some minor clearing of brush may be required for collection 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. If windbreaks are crossed by access roads, a permanent gap of 20 ft will be maintained throughout the operation of the wind farm. Temporary clearing of a 36-foot width could be reduced to 20 ft through tree planting after construction, according to landowner preference.

The 115 kV transmission line route and the 34.5 kV overhead route were sited to avoid impacts to tree rows and woodlots whenever feasible. However, access to leased parcels, and siting the line to avoid placing structures in occupied residential yards resulted in several areas where the route will run adjacent to windbreaks. Construction of the lines will be designed to avoid and minimize tree removal to the extent possible; impact estimates for the current layout show that the 115 kV transmission line and the 34.5 kV overhead line will result in approximately 8.3 acres and 1.6 acres, respectively, of permanent impacts to tree rows and woodlots. These are worst case impact numbers, based on an assumption that the entire 75-foot right of way of the overhead transmission line will be permanently cleared of trees; it is very likely that the final right of way corridor will overlap somewhat with public road right of way that is clear of trees, and the actual acreage of tree removal will be much smaller. Prior to construction, the Applicant will work with landowners to discuss minimization and possible mitigation measures. No impacts to the large oak forest in Section 36 of Oak Lake Township will occur.

No undisturbed native prairie parcels will be affected by the Project.

Table 12 Acreage of Direct or Indirect Impacts within Each Vegetation Class – Wind Farm Project

Land Cover Category	Impacts	Turbine Pads/ Staging	Access Roads	Underground Cable	Overhead 34.5 kV Trans-mission	Overhead 115 kV Trans-mission	Substations and O&M Facility	Met Towers and Sodar	Laydown Area	Subtotal by Category
Tilled Agriculture	*Temporary*	*588.6*	*112.1*	*55.9*	*25.2*	*65.5*	*13.0*	0.02	*20.0*	*880.3*
	Permanent	8.5	56.8	--	0.06	0.2	1.1	0.02	--	66.7
Planted Grassland (CRP)	*Temporary*	*17.6*	*2.4*	*1.0*	*0.6*	*3.4*	--	--	--	*25.1*
	Permanent	0.2	1.2	--	<0.01	0.01	--	--	--	1.4
Hayland	*Temporary*	*14.2*	*2.3*	*4.0*	*2.8*	*8.2*	--	--	--	*31.5*
	Permanent	0.2	1.1	--	0.01	0.02	--	--	--	1.3
Rangeland	*Temporary*	--	--	*0.9*	*1.0*	*2.5*	--	--	--	*4.4*
	Permanent	--	--	--	--	<0.01	--	--	--	<0.01
Pasture	*Temporary*	*66.1*	*11.8*	*5.3*	*2.1*	*25.1*	--	--	--	*110.3*
	Permanent	0.9	5.9	--	<0.01	0.07	--	--	--	6.9
Woodland	*Temporary*	*3.6*	*0.8*	*0.6*	*1.7*	*8.7*	--	--	--	*15.4*
	Permanent [1]	--	0.4	--	1.6	8.3	--	--	--	10.3
Wetlands	*Temporary*	--	*1.4*	*0.6*	*2.0*	*5.1*	--	--	--	*9.1*
	Permanent	--	0.01	--	--	--	--	--	--	0.01
Farmstead	*Temporary*	*0.1*	*1.1*	*0.6*	*0.3*	*1.8*	--	--	--	*3.9*
	Permanent	--	0.5	--	<0.01	<0.01	--	--	--	0.5
Non-vegetated Cover[2]	*Temporary*	--	*0.03*	*0.2*	*0.6*	*1.9*	--	--	--	*2.7*
	Permanent	--	0.01	--	<0.01	<0.01	--	--	--	0.01
TOTAL [3]	***Temporary***	***690.2***	***131.9***	***69.1***	***36.3***	***122.2***	***13.0***	***0.02***	***20.0***	***1,082.6***
	Permanent	**9.8**	**65.9**	**--**	**0.1**	**0.3**	**1.1**	**0.02**	**--**	**77.2**

-- Indicates no impact is anticipated.

[1] Permanent woodland impacts assumes that all woodland within the 75' ROW for the overhead 34.5 kV and 115 kV lines would be permanently changed to grassland or cropfield, for maintenance purposes

[2] Non-vegetated cover represents road, gravel pit and utility land uses.

[3] Total impact calculations assume that woodlands impacted by overhead lines would revert to grassland or cropland under the line and would still be available for use by the landowner. Therefore only the direct pole impacts within the permanent impacts to woodland category are included in the total impacts for the Project.

10.2.2 WETLANDS

Impacts to wetlands resources could occur by directly filling wetlands due to Project construction, or by otherwise negatively altering their quality. Wetland resources in the Project area were surveyed in May, June and July 2008. Surveys were conducted within the proposed substations, O&M facility, and laydown areas, and within 200-500 ft of all proposed WTG locations, access roads, and underground electric lines. The majority of wetlands present within the Project area are seepage-fed drainages, with some isolated pothole wetlands interspersed. The results of the delineation were used to refine the current layout to avoid all permanent impacts to jurisdictional wetlands and waters to the greatest extent practicable.

Because wetlands within the Project area are relatively small and widely scattered, the Applicant anticipates that the Project will be able to avoid most wetland areas. WTGs will be constructed in the upland hill areas, avoiding the low-lying wetlands. Wetland areas will also be avoided to the extent possible when positioning access roads and feeder lines. Because most wetlands are small and narrow, the Applicant anticipates that overhead 34.5 kV lines will be able to span wetlands without placing structures within the wetlands. To further protect wetlands, BMPs for sediment and erosion control will be implemented. In order to minimize the risk of contamination of wetlands due to accidental spilling of fuels or other hazardous substances, all construction equipment will be refueled in secure areas away from wetlands or drainage areas, and a spill kit will be available at the construction site. The current layout shows approximately 7.4 acres of temporary impact to wetlands due to installation of collection lines, overhead lines and other infrastructure, and approximately 600 ft^2 (0.01 acre) of permanent impacts to wetlands in Section 15 of Oak Lake Township due to one access road location where topography and lease agreements make avoidance difficult.

The current layout completely avoids all temporary and permanent impacts to wetlands within the USFWS conservation easement. The Applicant will work with the USFWS to ensure that construction of the wind farm facilities completely avoids the wetlands in this parcel, and to develop appropriate BMPs to employ during construction. The 115 kV transmission line is anticipated to span all wetlands and waters of the U.S., avoiding permanent impacts.

If the final layout results in unavoidable impacts to wetlands or waters of the U.S., the Applicant will work with the jurisdictional agencies (USACE and/or USFWS) to permit the activity and determine the best ways to minimize the impacts and create appropriate mitigation, if necessary.

10.2.3 WILDLIFE

Direct and indirect impacts to wildlife could occur through loss of or change to habitat because of construction of the proposed Project. Direct impacts to wildlife populations could occur due to mortality resulting from bird and bat collisions with wind turbines.

Construction activities that remove vegetation and disturb soil could cause some small wildlife species to be exposed to predators or displaced. Permanent habitat loss due to construction of WTGs, the Project collection substation and access roads will be minimal, restricted to localized areas primarily within cultivated fields. Temporary impacts to wildlife habitat adjacent to the structures will be mitigated through re-vegetation.

Short-term changes in habitat during construction, such as construction noise, and increased presence of vehicles and humans, will be localized and minimal. Vehicles could disturb ground-nesting birds and animals during the breeding season. Any potential losses are not expected to impact populations.

The literature on long-term effects of wind turbines on breeding habitat shows that although there appears to be a decrease in breeding songbird density in the immediate vicinity of turbines, broader scale changes were absent (Leddy et al 1999, Johnson et al 2000a and Schaffer and Johnson 2007, Appendix B).

Waste containment measures will be taken during construction in order to minimize the production of loose trash that could attract scavengers such as raccoons and crows. By removing waste from the Project area, impacts to nesting species due to increased presence of scavengers will be avoided. Any attraction of scavengers to the area will be of short duration and would not be expected to impact population levels.

10.2.3.1 Bird and Bat Mortality

Wind Farm Facility

The Site Characterization Study (Appendix B) conducted a literature review detailing the relationship between wind farms and fatalities of birds and bats. Previous studies done for proposed wind projects in the Project area were also consulted in the following summary.

A study of raptor fatalities at the nearby 354-turbine Buffalo Ridge wind farm in southwestern Minnesota (with similar land use and topography to the Buffalo Ridge II Wind Farm Project site) documented one raptor fatality, a red-tailed hawk, during 4 years of monitoring, from 1996 to 1999. Studies of migratory and song bird fatalities at the 354-turbine Buffalo Ridge wind farm estimates a

fatality rate of 3.0 – 5.9 fatalities/MW/year. It is reasonable to expect similar raptor and songbird mortality at the proposed Buffalo Ridge II Wind Farm (Derby, 2005).

Bat fatalities can occur because of collisions with wind turbines. Previous studies of bat mortality at wind farms in the United States through 2001 ranged from 0.3-2.7 fatalities/MW/year. The majority of the species affected by the turbines are migratory bats that migrate for long distances between summer and winter habitats (Derby, 2008 and 2005).

