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

Prevailing Wind Park, LLC

Prevailing Wind Park Energy Facility
Burns & McDonnell Project No. 104294

May 2018

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Bon Homme, Charles Mix, and Hutchinson Counties, South Dakota

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prepared by

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
ADT	Average Daily Traffic
AMSL	above mean sea level
Applicant	Prevailing Wind Park, LLC
ARSD	Administrative Rules of South Dakota
AWEA	American Wind Energy Association
BCC	Birds of Conservation Concern
BCI	Bat Conservation International, Inc.
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices
CadnaA	Computer Aided Design for Noise Abatement
COD	commercial operation date
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibels
DoD	Department of Defense
DOE	U.S. Department of Energy
EA	Environmental Assessment
ECPG	Eagle Conservation Plan Guidance
EERE	Office of Energy Efficiency & Renewable Energy
EIA	U.S. Energy Information Administration

Abbreviation	Term/Phrase/Name
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
GE	General Electric
GIS	Geographic Information System
GLO	General Land Office
GPA	Game Production Area
GW	gigawatt
HDR	HDR, Inc.
Hz	hertz
IEC	International Electrotechnical Commission
IPaC	Information for Planning and Conservation
IRAC	Interdepartmental Radio Advisory Committee IRAC
ISO	International Organization for Standardization
JPO	Joint Program Office
Ksat	saturated hydraulic conductivity
kV	kilovolt
kW	kilowatt
L_{90}	the sound level exceeded 90 percent of the time period

Abbreviation	Term/Phrase/Name
L_{eq}	equivalent-continuous sound level
LWES	Large Wind Energy Systems
L_x	exceedance sound level
m/s	meters per second
MBTA	Migratory Bird Treaty Act
Mph	miles per hour
MW	megawatt
MWh	megawatt-hour
NAAQS	National Ambient Air Quality Standards
NDVER	non-dispatchable variable energy resource
NEPA	National Environmental Policy Act
NESC	National Electric Safety Code
NLEB	northern long-eared bat
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NTIA	National Telecommunication Information Agency
NWCC	National Wind Coordinating Collaborative
NWR	National Wildlife Refuge
O&M	operations and maintenance

Abbreviation	Term/Phrase/Name
PEIS	Programmatic Environmental Impact Statement
PGA	peak ground acceleration
PLSS	Public Land Survey Section
PMU	phasor measurement units
PPA	Power Purchase Agreement
Prevailing Wind Park	Prevailing Wind Park, LLC
RD	rotor diameter
RF	radio frequency
Rpm	revolutions per minute
RPS	renewable portfolio standard
RUSLE	Revised Universal Soil Loss Equation
SCADA	supervisory control and data acquisition
SDARC	South Dakota Archaeological Research Center
SDCL	South Dakota Codified Laws
SDDENR	South Dakota Department of Environment and Natural Resources
SDDLR	South Dakota Department of Labor and Regulation
SDDOA	South Dakota Department of Agriculture
SDDOT	South Dakota Department of Transportation
SDGFP	South Dakota Game, Fish, and Parks
SDGS	South Dakota Geological Survey
SDPUC	South Dakota Public Utilities Commission
SGCN	Species of Greatest Conservation Need

Abbreviation	Term/Phrase/Name
SHPO	State Historic Preservation Office
sPower	sPower Development Company, LLC
SWPPP	Storm Water Pollution Prevention Plan
TCP	Traditional Cultural Properties
TMDL	total maximum daily load
TPWD	Texas Parks and Wildlife Department
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USLE	Universal Soil Loss Equation
WAPA	Western Area Power Administration
WCFZ	Worst Case Fresnel Zones
WEG	Wind Energy Guidelines
WEST	Western EcoSystems Technology, Inc.
WNS	white-nose syndrome
WPA	Waterfowl Production Area