As noted above, there do not appear to be topographic features within the Project area that would funnel high densities of migrating bats through the site. However, bat fatalities were documented in wind facilities in southwestern Minnesota, and it is anticipated that similar bat fatality rates will occur at the proposed Buffalo Ridge II Wind Farm site (Derby, 2008 and 2005).

A variety of measures will be used to avoid and minimize bat and bird fatalities that may result from the Project. The Project will use solid towers for WTGs instead of the lattice tower structures (lattice towers are used as perch/hunting sites). The minimum lighting required by the FAA will be used on the turbines; the strobe/flashing lights currently required by the FAA are less attractive to night-flying birds than steady-burning lights that used to be installed on wind turbines. These measures will minimize the amount of wildlife, especially raptor, fatalities resulting from collisions with the wind turbines. The Applicant will construct any overhead power lines required for the Project in accordance with the current guidelines for raptor-safe design (APLIC, 1996). If final design shows that temporary impacts would potentially occur within a USFWS grassland easement, the Applicant would coordinate with the agency to obtain the proper temporary access permits.

The Applicant will complete one year of pre- and one year of post-construction monitoring to determine avian and bat use of the Project area before and after Project implementation, and also to determine mortality rates associated with Project operation. The methodology of these studies has been reviewed and approved by USFWS and GFP (Appendix C).

115 kV Transmission Line

Raptors, waterfowl, and other bird species may also be affected by the construction and placement of the overhead collection and transmission lines. Avian collisions are a possibility after the completion of the overhead line. Waterfowl, wading birds and shorebirds are typically more susceptible to transmission line collision, especially if the transmission line is placed between agricultural fields that serve as feeding areas or between wetlands and open water, which serve as resting areas. For this Project, the 115 kV transmission line runs adjacent to agricultural fields for the majority of its length. Wetland and open water features are not common in the vicinity of the line.

Electrocution of large birds, such as raptors, is a concern related to distribution and sub-transmission lines. Electrocutions occur when birds come in contact with either two conductors or a conductor and a grounding device. The Applicant's transmission line design standards follow Avian Power Line Interaction Committee (APLI) design standards and provide adequate spacing between the conductors to minimize the risk of raptor electrocution. Thus there should be minimal risk of electrocution from the transmission line.

10.2.4 SENSITIVE SPECIES

Although there are no known bald eagle nests within or near the Project area, it is possible that bald eagles occur within the Project area. However, there are no documented bald eagle fatalities at any US wind power facilities, even where when bald eagles are known to nest nearby. No whooping cranes have been documented within Brookings or Deuel counties, and the Project area contains very little potential migratory habitat for whooping cranes. Both bald eagles and whooping cranes tend to fly well above the height of wind turbines when migrating. Therefore, impacts to bald eagles and whooping cranes from the Project are unlikely.

Direct impacts on the Topeka shiner and redbelly dace would be unlikely because turbines will be placed in upland areas. However, to minimize indirect impacts due to stream crossings or increased sedimentation from construction, the USFWS recommends further coordination for guidance in developing BMPs (Appendix C). If underground collection lines cross streams with Topeka shiner habitat, the Applicant will avoid impacts either by trenching any ephemeral tributaries during dry periods (avoiding any remaining pools that may contain species) or by directional boring. Once final design is developed, the Applicant will coordinate with the USFWS for all proposed stream crossings within the Topeka shiner watersheds. The Applicant will not place transmission line structures in Topeka shiner streams or cross streams with mechanical equipment. Mitigation measures for Topeka shiners will involve measures that will reduce or prevent the amount of sediment reaching adjacent waterways. Additionally, construction crews will receive training to avoid Topeka shiner habitat.

No occurrences of the Western prairie fringed orchid have been observed recently within South Dakota; it is believed to have been extirpated from the state. Since most of the areas that could be potential orchid habitat (drainage ways) are currently disturbed, and no undisturbed mesic prairies exists in the Project area, and turbines and roadways will be placed generally in uplands out of the drainage ways, impacts to the orchid from the proposed Project are unlikely. No surveys are proposed for this species for the Project, and the USFWS has agreed with this approach (Appendix C).

The Dakota skipper is a prairie obligate species requiring undisturbed native prairie, particularly those areas with abundant mid-height grasses and purple coneflower (*Echinacea angustifolia*). Routine

maintenance of the wind farm facility and 115 kV transmission line could involve clearing vegetation for access, which could impact butterfly habitat. However, the wind farm facility and 115 kV transmission line route have been routed to avoid potential butterfly habitat wherever possible. Furthermore, maintenance will consist of removing tall, woody vegetation and will not impact prairie habitat. By clearing woody vegetation, routine maintenance may result in a slight increase in favorable butterfly habitat within the transmission line ROW.

As noted above, a survey for Dakota (and Ottoe) skippers in July 2008 did not document the target species (Appendix D). Dr. Selby documented one area of suitable potential habitat that could be impacted by the proposed 115 kV transmission line: an approximately third of a mile cross-country segment of the route, along the section line between Section 24 of Sherman Township and Section 19 of Richland Township. Areas disturbed due to construction activities will be restored to pre-construction contours and will be reseeded as soon as possible with a native prairie seed mix. Disturbance due to routine maintenance along the proposed route will be avoided and minimized to the extent feasible by minimizing vegetation clearing. The use of herbicide as weed control will be minimized in this area in order to minimize potential impacts to prairie species; if noxious weeds are noted during maintenance of the transmission line, specific weed control measures (such as targeted spraying) will be implemented.

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

11.1 EXISTING AQUATIC ECOSYSTEM

Surface waters are described in Section 9.1, and shown on Figures 9a and 9b. The Project lies in the Upper Big Sioux and Lac Qui Parle watersheds (Figure 9a), and the proposed 115 kV transmission line is within the Upper Big Sioux watershed (Figure 9b). Within the southern and western portions of the Project area, surface water flows generally south and west toward the Big Sioux River. Within the northern and eastern portions of the Project area, surface water flows generally northeast toward the Lac Qui Parle River in the Minnesota River watershed. Surface water resources within and adjacent to the Project area include Oak Lake, Six Mile Creek, Deer Creek, and several ephemeral stream tributaries. Oak Lake is located east of the Project area and an ephemeral stream drains into the lake from the northeast portion of the Project area. Six Mile Creek runs southwest out of the center of the Project area, and Deer Creek south out of the southern portion the Project area. As noted in Section 10.1, the Topeka shiner and the northern redbelly dace (special status species) have the potential to inhabit Project streams.

As described in Section 10.1.1.7, there are 900 NWI wetlands in the Project area, totaling approximately 791 acres; lake (4.4 percent), palustrine emergent (83.6 percent), and palustrine forested/scrub-shrub (2.1 percent), and palustrine freshwater pond (9.9 percent) type wetlands make up the majority of the area. Site visits and field delineations have indicate that the NWI is likely underestimating the number of wetlands (particularly those associated with drainages and stream features); site-specific land cover data indicates that wetlands make up approximately 2,122 acres of the area within the Project boundary. The dominant vegetation found in the wetlands and drainageways consists of reed canary grass (*Phalaris arundinacea*) and sedges (*Carex spp.*); other non-dominant species include prairie cordgrass (*Spartina pectinata*), water smartweed (*Polygonum spp.*), cattail (*Typha spp.*), and green bulrush (*Scirpus atrovirens*).

11.2 IMPACTS TO AQUATIC ECOSYSTEMS AND MITIGATION

The primary potential for impact to aquatic ecosystems will 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 loamy soils in the Project area are not highly susceptible to erosion; however, care should be taken to avoid or minimize excavation in steep slope areas. Since 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 will be sited to avoid steep slopes. There may also be limited trenching of underground cabling in steep slopes, although that will be minimized as much as possible. During construction, BMPs will be implemented to ensure that drainage ways and streams are not impacted by sediment runoff from exposed soils during precipitation events. No overhead transmission poles will be placed in streambeds.

The South Dakota DENR has issued a General Storm Water Permit for Construction Activities similar to the proposed Project; an application for coverage under this permit will be needed for the Project. One of the conditions of this permit is the development of a SWPPP. The SWPPP will be developed once more detailed engineering information on grading is determined, and will mandate BMPs to control erosion and sedimentation for areas where slopes make soil erosion a particular concern. BMPs may include silt fencing, erosion control blankets, re-vegetating side slopes, temporary storm water sedimentation ponds, or other methods of controlling storm water runoff and minimizing erosion and sedimentation.

As described in Section 10.2.2, impacts to wetlands will be minimal, because WTGs will be constructed in the upland hill areas and wetlands will be avoided to the extent possible when positioning access roads collection feeder lines, and the overhead 115 kV transmission lines.

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

12.1 EXISTING LAND USE

The evaluation of land use focuses on the Project area, but includes a discussion on land use adjacent to the Project area and in Brookings and Deuel Counties to establish a regional setting for the Project.

The predominant land use within the Project area is agricultural—a combination of cultivated row crops and pastureland. Soils in the Project area consist of a variety of loams, silt loams, silty clay loams, and sandy loams derived from underlying glacial tills that are considered rich agricultural soils. The majority of the land, 58 percent, within the Project area is considered prime farmland. An additional nine percent is considered prime farmland if drained, and two percent is considered prime farmland if irrigated (USDA, 2003). Federal regulations define prime farmland as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops and is available for these uses" [7 CFR, 657.5 (a) (1)].

Other land uses within the Project area are scattered rural residences, farmsteads, roads, stock ponds, woodlands, lakes, planted grasslands, haylands, rangelands, wetlands, gravel pits, transmission lines, and the Brookings County and White substation (Figures 10a and 10b). The entire Project area is zoned as Agricultural by Brookings and Deuel Counties, with the exceptions of the City of Astoria (population150) and the City of Toronto (population 202), portions of which are located within the Project area. The City of White (population 530) is located one-half-mile south of the Project area. A Brookings-Deuel Rural Water District water tower is also located within the Project boundary (Figure 12a). There are existing transmission lines in the Project, including 115 kV transmission lines and 345 kV lines; distribution lines and telephone lines also are found throughout the Project.

GFP maps show that there are three walk-in hunting areas within the Project boundary, shown on Figure 12a (GFP, 2007). Walk–in hunting areas are privately-owned lands; landowners enter into agreements with the GFP to allow public hunting access during particular hunting seasons. A conversation with the GFP Conservation Officer for Brookings County indicated that for impacts of 5 acres or less, no changes to the agreement will be necessary (Jeff Grendler, 2008, personal communication).

There are no health facilities, no active railroads, no irrigated lands, no undisturbed native grassland, and no other major industrial land uses (other than Western's existing White substation and Xcel Energy's existing Brookings County substation) in the Project boundary (Figures 12a and 12b) There are two schools within the Project boundary, located within the cities of Toronto and Astoria. Three cemeteries are located within the Project boundary, in Deuel County. The cities of Toronto and

Astoria have municipal water provided by the Brookings-Deuel Rural Water Supply. The schools, residences, and businesses within Toronto and Astoria, and all cemeteries within the Project boundary are located more than 1 mile from the proposed turbines, substations, 115 kV overhead line and other Project infrastructure. There are no other noise sensitive land uses, other than the residential and farmstead properties, which are addressed in Section 12.4.3 that are protected by setback requirements and noise standards established by the Brookings County Zoning Ordinances (Appendix E).

12.2 EXISTING NOISE

Noise is defined as unwanted sound. It may be comprised of a variety of sounds of different intensities, across the entire frequency spectrum. Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA.

A noise level change of 3 dBA is barely perceptible to average human hearing. A 5-dBA change in noise level, however, is clearly noticeable. A 10-dBA change in noise level is perceived as a doubling or halving of noise loudness, while a 20-dBA change is considered a dramatic change in loudness. Table 13 shows noise levels associated with common, everyday sources, and places the magnitude of noise levels discussed here in context.

Table 13 Common Noise Sources and Levels

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

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

The primary land use in the Project area is rural agricultural land. Average noise levels in these areas are typically in the 30- to 40-dBA range and are considered acceptable for residential land use activities. Ambient noise in rural areas is commonly made up of rustling vegetation and infrequent

vehicle pass-bys. Higher ambient noise levels, typically 40 to 55 dBA, are expected near roadways, such as State Highway 30 and more urban areas, such as the nearby town of White, South Dakota.

The Brookings County Zoning Ordinance Section Article 23, Wind Energy System (WES) Requirements (Appendix E), section 12 Noise, states that "noise levels shall not exceed 50 dBA, including constructive interference effects at existing off-site residences, businesses and public buildings." (Brookings County Planning and Zoning, 2007). The Deuel County Zoning Ordinance 1215 WES Requirements (Deuel County Planning Commission, 2004) states that noise levels shall not exceed 50 dBA at the property line of unleased lands (Appendix E).

12.3 EXISTING AESTHETICS

Agricultural fields, farmsteads, fallow fields, large open vistas and gently rolling topography visually dominate the wind farm site. The landscape can be classified as rural open space. The photos in Figure 13 show typical landscapes within the Project area. Vegetation in and near the Project area is predominantly cropland and pasture with corn, small grains and forage crops creating a low uniform cover. A mix of deciduous and coniferous trees, planted for windbreaks, typically surround farmsteads. In the swales, there is occasional riparian growth of native willows, cattails, sedges, and rushes.

The settlements in the Project area are residences and farm buildings (inhabited and uninhabited) scattered along the rural roads. These structures are focal points in the dominant open space character of the vicinity. A number of the farm structures date back to the late 19th or early 20th centuries and are representative of that era of South Dakota farm architecture. Typically, the farmsteads and residences are located at lower elevations to avoid winds common to the area.

There are many operating wind farms already in the general Project area. These wind farms are located east and southeast of the Project site, and are visible from many areas within the Project boundary.

The longest viewshed of the existing wind farm is approximately 7 miles. At this distance, the turbines can be distinguished from vertical forms in the landscape, such as overhead transmission lines or trees. The paved highways and two-lane paved and gravel roads carry varying amounts of traffic, most of which is local. The rural character of the area is especially apparent along the local two-lane roads that typically will not have expansive views of the proposed wind farm; instead, they will have close views of the site and vicinity. However, in the general area of the site where the roads are at higher elevation, there will be intermittent, expansive views of the area.

12.4 LAND USE IMPACTS ANALYSIS

12.4.1 DISPLACEMENT

There are 158 occupied residences in the Project boundary (Figure 12a). Based upon the proposed Project layout of WTGs, access roads, collector lines, collector substation and the interconnection facilities Figure 3a), there will be no displacement of residences or businesses due to construction of the wind farm facilities. The minimum distance between any occupied residence and a turbine is 1,205 ft.

There are twelve occupied residences within 1,000 ft of the proposed centerline of the 115 kV transmission line (Figure 12b). The 115 kV transmission line route has been designed to avoid and minimize direct impacts to occupied residences, and there will be no displacement of residences or businesses due its construction. There is adequate space to site the proposed 115 kV overhead transmission structures between the roadway and the water tower, and no impacts to the use or operation of the water tower are anticipated.

12.4.2 RECREATIONAL IMPACTS

The current layout shows two wind turbines, and associated access roads, and underground collection lines placed in a 167-acre parcel that is mapped by the GFP as a walk-in hunting area in Section 1 of Sherman Township. This will result in approximately 0.8 acres of permanent impacts to the walk-in parcel. However, several site visits could not confirm that this parcel was still enrolled in the program, as no signs were visible at the boundary. If these two turbines are built, and the land is currently enrolled in the walk-in program, the Applicant will work with the landowner to determine if any coordination is necessary with the GFP. However, because the impacts to the walk in parcel are anticipated to be less than 5 acres, it is unlikely that further coordination with the GFP will be necessary. Therefore, no changes to current recreational uses of this walk-in area are anticipated.

No other impacts to existing or proposed recreational land uses are anticipated from the Project.

12.4.3 NOISE ANALYSIS

Noise concerns for this Project may be associated with both the construction and operation of the wind turbines and substation. When in motion, the wind turbines emit a perceptible sound. The level of this noise varies with the speed of the turbine and the distance of the listener from the turbine. On relatively windy days, the turbines create more noise; however, the ambient or natural wind noise level tends to override the turbine noise as distance from the turbines increases. A small Project substation (BRII-North) will be located in the northeast quarter of Section 19 in Oak Lake Township. The closest residence to this substation is located at least 700 ft away, and is separated from the substation

site by a roadway (479st Ave.) and several rows of trees. It is not anticipated that the Project substation will noticeably increase the noise levels at this or any other occupied residence. Additionally, a second small Project substation (BRII-South) will be located just north of the existing Brookings County substation, in the eastern half of Section 25 in Sherman Township. The closest residence is located over a half mile away; construction of the BRII-South substation is not anticipated to noticeably increase the noise levels at this or any other occupied residence.

In order to analyze turbine noise that may result from construction of the Project, the Applicant conducted a worst-case noise analysis, using the loudest of the four proposed turbine types, for the current layout. A summary of the noise analysis, attached as Appendix F, follows.

Analysis results indicate that the Mitsubishi MWT95 is the loudest of the four turbines evaluated, with a sound pressure level of 111 dBA. Noise emissions from a single Mitsubishi 2.4 MW turbine produce a 50 dBA contour line approximately 160 m (525 ft) from the turbine at ground level.

Analysis results also indicate that noise levels associated with the simultaneous operation of all 161 turbines currently proposed at the Buffalo Ridge II Project are not predicted to reach 50 dBA at any residential receptor in the Project area. The maximum predicted turbine-generated noise level at an occupied residence is approximately 48 dBA, lower than the limit of 50 dBA. As noted above in Section 5.1, it is possible that the layout will change if the 1.5 or 2.4 MW machine is selected for this Project, or as a result of other factors such as landowner preference or ongoing discussions with landowners and agencies. Although the turbines may be shifted or added within leased lands in the Project boundary, in no cases would turbines be moved closer than 1,100 ft to an occupied residence. Because the 2.4 MW machine (the loudest of those under consideration) produces noise levels less than 50 dBA beyond 525 ft, no exceedance of the 50 dBA noise standard are expected. For any change in layout, the Applicant will re-model noise levels at the occupied residences in order to ensure that no exceedances occur.

12.4.4 AESTHETIC IMPACTS

The placement of turbines will have an effect on the visual quality within the site vicinity. However, discussion of the aesthetic effect of the proposed wind farm is based on subjective human response. The wind farm will have a combination of effects on the visual quality/rural character of the area. By one measure, the proposed Project could be perceived as a visual intrusion, characterized as metal structures, 80 to 100 m high at hub height, standing on formerly undisturbed ridgelines, intruding on the natural agricultural aesthetic value of the landscape.