COMPLETENESS CHECKLIST

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

Completeness Checklist

SDCL	ARSD	Required Information	Location
49-41B-11(1)	20:10:22:06	**Names of participants required.** The application shall contain the name, address, and telephone number of all persons participating in the proposed facility at the time of filing, as well as the names of any individuals authorized to receive communications relating to the application on behalf of those persons.	Section 4.0
49-41B-11(7)	20:10:22:07	**Name of owner and manager.** The application shall contain a complete description of the current and proposed rights of ownership of the proposed facility. It shall also contain the name of the project manager of the proposed facility.	Section 5.0
49-41B-11(8)	20:10:22:08	**Purpose of facility.** The applicant shall describe the purpose of the proposed facility.	Section 6.0
49-41B-11(12)	20:10:22:09	**Estimated cost of facility.** The applicant shall describe the estimated construction cost of the proposed facility	Section 7.0
49-41B-11(9)	20:10:22:10	**Demand for facility.** The applicant shall provide a description of present and estimated consumer demand and estimated future energy needs of those customers to be directly served by the proposed facility. The applicant shall also provide data, data sources, assumptions, forecast methods or models, or other reasoning upon which the description is based. This statement shall also include information on the relative contribution to any power or energy distribution network or pool that the proposed facility is projected to supply and a statement on the consequences of delay or termination of the construction of the facility.	Section 6.0
49-41B-11(2)	20:10:22:11	**General site description.** The application shall contain a general site description of the proposed facility including a description of the specific site and its location with respect to state, county, and other political subdivisions; a map showing prominent features such as cities, lakes and rivers; and maps showing cemeteries, places of historical significance, transportation facilities, or other public facilities adjacent to or abutting the plant or transmission site.	Section 8.0; Figures 1, 8, and 10 in Appendix A; Figures 2.1-2.11 in Appendix R

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

SDCL	ARSD	Required Information	Location
		sections to depict the major subsurface variations in the siting area; (4) A description and location of economic deposits such as lignite, sand and gravel, scoria, and industrial and ceramic quality clay existent within the plant, wind energy, or transmission site; (5) A description of the soil type at the plant, wind energy, or transmission site; (6) An analysis of potential erosion or sedimentation which may result from site clearing, construction, or operating activities and measures which will be taken for their control; (7) Information on areas of seismic risks, subsidence potential and slope instability for the plant, wind energy, or transmission site; and (8) An analysis of any constraints that may be imposed by geological characteristics on the design, construction, or operation of the proposed facility and a description of plans to offset such constraints.	
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 groundwater;	Section 12.0; Figure 8 in Appendix A

SDCL	ARSD	Required Information	Location
		(5) A description of designs for storage, reprocessing, and cooling prior to discharge of heated water entering natural drainage systems; and (6) If deep well injection is to be used for effluent disposal, a description of the reservoir storage capacity, rate of injection, and confinement characteristics and potential negative effects on any aquifers and groundwater users which may be affected.	
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:16	**Effect on terrestrial ecosystems.** The applicant shall provide information on the effect of the proposed facility on the terrestrial ecosystems, including existing information resulting from biological surveys conducted to identify and quantify the terrestrial fauna and flora potentially affected within the transmission site, wind energy site, or siting area; an analysis of the impact of construction and operation of the proposed facility on the terrestrial biotic environment, including breeding times and places and pathways of migration; important species; and planned measures to ameliorate negative biological impacts as a result of construction and operation of the proposed facility.	Section 13.0
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:17	**Effect on aquatic ecosystems.** The applicant shall provide information of the effect of the proposed facility on aquatic ecosystems, and including existing information resulting from biological surveys conducted to identify and quantify the aquatic fauna and flora, potentially affected within the transmission site, wind energy site, or siting area, an analysis of the impact of the construction and operation of the proposed facility on the total aquatic biotic environment and planned measures to ameliorate negative biological impacts as a result of construction and operation of the proposed facility.	Section 14.0
49-41B-11(2,11); 49-41B-22	20:10:22:18	**Land use.** The applicant shall provide the following information concerning present and anticipated use or condition of the land: (1) A map or maps drawn to scale of the plant, wind energy, or transmission site identifying existing land use according to the following classification system: (a) Land used primarily for row and nonrow crops in rotation; (b) Irrigated lands; (c) Pasturelands and rangelands; (d) Haylands; (e) Undisturbed native grasslands; (f) Existing and potential extractive nonrenewable resources;	Sections 15.0 and 20.0; Figure 9 in Appendix A