On the other hand, wind farms have their own aesthetic quality, distinguishing them from other non-agricultural land uses. First, the wind farm does not generate much traffic or generate a noticeable

increase in day-to-day human activity in the area. Therefore, the Project site will retain the rural sense and remote characteristic of the vicinity. Second, although "industrial" in form and purpose, turbines are essentially "farming" the wind for energy. The proposed land use will not involve any ongoing industrial use of non-renewable resources or emissions into the environment. Although the turbines are high-tech in appearance, they are compatible with the rural, agricultural heritage of the area.

Essentially, the installation of the Project will modify the visual quality of the area within and adjacent to the Project boundary. The topography in the Project area is generally flat and the vegetation cover is uniformly low, making the ridgelines of the landform in the vicinity highly vulnerable to visual disruptions. Wind turbines already existing near the Project have altered the landscape in the area from agricultural to wind farm/agricultural. The proposed Project will intensify the visual character imposed by the existing wind turbines.

The cumulative effect of the proposed Project and existing projects will increase both the "industrial" appearance of the wind farms on Buffalo Ridge and the areas from which they will be seen. Since wind generation development is likely to continue on the ridge, this visual impact is probably inevitable. In addition, it has been noted that the presence of turbines within the viewshed of WPAs, USFWS easements, GFP walk-in hunting areas or other natural areas will diminish the natural quality of those areas and the experience of the persons utilizing those areas. While it may be true to some extent that the ability to see turbines in the background intrudes upon the purity of that experience, the same could be said of any human habitation or activity in the vicinity, and the presence of turbines may be less intrusive than many such activities. Nonetheless, this may be perceived as a negative impact.

The following are proposed mitigation measures:

- Turbines will not be located in biologically sensitive areas such as wetlands or undisturbed native prairies.
- Turbines will not be illuminated, except as required by FAA regulations.
- Existing roads will be used for construction and maintenance where possible. Road construction will be minimized.
- Access roads created for the wind farm facility will be located on gentle grades to minimize visible cuts and fills.
- Temporarily disturbed areas in uncultivated land will be reseeded to blend in with existing vegetation.

To attain maximum efficiency, wind power technology requires as much exposure to the wind as possible. As a result, the turbines are located on the ridge tops of Buffalo Ridge, which makes them highly visible to a wide range of surrounding areas. Mitigation measures that would result in shorter towers or placement of the turbines at alternate locations off the ridgelines would result in a non-viable project.

12.4.5 ELECTROMAGNETIC INTERFERENCE

There are a number of underground and overhead telecommunications lines in the Project area. Telecommunications firms located in areas with wind development have sometimes experienced disturbances to their communications infrastructure from electric feeder and communications lines associated with wind farms. The Applicant is actively coordinating with Interstate Telecommunications Cooperative (ITC), the telecommunications provider in the Project area, in order to minimize the potential for any interference problems. If, after construction, any interference with communications infrastructure is detected, the Applicant will work with ITC in order to alleviate the problem.

Wind Farm Facility

The Applicant has completed a study of the potential for WTGs to obstruct microwave telecommunications paths. This study determined that there are three Department of Energy microwave beam paths associated with controlling and supervising Western's transmission system in the area. The Applicant is coordinating with the National Telecommunications and Information Administration, the Department of Energy and Western in order to ensure the placement of the turbines and associated infrastructure does not affect microwave transmissions. The current layout avoids all beam paths.

WTGs can also sometimes block or interfere with broadcast signals, causing video "ghosting" or "shimmering." The Applicant will conduct a pre-construction baseline field study to precisely measure the current level of television reception in the Project area. If, after construction, the Applicant receives information that shows television interference caused by operation of the WTGs in areas where good reception is presently obtained, the Applicant would resolve such problems on a case-by-case basis.

115 kV Transmission Facility

Corona from transmission line conductors can generate electromagnetic "noise" at the same frequencies that radio and television signals are transmitted. This noise can cause interference with the reception of these signals depending on the frequency and strength of the radio and television signal. Tightening loose hardware on the transmission line usually resolves the problem. If radio interference

from the 115 kV transmission line corona does occur on reception of AM radio, the problem can be rectified by appropriate modifications to the receiving antenna system. Moreover, AM radio frequency interference typically occurs immediately under a transmission line and dissipates rapidly with distance.

FM radio receivers usually do not pick up interference from transmission lines because corona-generated radio frequency noise currents are quite small in the FM broadcast band, and the interference rejection properties inherent in FM radio systems makes them virtually immune to amplitude type disturbances.

Television interference is rare but may occur when a large transmission structure is aligned between the receiver and a weak distant signal, creating a shadow effect. Loose and/or damaged hardware may also cause television interference. If television or radio interference is caused by or from the operation of the proposed 115 kV transmission line in areas where good reception is presently obtained, the Applicant will inspect and repair any loose or damaged hardware in the transmission line, or take other necessary action or restore reception to the present level.

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

The majority of the Project will be constructed on agricultural land regulated by Brookings County, South Dakota. Applications will be made for a Conditional Use Permit, a Soil Erosion & Sediment Control Plan, Building Permits and Driveway Application and Construction Permits. Brookings County also requires that each turbine tower have a 9-1-1 identification sign (maximum size is 16 ft^2) for emergency response teams to locate specific turbines within the Project. One of the primary focuses of the zoning authorizations for the Project will be the required setbacks for WTGs from various structures and land uses (residences, roads, property lines).

Brookings County Zoning requirements for WESs (Brookings County Zoning Regulation, Article 23) establishes the following setbacks:

- Residences, businesses and public buildings — 1,000 ft
- Public Road right of way — 500 ft or 1.1 times the height of the turbines, whichever is greater
- Property Lines (unless an easement is obtained) — 500 ft or 1.1 times the height of the turbines, whichever is greater

Project components will be placed and the Project will be constructed in accordance with Brookings County setback requirements. There is one string of turbines in the north half of Section 13 in Oak Lake Township where five WTGs are located closer than 500 ft to the township right of way. However, there is no public road maintained along that section line between Sections 12 and 13; a dirt, two track field access appears to be used by local landowners. The Applicant is working with Oak Lake Township over this issue, and preliminary discussions show that it is possible the Township will allow the Applicant to take over control of this right of way. If the Township turns over the township right of way to the Applicant, the turbines will stay where they are currently proposed; if the Township maintains ownership, it is likely that these five turbines would move approximately 150 to 200 ft to the south in order to comply with the setbacks. In either case, use of the section line by local landowners for field access will still be allowed. This issue is expected to be settled by January 2009.

Additionally, the noise modeling results indicate that the proposed Project will comply with the Brookings County requirement that wind turbines not produce noise of more than 50 dBA at residences. The Applicant will ensure that each WTG has a 9-1-1 identification sign. Appendix E contains the Brookings County zoning ordinances pertaining to wind farm facilities.

The Deuel County Zoning Ordinance (Section 1215) states (that structures over 100 ft in height have the following setbacks:

- Off-site residences, businesses or public facilities 1,000 ft
- On-site (leased) residences 500 ft
- Public right of way Height of the turbine
- Property Lines (unless an easement is obtained) Two times the height of turbine

There are currently no wind farm facilities proposed in Deuel County. If the final layout includes proposed turbines or other facilities within Deuel County, the Applicant will coordinate with the Deuel County Zoning Office in order to obtain a Wind Energy System permit. As part of this process, the Applicant will work with the County to ensure that any Project facilities comply with setback distances.

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

Potential impacts to water quality are addressed in Section 9.0. 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 will contain sediments that might otherwise increase loading in receiving waters.

An NPDES permit is required for land disturbing activities of greater than 1 acre. The Project will temporarily disturb approximately 1,082 acres because of the construction of turbines, electric collection system, access roads, Project substation, O&M facility, meteorological towers and SODAR unit, temporary laydown areas and batchplant, and 115 kV transmission line. The South Dakota DENR has issued a General Storm Water Permit for Construction Activities; and the Applicant will apply for coverage under this permit for the Project. One of the conditions of this permit is the development of a SWPPP that will identify BMPs to control erosion and sedimentation. BMPs may include silt fencing, erosion control blankets, temporary storm water sedimentation ponds, or other methods of controlling storm water runoff and minimizing sedimentation.

As a result of implementation of the conditions of the General Storm Water Permit process (SWPPP mandated BMPs) the Project is not expected to have any detrimental impact on water quality, either during construction or operation of the wind farm and 115 kV transmission line facility.

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

15.1 EXISTING AIR QUALITY

The Project area is currently in attainment for both national and South Dakota Ambient Air Quality Standards. In fact, the entire State of South Dakota is in attainment for all criteria pollutants (U.S. EPA). The nearest Ambient Air Quality Monitoring Site is located at the Brookings city hall in Brookings County, South Dakota, which is southwest of the Project (DENR, Map of Monitoring Sites). The primary emission sources that exist near the facility include agriculture and grain processing facilities.

The circuit breakers of the existing White and Brookings county substations likely contain small amounts of sulfur hexafluoride gas (SF6), which is used for its high quality electrical insulating and thermal stability properties. SF6 is a greenhouse gas, and if released into the atmosphere, can contribute to greenhouse gas emissions.

15.2 AIR QUALITY IMPACTS

Wind Farm Facility

During construction of the wind farm Project, fugitive dust emissions will increase due to truck and equipment travel in the area. Additionally, there will be short term emissions from diesel trucks, construction equipment, and the batch plant, if used. The additional particulate matter emissions are not expected to exceed the National Ambient Air Quality Standards (NAAQS). The operation of the wind farm facility will produce no air emissions.

115 kV Transmission Line

Construction impacts from the 115 kV transmission line will include fugitive dust emissions along the alignment due to equipment traffic. The only potential air emissions from a transmission line result from corona. Corona can produce ozone and oxides of nitrogen in the air surrounding the conductor. Corona consists of the breakdown or ionization of air within a few centimeters or less immediately surrounding conductors. For 115/115 kV double-circuit and 115 kV single-circuit transmission lines, the conductor gradient surface is usually below the air breakdown level. The Project area presently meets all federal air quality standards. Studies designed to monitor the production of ozone under transmission lines have generally been unable to detect any increase due to the transmission line facility. Given this, there will be no measurable impacts relating to ozone for the facility.

The circuit breakers of the proposed Project substations and the addition to the Brookings County substation likely will contain small amounts of SF6. Release of SF6 from a breaker or other electrical device can occur during the initial filling process or due to leaks after filling. However, there are very

tight regulations and penalties surrounding release of SF6. Therefore, leakage is monitored closely and repaired promptly if detected. It is not anticipated that the very small amounts of SF6 used in the proposed substation components will cause an air quality impact.

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

The Applicant proposes to have the Buffalo Ridge II Wind Farm operational as early as December 2010. A preliminary permitting and construction schedule for the Project is below.

- Submit PUC Permit Application — October 2008
- PUC Permit (and other permits) Received — February 2009
- Road Clearing and Construction — May-Nov. 2009
- WTG Foundation Construction — May-Nov. 2009
- Grading, Trenching of Underground Facilities — July-Nov. 2009
- Overhead 34.5 kV and 115 kV Transmission Line Construction — July-Nov. 2009
- WTG Assembly, Communication & SCADA System Installation — May-Nov. 2010
- Collection Substation Construction — May-Sept. 2009
- WTG Testing — Oct.-Dec. 2010

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

17.1 EXISTING SOCIOECONOMIC AND COMMUNITY RESOURCES

17.1.1 COMMUNITIES

An area within one mile of the Project area is considered the affected socioeconomic environment in this analysis. Additional socioeconomic information on Brookings and Deuel Counties is provided to place this area in a larger context.

The 2000 Brookings County Comprehensive Plan shows population growth leveling off and a general trend of migration from rural areas to towns and cities (Brookings County Planning Commission, 2000). The 2004 Deuel County Comprehensive Plan (Deuel County Planning Commission, 2004) shows a population decline that has leveled off since 1990, and a similar pattern of migration from rural areas to towns. Table 14 summarizes some of the demographic characteristics of the area.

The population in this area is generally white and is slightly less diverse, in terms of racial composition, than the populations of Brookings County and South Dakota as a whole. The area is rural and the primary commercial activity is agriculture. No other major industries are located within the Project boundary, with the exception of the existing transmission and substation infrastructure. In 2000, up to 41.8 percent of individuals in the townships within the Project area were below the poverty level, compared to 14 percent in Brookings County, 10.3 percent in Deuel County, and 13.2 percent in South Dakota (U.S. Census Bureau, 2000). The highest rate (41.8 percent) was in Richland Township; the remainder of the townships had poverty rates at or below those of Brookings County. Unemployment rates measured 2.4 percent in Brookings County and 2.5 percent in Deuel County in June 2008, slightly lower than the 2.7 percent statewide (Labor Market Information Center, 2008). Median annual household incomes in 2000 ranged between $21,250 and $47,083 for the townships in the Project, compared to $35,438 in Brookings County, $31,788 in Deuel County, and $35,282 for South Dakota.

The three nearest towns to the proposed Project are White (year 2000 population: 530), Toronto (year 2000 population: 202), and Astoria (year 2000 population: 150). Brookings (year 2000 population: 18,504), the Brookings County Seat, is approximately 8 miles southwest of the Project area. Astoria, White and Toronto each has a restaurant, a gas station, and several other small businesses, and Brookings services include hotels, restaurants, public schools, a hospital, and South Dakota State University (2007/2008 enrollment: 10,938 – South Dakota State University, 2008).

Table 14 Demographic Characteristics of Facility Area

Area	Population (2000)	Estimated Population (2007)	Percent Minority	Median Household Income	Percent of Individuals Living Below Poverty
Argo Township	163	183	0	$47,083	10.1
Oak Lake Township	98	114	2.1	$31,750	0
Lake Hendricks Township	172	178	2.9	$38,750	6.5
Richland Township	195	214	1.5	$21,250	41.8
Sherman Township	175	194	0.6	$38,750	13.6
Blom Township	129	128	1.5	$26,500	21.7
Scandinavia Township	127	220	1.4	$20,417	14.3
Brookings County	**28,220**	**29,241**	**3.6**	**$35,438**	**14.0**
Deuel County	**4,498**	**4,259**	**1.5**	**$31,788**	**10.3**
South Dakota	**754,844**	**796,214**	**11.3**	**$35,282**	**13.2**

Source: US Census, 2000

17.1.2 COMMERCIAL AND INDUSTRIAL SECTOR

As stated above, the primary commercial activity in the Project area is agriculture. Brookings County's 962 farms (418,115 acres) produced a total market value of agricultural products of more than $97.5 million in the year 2002 (the latest year with available data), including $42.8 million in crops and $54.8 million in livestock, poultry, and related products (USDA, 2002). Approximately 58 percent of the land within the Project area is prime farmland.

Deuel County's 583 farms (327,617 acres) produced a total market value of agricultural products of more than $65.7 million in the year 2002, including $22.3 million in crops and $43.4 million in livestock, poultry, and related products (USDA, 2002).

17.1.3 TRANSPORTATION

17.1.3.1 Surface Transportation

The Project area is located to the north and south of State Highway 30, a paved, two-lane highway. This highway connects to Interstate 29 approximately 6 miles west of the City of White, and to Minnesota State Highway 19 approximately 3 miles east of the Project. Data for 2007 shows that the annual average daily traffic along State Highway 30 is 740 vehicles, 108 of which are heavy trucks (South Dakota Department of Transportation, 2007). Numerous gravel and unimproved dirt roads provide access to various portions of the Project area. Most vehicular traffic is limited to local commuters and farm equipment. Table 15 lists roads within the Project area.

Table 15 Area Roads

County	Road	Condition
Brookings, Deuel	478th Avenue	Paved Asphalt
Brookings, Deuel	474th Ave., 475th Ave., 476th Ave., 477th Ave., 479th Ave., 480th Ave., 481st Ave., 482nd Ave., 483rd Ave..	Gravel with Class-5 Surface
Brookings	484th Ave., 485th Ave.	Gravel with Class-5 Surface
Brookings	State Highway 30	Paved Asphalt
Brookings	197th St. (County Road 40)	Paved Asphalt
Brookings	200th St. (County Road 44)	Paved Asphalt
Deuel	State Highway 28	Paved Asphalt
Deuel	195th St.	Gravel with Class-5 Surface
Brookings and Deuel	196th St	Gravel with Class-5 Surface
Brookings	198th St., 199th St., 201st St., 202nd St., 204th St., 205th St., 206th St.,207th St.	Gravel with Class-5 Surface

17.1.3.2 Aviation

There are no regional or municipal airports in the vicinity of the Project. The closest airport is in Brookings, approximately 12 miles southwest of the Project. This airport provides regular commercial service, as well as private and charter plane service. Other (small) airfields accommodating small single engine planes are located near Clear Lake, Flandreau, and Arlington, South Dakota. These airports are located more than 15 miles from the Project. No evidence of any private airstrips was found within the Project area during site visits, on USGS topographic maps, or on aerial photos.

17.1.4 CULTURAL RESOURCES

Appendix G discusses the cultural resources literature review that has been performed for the Project; a summary follows.

In May, August and October 2008 the Applicant sponsored a desktop review of existing cultural resources records on file at:

- the South Dakota Archaeological Research Center (ARC) (134 locations)
- the South Dakota State Register of Historic Places (0 locations), and
- the National Register of Historic Places (0 locations).