SDCL	ARSD	Required Information	Location
		(g) Other major industries; (h) Rural residences and farmsteads, family farms, and ranches; (i) Residential; (j) Public, commercial, and institutional use; (k) Municipal water supply and water sources for organized rural water systems; and (l) Noise sensitive land uses; (2) Identification of the number of persons and homes which will be displaced by the location of the proposed facility; (3) An analysis of the compatibility of the proposed facility with present land use of the surrounding area, with special attention paid to the effects on rural life and the business of farming; and (4) A general analysis of the effects of the proposed facility and associated facilities on land uses and the planned measures to ameliorate adverse impacts.	
49-41B-11(2,11); 49-41B-28	20:10:22:19	**Local land use controls.** The applicant shall provide a general description of local land use controls and the manner in which the proposed facility will comply with the local land use zoning or building rules, regulations or ordinances. If the proposed facility violates local land use controls, the applicant shall provide the commission with a detailed explanation of the reasons why the proposed facility should preempt the local controls. The explanation shall include a detailed description of the restrictiveness of the local controls in view of existing technology, factors of cost, economics, needs of parties, or any additional information to aid the commission in determining whether a permit may supersede or preempt a local control pursuant to SDCL 49-41B-28.	Section 16.0
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:20	**Water quality.** The applicant shall provide evidence that the proposed facility will comply with all water quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.	Section 17.0
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:21	**Air quality.** The applicant shall provide evidence that the proposed facility will comply with all air quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.	Section 18.0
49-41B-11(3)	20:10:22:22	**Time schedule.** The applicant shall provide estimated time schedules for accomplishment of major events in the commencement and duration of construction of the proposed facility.	Section 19.0

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

SDCL	ARSD	Required Information	Location
		remain within the county and the township in which the facility is located after construction is completed.	
49-41B-11(5)	20:10:22:25	**Future additions and modifications.** The applicant shall describe any plans for future modification or expansion of the proposed facility or construction of additional facilities which the applicant may wish to be approved in the permit.	Section 23.0
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 shall be included in the plan. The commission may require a bond, guarantee, insurance, or other requirement to provide funding for the decommissioning and removal of a wind energy facility. The commission shall consider the size of the facility, the location of the facility, and the financial condition of the applicant when determining whether to require some type of funding. The same criteria shall be used to determine the amount of any required funding.	Section 24.0
49-41B-11(2,11)	20:10:22:33.02	**Information concerning wind energy facilities.** If a wind energy facility is proposed, the applicant shall provide the following information: (1) Configuration of the wind turbines, including the distance measured from ground level to the blade extended at its highest point, distance between the wind turbines, type of material, and color; (2) The number of wind turbines, including the number of anticipated additions of wind turbines in each of the next five years; (3) Any warning lighting requirements for the wind turbines; (4) Setback distances from off-site buildings, right-of-ways of public roads, and property lines; (5) Anticipated noise levels during construction and operation; (6) Anticipated electromagnetic interference during operation of the facilities; (7) The proposed wind energy site and major alternatives as depicted on overhead photographs and land use culture maps; (8) Reliability and safety; (9) Right-of-way or condemnation requirements; (10) Necessary clearing activities;	Section 26.0

SDCL	ARSD	Required Information	Location
		(11) Configuration of towers and poles for any electric interconnection facilities, including material, overall height, and width; (12) Conductor configuration and size, length of span between structures, and number of circuits per pole or tower for any electric interconnection facilities; and (13) If any electric interconnection facilities are placed underground, the depth of burial, distance between access points, conductor configuration and size, and number of circuits.	
49-41B-22	N/A	**Applicant's burden of proof.** The applicant has the burden of proof to establish that: (1) The proposed facility will comply with all applicable laws and rules; (2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area; (3) The facility will not substantially impair the health, safety or welfare of the inhabitants; and (4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government	Section 3.0 and Section 27.4
49-41B-11	20:10:22:39	**Testimony and exhibits.** Upon the filing of an application pursuant to SDCL 49-41B-11, an applicant shall also file all data, exhibits, and related testimony which the applicant intends to submit in support of its application. The application shall specifically show the witnesses supporting the information contained in the application.	Section 28.0

1.0 INTRODUCTION

Prevailing Wind Park, LLC (Prevailing Wind Park or Applicant) is proposing to develop a wind energy facility (Prevailing Wind Park Project or Project) in Bon Homme, Charles Mix, and Hutchinson counties, South Dakota. The Project will consist of up to 61 wind turbines, with a nameplate capacity of 219.6 megawatts (MW). The Project Area is comprised of 50,364 acres of private land between the towns of Avon, Tripp, and Wagner (Figure 1 in Appendix A). Project components would include:

- Up to 61 wind turbines
- Access roads to each wind turbine
- Underground electrical power collector system and communications
- A collector substation
- Up to four permanent meteorological towers
- An operations and maintenance (O&M) facility
- Additional temporary construction areas, including crane paths, public road improvements, a laydown yard, and a concrete batch plant(s) (as needed)

The Project would interconnect with Western Area Power Administration's (WAPA's) existing Utica Junction Substation, located approximately 27 miles east of the Project. The Applicant is proposing to construct a new 115-kilovolt (kV) gen-tie line in Bon Homme and Yankton counties from the Project collector substation to the Utica Junction Substation. The gen-tie line is not under the jurisdiction of the SDPUC and will be permitted in Bon Homme and Yankton counties.

Prevailing Wind Park is a South Dakota limited liability company and a wholly owned subsidiary of sPower Development Company, LLC (sPower). sPower is an independent renewable energy company based in Salt Lake City, Utah. sPower is the largest private owner of operating solar assets in the United States. sPower owns and operates a portfolio of solar and wind assets greater than 1.3 gigawatts (GW) and has a development pipeline of more than 10 GW.. sPower has the experience, capabilities and personnel to successfully develop and operate the proposed Project.

2.0 PROJECT DEVELOPMENT SUMMARY

In October 2017, sPower acquired the Prevailing Wind Park, LLC assets and development rights to the Project from Prevailing Winds, LLC. Prevailing Winds, LLC was formed in 2014 by the same local group of investors that successfully developed the 80-MW B&H Wind Project (now Beethoven Wind Project). The local investors' goal was to build on B&H Wind's success and create additional sources of income for area landowners and economic growth for the local communities through wind energy. Development activities began with the preparation of an interconnection request with WAPA and Prevailing Winds, LLC's acquisition of the remaining B&H Wind assets. The assets included meteorological towers with over 5 years of continuous wind resource data, past WAPA interconnection and environmental studies, land leases, and the models used to study the wind resource in the area.

Prevailing Winds, LLC filed an application with the SDPUC in June 2016 for a 200-MW wind farm with up to 100 2.3-MW wind turbines. At that time, Prevailing Winds, LLC did not have all land rights secured for the Project and did not have an off-taker for the energy that would be produced. Prevailing Winds, LLC subsequently withdrew the application in August 2016. In its Motion to Withdraw Application Without Prejudice, Prevailing Winds, LLC explained it was "moving to withdraw the Application to allow Prevailing Winds to better inform the community on the wind project and allow Prevailing Winds to revisit its options regarding the project."

Since its October 2017 acquisition of the assets and development rights to the Project, Prevailing Wind Park has undertaken extensive development activities, consisting of landowner outreach and easement acquisition, detailed studies of resources in the Project Area, coordination with resource agencies, and design and refinement of the Project configuration.

Community Outreach and Land Acquisition: Prevailing Wind Park has obtained all of the private land rights necessary to construct the Project. Prevailing Wind Park held open house events for the community on December 13, 2017, and April 5, 2018. In addition, a landowner dinner was held on April 3, 2018.

Agency Coordination: The Applicant and its predecessor, Prevailing Winds, LLC, have coordinated with State and Federal agencies throughout Project planning and development. Coordination with the U.S. Fish and Wildlife Service (USFWS) and South Dakota Game, Fish, and Parks (SDGFP) has focused on protection of native grasslands; potential impacts to Endangered Species Act (ESA)-protected species including northern long-eared bat and whooping crane; and avian use of the Project Area, including bald eagles. Cultural resource survey work is being conducted in coordination with WAPA, which is the lead Federal agency for compliance with the National Environmental Policy Act (NEPA) and Section 106 of

the National Historic Preservation Act of 1966, including tribal consultation (as discussed further in Section 3.1 below).