Previous cultural resource surveys within the Project footprint identified 21 resources and 2 probable resource locations. The 23 resources include:

- 18 Native American artifact scatters and/or isolated finds. Fourteen of these resources have been recommended or determined through consensus to be not eligible for listing on the National Register of Historic Places (NRHP). Four have not been evaluated for listing on the NRHP;
- Two historic-period, Euro-American artifact scatters and/or foundations. One of these resources has been recommended or determined through consensus to be not eligible for listing on the NRHP. The other has not been evaluated for listing on the NRHP;
- One reported faunal/Paleontological location of unknown origin. It has not been evaluated for listing on the NRHP;
- One probable stone circle location that has not been confirmed, and;
- One probable location of a group of earthworks reported in the *T.H. Lewis Notes for Brookings County.*

Standing structures locations in the Project footprint were previously inventoried, and some were evaluated for listing on the NRHP. These 111 structure locations, each recorded with a binomial as an individual structure or as a distinct, cohesive unit, illustrate a typical cross-section of rural, Euro-American functional types, including:

- 73 agricultural/subsistence locations, each not yet evaluated for listing on the NRHP;
- 20 commercial/residential locations, namely nine in the town of Toronto (one is eligible) and 11 in nearby Astoria (two are eligible);
- 13 bridges, namely one recommended or determined through consensus to be eligible for listing on the NRHP, nine recommended or determined through consensus to be not eligible for listing on the NRHP, and three not yet evaluated for listing on the NRHP;
- Three domestic locations, each not yet evaluated for listing on the NRHP, and
- Two educational locations not yet evaluated for listing on the NRHP.

The NRHP-eligible bridge is shown on Figure 12a.

17.2 SOCIOECONOMIC AND COMMUNITY IMPACTS

17.2.1 COMMUNITY IMPACTS

Construction impacts to social and economic resources should be short-term. Revenue will increase for some local businesses, such as hotels, restaurants, gas stations, and grocery stores, due to Project construction workers. Other local businesses such as ready-mix concrete and gravel suppliers, hardware stores, welding and machine shops, packaging and postal services, and heavy equipment repair and maintenance service providers will also likely benefit from Project construction. Impacts to social services will be unlikely because of the short-term nature of the construction Project.

Project wind farm construction crews will total nearly 82-102 personnel at peak, with an additional 28 personnel needed for installation of the 115kV transmission line. The estimated number of personnel per construction job class for the wind farm construction is as follows:

- Carpenter Journeyman- 4-6 persons
- Carpenter Foreman- 2-3 persons
- Operator- 28-32 persons
- Crawler Operator (for larger cranes)- 4-6 persons
- Oiler- 3-4 persons
- Operator Foreman- 5-6 persons
- Iron Worker- 12-14 persons
- Laborer- 6-8 persons
- Laborer Foreman- 2-3 persons
- Millwright- 12-14 persons
- Millwright General Foreman- 2-3 persons

The estimated number of personnel per class for construction job classifications related to the installation of the 115 kV transmission line are as follows:

- General Foreman- 1 person
- Foreman- 3 persons
- Lineman- 10 persons
- Operator- 4 persons
- Groundwater/Truck driver- 5 persons
- Groundman- 5 persons

Public requests for proposals will be issued to qualified contractors near the Project. With the demand for qualified wind operations and maintenance workers at a peak across the country, the Applicant anticipates that there will not be enough trained people to fill the available number of jobs. From its experience constructing the adjacent MinnDakota project, the Applicant gained experience with hiring local personnel with relevant skills from different industries and training them to work on wind projects. The Applicant has found that hiring people with roots in the community increases the chance that they are going to be satisfied employees. The estimated monthly payroll will be approximately $1 million to $1.5 million during the peak construction period for the wind farm portion of the Project. The monthly payroll will be approximately $250,000 to $400,000 during the peak construction period for the 115 kV transmission line portion of the Project. Construction workers will likely reside in nearby houses or motels. All construction work is anticipated to be completed as early as December 2010.

Construction activities for this Project will be short-term. Therefore, no long-term impact from construction to the socioeconomics of the area is expected; any short-term effects likely will be beneficial to local businesses.

Fire services for the Project area are provided by Brookings County volunteer fire departments located in White, Brookings, Volga, Estelline, Aurora, Toronto, and Astoria. Turbine access roads will improve emergency access to the Project area. Appropriate precautions, including lightning protection and grounding, will be used to minimize the creation of additional fire risk in the Project area. Upon completion of the Project, Buffalo Ridge II LLC, will provide information and on-site training to the local fire departments, and will mark each WTG with a 9-1-1 identification sign.

The Project will have no lasting adverse impact on the industrial sector, housing, labor market, health facilities, sewage and water systems, existing energy facilities, solid waste facilities, schools, law enforcement, other community and government facilities, or any recreation facilities. The Project will have no impact on population, overall occupation distribution, or the integration and cohesion of communities.

There will be some long-term beneficial impacts from the Buffalo Ridge II Wind Farm. These benefits include an increase to the state's tax base resulting from the incremental increase in revenues from property taxes, which are based on the value of the facilities. Taxes will be paid based on compliance with all applicable South Dakota and county statutes and regulations. Additionally, participating landowners will receive upfront payments based on the number of turbines on their property, as well as ongoing annual payments through the life of the Project. The availability of reliable renewable power in the area will also have a positive effect on local businesses and the quality of service provided to the public. This increase in locally generated power will come with no, or insignificant, impacts to

the local environment, as compared to fossil-based power sources. Additionally, operation and maintenance of the Project will result in several long-term positions, which will likely have a positive impact on income levels in the Project area. The estimated monthly payroll for the first 10 years of operation is estimated to be approximately $750,000 to $1 million in 2010 dollars. Table 16 provides a breakdown of long-term positions by job classifications. These positions will remain steady through at least the first 10 years of operation.

Table 16 Estimated Operation and Maintenance Job Classifications

Job Classification	Number of positions
Construction Supervisor	1
Administrative Assistant	1
Purchasing Agent	1
Operations & Maintenance Technicians	15-20

17.2.2 COMMUNITY SAFETY

Construction of windpower facilities, as with other facilities, will lead to the generation of various types of waste: packaging, equipment parts, litter, and debris generated by site clearing. Removal of such material will be accomplished in a timely manner. Similarly, ongoing operation and maintenance of these facilities results in the generation of various waste products. This may include worn parts and packaging of new parts. All such material shall be removed from the site and managed in an appropriate manner.

Operation and maintenance of wind power facilities will result in the generation of some hazardous materials; primarily used lubricating materials. All such material shall be removed from the site and managed in a manner consistent with all appropriate rules and regulations, including any necessary coordination with local and state agencies.

17.2.3 PROPERTY VALUES

Wind Farm Facility

There is limited literature available on the effect of wind farms on property values. A 2002 study of a proposed wind farm in Kittitas County, Washington, indicated that the proposed wind farm will not negatively impact property values in the vicinity, as did a 2005 study that reviewed property transactions in the vicinity of wind farms in the State of Wisconsin (Poletti and Associates, 2005; EcoNorthwest, 2002). A 2003 study that reviewed sales data for properties in the vicinity of wind farms (Sterzinger et al, 2003) showed a small positive correlation in the value of properties sold within 5 miles of wind developments when compared to properties sold in comparable communities. A 2006 study done on the potential impacts of the visibility of wind turbines on property values in Madison

and Oneida Counties, New York and Wayne and Somerset Counties, Pennsylvania, found no measurable effects of the presence of turbines in the viewshed on property values (Hoen, 2006). No significant effects (either positive or negative) on property values are anticipated as a result of the proposed Project.

115 kV Transmission Line

Property values for parcels of land crossed by or adjacent to the proposed 115 kV transmission line are not anticipated to measurably change. Literature reviews indicate that although value losses up to 20 percent have been reported (EPRI, 2003); study results are highly dependent on methodology and location. Numerous studies have found that property values in parcels neighboring transmission lines are more dependent on traditional assessment categories, such as location, house size, and amenities, than on the presence of a transmission line. Impacts are the greatest for agricultural lands where the transmission lines interfere with cultivating paths and spraying practices, high-end vacation properties, and small homesteads. Loss of value for residential parcels primarily results from concern about health and visual impacts. However, impacts typically diminish within 10 years of transmission line construction. Positive impacts to property values can occur when transmission line ROWs are allowed to be cultivated or developed into recreational areas (Cowger, 1996 and Wisconsin Public Service Commission, 2000). No long-term impacts to property values as a result of the construction of the 115 kV line are anticipated.

17.2.4 AGRICULTURAL IMPACTS

Existing agricultural land will be taken out of crop and forage production by the proposed Project, primarily areas around WTG foundations, access roads, and electric collection and interconnection facilities. Agricultural activities may occur up to the edge of access roads and turbine pads. The buried underground collection system will not alter agricultural activities. The 115 kV transmission line structures will be placed near the field edge, minimizing impacts to agriculture. It is estimated that approximately 67 acres of tilled agricultural land will be permanently impacted, which constitutes less than 1 percent of the total cultivated cropland in the Project area, and less than 0.1 percent of the total 418,115 acres of cropland in Brookings County. The magnitude of the loss of farmland is small relative to the total acres of farmable acreage in the county.

17.2.5 TRANSPORTATION IMPACTS

17.2.5.1 Ground Transportation

The Project area consists of state and county highways and local two-lane roads. During construction, it is anticipated that several types of light, medium, and heavy-duty construction vehicles will travel to and from the site, as well as private vehicles used by the construction personnel. That volume will

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 will be removed from the site or reduced in number.

The Project will 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 the South Dakota Department of Transportation, Brookings and Deuel Counties, and townships to obtain the appropriate access and use permits, as well as minimize and mitigate any impacts to area transportation.

17.2.5.2 Air Traffic

The Project will require review by the FAA and the South Dakota Aeronautics Commission, which will assure that the Project does not cause significant impacts to air traffic. The Applicant will light the turbines to comply with FAA requirements. A preliminary lighting plan currently being reviewed by the FAA shows the lights at the ends of strings as well as lights approximately every half a mile within strings. The final layout will be submitted to the FAA for approval prior to construction. The Applicant will provide the SDPUC a copy of the No Hazard letters received from the FAA.