County Permitting: The Applicant conducted pre-application meetings in Bon Homme, Charles Mix, and Hutchinson counties in December 2017 (Bon Homme) and April 2018 (Bon Homme, Hutchinson, and Charles Mix). The Applicant will apply for county permits beginning in the second quarter of 2018. County permitting is discussed in Sections 16.0 and 27.1.

Purchase Agreement: In January 2018, Prevailing Wind Park entered into a 30-year power purchase agreement (PPA) with a South Dakota load serving entity. The PPA provides that the Project is to supply energy at the end of 2019.

Project Design: The results of the various studies and coordination activities listed above have been used to inform the site layout and design of the Project. Final micrositing of Project facilities is expected to occur in late 2018, based on the results of the completed cultural resource investigations, geotechnical analysis, and final engineering design. The remaining study work is not anticipated to affect the environmental analysis set forth in this Application, nor will it prevent the Project from meeting all applicable local, State and Federal permitting requirements.

Environmental Analysis: The environmental studies, technical studies, and surveys for the Prevailing Wind Park Project are listed below in Table 2-1.

Table 2-1: Environmental Studies and Surveys for the Prevailing Wind Park Project

Study	Dates	Status
Tiers 1 and 2 Report	June 2016	Complete
Raptor Nest Survey	April 2016	Complete
Avian Use Surveys – Year One	March 2015-February 2016	Complete
Avian Use Surveys – Year Two	May 2016-April 2017	Complete
Whooping Crane Habitat Review	August 2016	Complete
Bald Eagle Nest Monitoring	March-July 2015 May-September 2016	Complete
Bird and Bat Conservation Strategy	May 2018	Complete
Northern Long-Eared Bat Acoustic Survey	July-August 2015	Complete
Northern Long-Eared Bat Presence/Absence Survey	July-August 2016	Complete
Rare Plant Habitat Assessment	May-June 2018	In process
Native Grassland Field Verification	May-June 2018	In process

Study	Dates	Status
Wetland Desktop Determination	March 2018	Complete
Wetland Field Delineation	May-June 2018	In process
Cultural Resources Literature Search	April 2018	Complete
Cultural Resources Desktop Review and Construction Grid	April 2018	Complete
Cultural Resources Archeological Survey	June-July 2018	Pending
Historical/Architectural Survey	June-July 2018	Pending
Engineering Report on Effects to FCC-Licensed RF Facilities	April 2016	Complete
Sound Study	April 2018	Complete
Shadow Flicker Analysis	May 2018	Complete

3.0 FACILITY PERMIT APPLICATION

In accordance with SDCL Chapter 49-41B and ARSD Chapter 20:10:22, the Application provides information on the existing environment, potential Project impacts, and proposed avoidance, minimization, and/or mitigation measures for the following resources:

- Physical (geology, economic deposits, soils)
- Hydrology (surface water and groundwater)
- Terrestrial ecosystems (vegetation, wetlands, wildlife, threatened and endangered species)
- Aquatic ecosystems
- Land use (agriculture, residential, displacement, sound, aesthetics, electromagnetic interference, safety and health, real estate values)
- Water quality
- Air quality
- Communities (socioeconomics, transportation and emergency response, cultural resources)

3.1 Relationship to NEPA

WAPA is preparing an Environmental Assessment (EA) for the Project interconnection in accordance with the applicable requirements and standards of NEPA. The proposed interconnection of the Project to WAPA's transmission system is a Federal action under NEPA. In order to execute an interconnection agreement to connect the Project to WAPA's existing Utica Junction Substation, WAPA must analyze the potential environmental impacts of the wind facility and gen-tie line under NEPA. While WAPA must analyze impacts of the entire wind facility and gen-tie line, WAPA's Federal action is limited to the approval of the interconnection. Siting authority approval for the Project remains with the State and counties.

The EA will tier off the analysis conducted in the *Upper Great Plains Wind Energy Final Programmatic Environmental Impact Statement* (PEIS), prepared jointly by WAPA and the USFWS (WAPA and USFWS, 2015). The PEIS assesses environmental impacts associated with wind energy development and identifies management practices to address impacts. The EA for the Prevailing Wind Park Project would focus on site-specific issues that are not already addressed in sufficient detail in the PEIS. The EA is currently being prepared, and Prevailing Wind Park anticipates that WAPA will approve a final EA and issue a Finding of No Significant Impact (FONSI) in fourth quarter 2018.

3.2 Summary of Potential Impacts

Following is a summary of the potential impacts that could result from construction and operation of the Project.

Approximately 45 acres of permanent disturbance, representing less than 0.1 percent of the total acreage within the Project Area, would be broadly dispersed throughout the Project Area. Therefore, the Project is not expected to cause major changes in storm water runoff patterns or volume of runoff, nor is it expected to have adverse impacts on existing hydrology. Existing hydrology and potential impacts are discussed in Section 12.0.

The Project has avoided locating facilities in wetland areas, to the extent practicable. Wind turbines and access roads are generally located in upland areas, avoiding low-lying wetlands and drainage ways. Based on a desktop wetland determination, the Project would potentially result in permanent impacts to two wetlands (0.0042 acre and 0.0002 acre of impacts) and would cross three intermittent streams (62.4 linear feet of stream segments). Wetland and stream impacts would be authorized in compliance with Section 404 of the Clean Water Act (CWA). Information on existing wetlands and potential impacts are discussed in Section 13.3.

The majority of land proposed to be disturbed by the Project in the long-term is cropland (64 percent) and hayland (22 percent). Only approximately 1 acre (2 percent) of long-term Project disturbance would occur in potential untilled grasslands. Construction of Project facilities in cropland or hayland is not expected to negatively affect terrestrial ecosystems. Best Management Practices (BMPs) would be utilized to avoid or reduce impacts to the vegetation and water resources of the Project Area during construction. Existing vegetation resources and impacts are discussed in Section 13.1.

Eight species listed as threatened or endangered under the ESA have been documented in Bon Homme, Charles Mix, and/or Hutchinson counties: pallid sturgeon (*Scaphirhynchus albus*), Topeka shiner (*Notropis topeka*), interior least tern (*Sterna antillarum athalassos*), whooping crane (*Grus americana*), red knot (*Calidris canutus rufa*), piping plover (*Charadrius melodus*), northern long-eared bat (*Myotis septentrionalis*), and western prairie fringed orchid (*Pratanthera praceclara*). Five of these species have the potential to occur in the Project Area during some portion of the year: interior least tern, whooping crane, northern long-eared bat, red knot, and piping plover. The interior least tern, red knot, whooping crane, and piping plover could migrate through the Project Area during the spring and fall but are otherwise not expected to occur in the Project Area. The Project Area is located within the 95 percent migration corridor when considered specific to South Dakota; however, there have been no confirmed

whooping crane sightings within the Project Area as of spring 2018. The Project Area is within the defined range of the northern long-eared bat, and the species could be present during the summer breeding period. The pallid sturgeon and Topeka shiner are federally listed fish species but have not been documented within the Project Area. The Project Area is also within the range of the federally listed western prairie fringed orchid; however, this species is believed to be extirpated from South Dakota and has not been observed in the Project Area. Sections 13.0 and 14.0 describe existing fish, wildlife, and plant resources and potential impacts to terrestrial and aquatic species. One federally listed species, northern long-eared bat, was qualitatively identified in the Project Area during analysis of acoustic survey data in 2015 but was not identified during 2016 surveys. No other federally listed species have been documented in the Project Area. The Applicant will comply with avoidance, minimization, and mitigation measures specified in the PEIS; therefore, the Project would not adversely impact listed species.

Migratory birds, including eagles and other raptors, have been observed in the Project Area. In addition, one active bald eagle nest is located approximately 0.5 mile from the Project Area. The results of pre-construction avian use and nest surveys and potential impacts are discussed in Section 13.4. If construction occurs during the migratory bird nesting season (typically April through September) nesting bird surveys will be conducted shortly before construction initiates. The Applicant prepared a Bird and Bat Conservation Strategy (BBCS) for the Project to address operational impacts to birds (Appendix L).

Existing land uses are not anticipated to be significantly changed or impacted by the Project. Sound from Project construction activities would be temporary and generally limited to daytime hours. Once the Project becomes operational, sound from the turbines and other facilities would be limited to 45 A-weighted decibels (dBA) at all habitable residences. Existing land use and potential impacts are described in Section 15.0.