17.3 CULTURAL RESOURCE IMPACTS

The Applicant will physically avoid all previously recorded resources (listed in the Appendix G tables) 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 inventory for and evaluation of archaeological properties that may exist within proposed construction limits in the Project footprint. This archaeological investigation, contracted to the Archaeology Laboratory, Augustana College (ALAC), is ongoing and will be documented in a technical report that will meet state and federal technical standards (Archaeology Laboratory, Augustana College 2008). The Applicant directed the ALAC to document each resource's integrity and significance and, with this information, recommend resources eligible for listing on the NRHP.

The Applicant will make every effort to physically avoid all identified potentially eligible resources. Should the Applicant identify a coincidence among construction or operations limits and a known resource, the Applicant will engage the ARC and the South Dakota Historic Preservation Office in writing, requesting them to review the ALAC's recommendations regarding NRHP eligibility and work with the Applicant to resolve the coincidence.

This resolution may include, but should not necessarily be limited to, the following actions:

- Development of construction or operations measures to avoid the resource;
- Development of construction or operations best management practices to minimize impact to the resource, or;
- Development of a field investigation plan to recover data from the resource that may be lost due to construction or operations activities.

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

See Section 17.2.1.

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

There are neither future additions nor modifications planned for this Project. As noted in Section 5.1, it is possible that not all of the turbine locations shown in the current layout will be built at the same time. The Applicant is currently in the development phase of another wind project, adjacent to and north of the Buffalo Ridge II Project, and it is possible that some of the turbine locations shown in this application will ultimately be built as part of that northern project. If that is the case, those turbines would be permitted for that future project through the SD PUC, if applicable, and through the appropriate county permitting processes.

20.0 ALTERNATIVE ENERGY SOURCES (ARSD 20:10:22:30)

Buffalo Ridge II LLC's only focus is the business of developing and operating wind energy facilities. Therefore, no other alternate energy sources were considered for development. As Section 6.0 (Alternative Sites) describes, the proposed site has been selected as a prime site for wind energy resources. Regional utilities rely on many other energy generation sources (coal, nuclear, hydroelectric, natural gas, oil), but are now also focusing on renewable resources, like wind energy. Some states, including Minnesota and South Dakota, have renewable portfolio standards that mandate targets for renewable energy. The Project proposed by Buffalo Ridge II LLC in this application is a response to the general increase in demand for renewable energy production.

21.0 DECOMMISSIONING OF WIND ENERGY FACILITIES

Buffalo Ridge II LLC has entered into up to 40-year lease agreements for placement of the WTGs and associated infrastructure with private landowners within the Project area. Buffalo Ridge II LLC is submitting this decommissioning and restoration plan (Appendix H) for the Buffalo Ridge II Wind Project to Brookings County. This plan has been prepared in accordance with the requirements of

Brookings County Zoning Ordinance, Article 23.09. If the final layout includes infrastructure within Deuel County, decommissioning will comply with requirements of Deuel County Zoning Ordinance, Section 1215, Part 9. Buffalo Ridge II LLC anticipates that the life of the Project will be no less than 20 years and reserves the right to 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 (this is called "repowering").

Appendix H shows more detail on decommissioning of the Project. In the event that Buffalo Ridge II LLC decides to decommission the Buffalo Ridge II Wind Project instead of repowering, it will advise the Brookings and Deuel (if applicable) County Zoning Offices of the planned decommissioning activities. Buffalo Ridge II LLC will begin decommissioning the facility within 8 months from the time the facility ceases to operate. Decommissioning will be completed within 18 months from the time the facility ceases to operate. Buffalo Ridge II LLC will be responsible for all costs to decommission the Project and associated facilities.

To the extent that there is an industry standard, decommissioning costs are estimated to be approximately $90,805 per turbine in current dollars. At the current scrap steel price of approximately $230 per ton and the past 20-year historical average of $106 per ton, the salvage value per turbine is estimated at approximately $79,355.

Therefore, it is anticipated that the total decommissioning costs of the Buffalo Ridge II Wind Farm will be essentially covered by the salvage value of recovered Project components. Note that these values are based on 2008 costs and do not assume any inflation costs or other mark-up fluctuations.

Decommissioning will involve removal of all wind facilities including towers, turbine generators, transformers, overhead and underground cables, foundations, buildings, and ancillary equipment down to a depth of about 4 ft below grade. All access roads will be removed unless the affected landowner provides written notice that the road or portions of the road will be retained. Any exceptions to complete removal of the Project components will be recorded with the Brookings and Deuel (if applicable) County Zoning Offices. Additionally, any disturbed surface will be graded, reseeded, and restored as nearly as possible to its preconstruction condition within eighteen months of Project decommissioning.

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

22.1.1 WIND FARM FACILITY

Reliability

Reliability is defined as the ability of the turbine to generate electricity when sufficient wind is available. Gamesa has a worldwide warranted reliability of 97 percent, with estimated actual reliability of 98 percent. Suzlon has a higher than 95 percent reliability on average. As of June 2008, over 8,500 GE 1.5 MW turbines were in use worldwide, with more than 5,200 installed in the U.S and a reliability greater than 98 percent. Reliability numbers for the 2.4 MW Mitsubishi turbines are unavailable at the time of this application because there are few of them currently installed and operating; however, they are anticipated to be within similar ranges (95 to 98 percent), based on other Mitsubishi turbine records.

Safety

The Project site is located in an area of low population density. Construction and operation of the Project will have minimal impacts on the security and safety of the local populace. 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 roadways and homesteads per the applicable County Zoning requirements.
- 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, including those of the American National Standards Institute (ANSI).
- 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.
- All turbines will be listed in the Brookings County 9-1-1 system and Deuel County's 9-1-1-system, as applicable.

22.1.2 115 kV TRANSMISSION LINE

Reliability

As part of the studies done for Interconnection Agreement with Xcel Energy, the Applicant determined that the proposed 115 kV transmission line system was the optimum method of reliably transmitting the power generated by the proposed wind farm facility into the MISO grid. Factors considered in this decision included energy losses, reliability and cost. In addition, the selected option will accommodate a future interconnection of an additional wind project, of 170MW, utilizing the Buffalo Ridge II right of way, and transmission poles.

Safety

Proper safeguards will be implemented for construction and operation of the facility. The facility will be designed with the local, state, and NESC standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials, and ROW widths. Construction crews will comply with local, state, and NESC standards regarding installation of facilities and standard construction practices. Industry safety procedures will be followed during and after installation of the transmission line. This will include clear signage during all construction activities.

The proposed transmission line will be equipped with protective devices to safeguard the public from the transmission line should an accident occur and a structure or conductor fall to the ground. The protective devices are breakers and relays located where the transmission line connects to the substation. The protective equipment will de-energize the transmission line should such an event occur. In addition, the substation will be fenced and access limited to authorized personnel. The costs associated with these measures have not been tabulated separately from the overall facility costs since these measures are standard practice for the Applicant.

Stray Voltage

Electric current flows through the earth at each point where the electrical system is grounded. Stray voltage is a natural phenomenon that is the result of low levels of electrical current flowing between two points that are not directly connected. Electrical systems, including farm systems and utility distribution systems, must be adequately grounded to the earth to ensure continuous safety, reliability and to minimize this current flow. If the ground connection is not strong enough, a small voltage can develop between ground points. This voltage is called neutral-to-earth voltage (NEV). Stray voltage is the result of a person or animal coming in contact with NEV. Stray voltage does not cause electrocution and is not related to ground currents, EMF or earth currents.

Stray voltage is a particular concern for dairy farms because it can impact operations and milk production. Problems are usually related to the distribution and service lines directly serving the farm

or the wiring on a farm affecting confined farm animals. In those instances when distribution lines have been shown to contribute to stray voltage, the electric distribution system directly serving the farm or the wiring on a farm was directly under and parallel to the transmission line. These circumstances are considered in installing transmission lines and can be readily mitigated. Problems related to distribution lines are also readily managed by correctly connecting and grounding electrical equipment.

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

23.1 PERMITS AND APPROVALS

The Project must comply with federal, state and local laws requiring permits or approvals. Table 17 lists the permits and approvals that are anticipated as part of the Project.

Table 17 List of Potential Permits or Approvals

Agency	Permit/Approval	Description	Status
US Fish and Wildlife Service (USFWS)	Threatened and Endangered Species - Section 7 Consultation	Determination of effect on federally listed species	Formal consultation is unlikely, but may be necessary if a road crossing of a Topeka shiner stream is proposed. Informal coordination ongoing
	Temporary Right of Way Access	Required for temporary disturbance in grassland easements	To be determined if necessary
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 ft	Ongoing
U.S. Army Corps of Engineers (USACE)	Section 404 Permit	Complete an application under the Clean Water Act for impacts to wetland and waters of the U.S.	Unlikely, but to be determined once layout is finalized
US Department of Agriculture (USDA)	Conservation Reserve Program (CRP) Coordination	Coordinate with the USDA regarding project facilities in CRP parcels	To be determined once layout is finalized
	USDA Loan Coordination	Coordinate with the USDA regarding project facilities in parcels under USDA loans	To be determined if necessary
Native American Tribes	Section 106 Consultation	Determination of effect on Native American cultural resources	Not anticipated unless individual Section 404 permit is needed from the USACE
SD State Historic Preservation Office (SHPO)	Section 106 Consultation	Determination of effect on archaeological and historical resources	Not anticipated unless individual Section 404 permit is needed from the USACE
SD Public Utilities Commission (PUC)	Energy Facility Site Permit	Application required for facilities with nameplate capacity greater than 100 MW	Submitted October 2008

Agency	Permit/Approval	Description	Status
SD Game, Fish, and Parks Department	Coordination	Coordination as part of SD PUC process	Ongoing
SD Department of Environment & Natural Resources (DENR)	401 Water Quality Certification	Complete an application under the Clean Water Act, only if Individual Permit required for Section 404	Not anticipated unless individual Section 404 permit is needed from the USACE
	General Storm Water Permit for Construction Activities (NPDES)	Stormwater permit required for construction activities	SWPPP will be prepared and NOI will be submitted after final design is complete
	Temporary water use permit for construction activities	Temporary permits for the use of public water for construction, testing, or drilling purposes; issuance of a temporary permit is not a grant of a water right	If necessary, will be obtained prior to construction
	General Permit for Temporary Dewatering	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 Aeronautics Commission	Aeronautical Hazard Permit	Permit lighting plan determined with FAA coordination	Ongoing
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	Ongoing
SD Department of Transportation (DOT)	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	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 after final design is complete

Agency	Permit/Approval	Description	Status
Brookings County	Conditional Use Permit (CUP)	Required by Brookings County	To be submitted Fall 2008
	Building Permit for each Turbine	Required by Brookings County	Will be obtained after final design is complete
	County Road Driveway Permit	Permit required for any access roads abutting county roads	Will be obtained after final design is complete
	County Highway ROW Occupancy	Permit required for use within county roads' ROW	Will be obtained after final design is complete
	Utility Permit for Feeder Lines Crossing Road Right of Ways	Permit required for any utility crossing of county roads	Will be obtained after final design is complete
	Soil Erosion and Sediment Control Plan Approval	Possibly required; varies by county	Will be obtained after final design is complete
	Application for Permit to Move Loads on Restricted Highways	Permit required for heavy equipment transport over restricted county highways during construction	Will be obtained after final design is complete
Deuel County	Wind Energy System Permit (WES)	Required by Deuel County	To be submitted Fall 2008
	Building Permit for each Turbine	Required by Deuel County	Will be obtained after final design is complete
	County Road Driveway Permit	Permit required for any access roads abutting county roads	Will be obtained after final design is complete
	County Highway ROW Occupancy	Permit required for use within county roads' ROW	Will be obtained after final design is complete
	Utility Permit for Feeder Lines Crossing Road Right of Ways	Permit required for any utility crossing of county roads	Will be obtained after final design is complete
	Soil Erosion and Sediment Control Plan Approval	Possibly required; varies by county	Will be obtained after final design is complete
	Application for Permit to Move Loads on Restricted Highways	Permit required for heavy equipment transport over restricted county highways during construction	Will be obtained after final design is complete
Townships	Township Road Access	Possible permit required for township road access	Will be obtained after final design is complete

23.2 AGENCY CONSULTATION AND PUBLIC SCOPING PROCESS

The Applicant has consulted with various local, state, and federal agencies to identify agency concerns regarding the proposed Project (Appendix C). The agencies were notified in October 2008 of the

recent project boundary change; however, no responses have been received to date. The Applicant will continue working with the agencies to address any comments they may have on the expanded boundary.

Several landowner meetings have been held to discuss the Project. Landowner meetings were held in the City of White on May 1 and July 8, 2008. Updated maps of the Project were provided to landowners via a mailing in August 2008. Additional opportunities for public and agency comments will be held as part of the review process for this application for a Facility Permit, as well as for the Brookings County Conditional Use Permit.

23.3 PUBLIC AND AGENCY COMMENTS

Agency comments (telephone conversations, email and letter replies), as well as oral and written comments received at the landowner meetings, are summarized below and grouped by subject. Representatives of Buffalo Ridge II LLC and HDR Engineering recorded comments received at the landowner meetings.

Layout

Several comments at the landowner meetings addressed what criteria would be used to determine which turbines will be selected for final construction. Other landowners had comments about specific access road alignments on their property. Criteria that may be used to determine final turbine layout are addressed in Sections 8.0, 10.0 and 17.0.

Biological Resources

The USFWS and GFP provided comments on the Project, particularly on its potential to impact avian, bat, and special status species. Project impacts on biological resources are addressed in Sections 10.0 and 11.0.

Telecommunications

ITC responded by telephone to the Applicant's comment letter, and requested that a map of the Applicant's proposed underground and overhead electrical alignments be sent to them for review. The Applicant sent the map to ITC, and a conference call was held on June 17, 2008 to discuss ITC's initial comments. ITC's comments focused on the southern portion of the Project boundary, where some of the Project's facilities would parallel ITC's copper wire infrastructure, with the potential for interference. Project impacts on telecommunications are addressed in Section 12.2.4.

Land Use and Grasslands

The Applicant received a comment from the USFWS and a landowner about the possibility of building WTGs within a USFWS grassland. At this time, the layout does not impact lands in USFWS grassland easements. Project impacts on these resources are discussed in Sections 10.2.1.

Lighting

The South Dakota Aeronautics Commission responded to the Applicant's letter requesting comment, with recommendations regarding turbine lighting. The applicant is coordinating with the FAA and the SDAC regarding the final lighting plan for the project Lighting for the Project is discussed in Section 17.2.5.1.

Socioeconomics

Many landowners expressed support for this project, and had specific questions about easements. Other comments requested that their land holdings be considered for WTG placement. Project impacts on socioeconomics are discussed in Section 17.2.

Cultural Resources

The SD SHPO responded to the Applicant's letter requesting comment, with recommendations for the cultural resources survey. Project impacts on cultural resources are discussed in Section 17.3.

23.4 APPLICANT'S BURDEN OF PROOF – 49-41B-22

As described in the Executive Summary, in this Application the Applicant has addressed all matters set forth in SDCL Chapter 49-41B and in ARSD chapter 20:10:22 (entitled 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 all applicable laws and rules.
- The facilities 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 facilities will not substantially impair the health, safety, or welfare of the inhabitants.
- The facilities 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.

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

24.1 LIST OF PREPARERS

The following individuals contributed to this report:

Group	Individual	Title
Buffalo Ridge II LLC/Iberdrola Renewables, Inc	Tim Seck	Director, Wind Development
	Andy Linehan	Wind Permitting Director
	Paul Skurdahl	Midwest Director, Technical Services
	Sarah Emery	Senior Permitting Manager
HDR Engineering, Inc.	Joyce Pickle	Environmental Scientist
	Mike DeRuyter	Environmental Scientist
	Tim Casey	Noise Specialist
	Michael Madson	Cultural Resources Specialist
	Hong Spores	Hydrogeologist
	Anjali Malhoutra	GIS Specialist
	Jonathan Schubbe	Environmental Scientist
May, Adam, Gerdes and Thompson, LLP	Brett Koenecke	Attorney at Law
Western Ecosystems Technology	Clayton Derby	Wildlife Biologist
	Ann Dahl	Wildlife Biologist/GIS Specialist
Augustana College Archaeology Lab	William Ranney	Senior Archaeologist

24.2 APPLICANT VERIFICATION

Timothy Seck, being duly sworn, deposes and states that he is the Project Manager of the Buffalo Ridge II Project, and is the authorized agent of Iberdrola Renewables and Buffalo Ridge II LLC and is authorized to sign this application on behalf of the project owner and Applicant, Buffalo Ridge II LLC.

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

Dated this 24th day of October, 2008

Timothy Seck

Timothy Seck

Subscribed and sworn to before me this 24th day of October, 2008

Mary T. Snow

MARY T. SNOW
NOTARY PUBLIC-MINNESOTA
My Commission Expires Jan. 31, 2010

Notary Public
My Commission Expires:

24.3 DEFINITIONS AND ABBREVIATIONS

Applicant	Buffalo Ridge II LLC
AWEA	American Wind Energy Association
BMP	Best Management Practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CRP	Conservation Reserve Program
dB	Decibels
dBA	A-weighted decibel
DENR	South Dakota Department of Environment and Natural Resources
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FSA	Farm Service Administration
GFP	South Dakota Department of Game, Fish and Parks
m/s	meters/second
MISO	Midwest Independent System Operator
MW	megawatt
MWh/yr	megawatt hour per year
NAAQS	National Ambient Air Quality Standards
NPDES	National Pollution Discharge Elimination System

NPS	National Park Service
NRCS	Natural Resource Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NRI	National Rivers Inventory
NWI	National Wetlands Inventory
PPA	power purchase agreement
ROW	right-of-way
rpm	revolutions per minute
SD PUC	South Dakota Public Utilities Commission
SHPO	State Historic Preservation Office
SWPPP	Storm Water Pollution Prevention Plan
TSS	total suspended solids
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WES	Wind Energy System
WEST	Western Ecosystems Technology, Inc.
WPA	Waterfowl Production Area
WTG	wind turbine generator

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