Construction activities for this Project would be short-term, and, therefore, no long-term negative impact to the socioeconomics of the area is expected. Short-term construction effects likely would be beneficial to businesses in the region. Community impacts are discussed further in Section 20.0.

During Project construction, fugitive dust emissions would increase due to vehicle and equipment traffic in the area. The additional particulate matter emissions would not exceed the National Ambient Air Quality Standards (NAAQS). The wind turbines would not produce air emissions during operation. Air quality is discussed in Section 18.0.

Cultural resource Level I records review and site survey from public rights-of-way for the Project Area identified previously recorded archaeological and historic resources located within or near the Project

Area. The results of the Level I analysis are provided in Appendices R and S. Cultural resource field surveys of all areas disturbed by construction of Project facilities are planned to begin in June 2018. For cultural resources identified during the surveys, a recommendation of National Register of Historic Places (NRHP)-eligibility of the resource will be made. Sites determined to be NRHP-eligible will be avoided by the Project. If avoidance is not practicable, the Applicant will work with WAPA and the State Historic Preservation Office (SHPO) to develop appropriate minimization or mitigation measures. Cultural resources are discussed in Section 20.5.

Mitigation measures proposed for the Project include:

- Wind turbines will be illuminated as required by Federal Aviation Administration (FAA) regulations and recommendations;
- Existing roads will be used for construction and maintenance where possible;
- Access roads created for the Project will be located to limit cuts and fills;
- Temporarily disturbed uncultivated areas will be reseeded with certified weed-free seed mixes to blend in with existing vegetation;
- BMPs will be used during construction to control erosion and prevent or reduce impacts to drainage ways and streams by sediment runoff from exposed soils;
- Direct impacts to eligible or potentially eligible sites for the NRHP will be avoided to the extent practicable;
- The Applicant will avoid impacts to wetlands to the extent practicable;
- The Applicant will avoid impacts to undisturbed grasslands to the extent practicable;
- The Applicant will meet or exceed setbacks, conditions, and siting standards required by State and local governing bodies where the wind turbines are located;
- The Applicant will comply with all applicable avoidance, minimization, and mitigation measures in the PEIS; and
- If construction occurs during the migratory bird nesting season (typically April through September), the Applicant will conduct nesting bird surveys shortly before initiation of ground-disturbing activities.

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

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

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

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

ARSD 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.*

The Applicant, Prevailing Wind Park, LLC, is a South Dakota limited liability company and a wholly owned subsidiary of sPower Development Company, LLC. Individuals who are authorized to receive communications relating to the Application on behalf of the Applicant include:

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

ARSD 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.*

Prevailing Wind Park, LLC is a South Dakota limited liability company and a wholly owned subsidiary of sPower Development Company, LLC. Prevailing Wind Park will own, manage, and operate the Project. Prevailing Wind Park has obtained a Certificate of Authority from the South Dakota Secretary of State to conduct business in South Dakota. As a limited liability company, sole-member managed by sPower Development Company, LLC, Prevailing Wind Park, LLC does not have officers and directors. Sean McBride, Authorized Person, sPower Development Company, LLC, is managing development of the Project. James Damon, sPower Development Company, LLC, is the Project manager.

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

ARSD 20:10:22:08. Purpose of facility. *The applicant shall describe the purpose of the proposed facility.*

ARSD 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.*

Prevailing Wind Park has entered into a 30-year PPA with a South Dakota load serving entity. The output from the facility, which could annually generate up to 933,116 megawatt-hours (MWh), will be used to meet the needs for South Dakota residential, commercial, and industrial customers. Demand for this renewable power and the benefits it provides are discussed further in Section 6.1.

The Project would provide significant needed local and regional economic benefits. The area where the Project is proposed is almost entirely dependent on an agricultural economy. Local agricultural economies are very sensitive to world commodity prices and weather. The primary driver to increase local agricultural economies is to add value to existing farming operations through increasing farming efficiency with larger farms and adding large livestock feeding operations. Both may benefit the individual farmer but generally do not increase jobs or population in the local communities. Wind energy adds significant revenue to existing farming operations and creates jobs in the local communities.

Prevailing Wind Park would directly benefit local workers and local business. During construction, up to 245 temporary construction jobs are anticipated at the peak of construction, and 8 to 10 permanent jobs will also be created in the community. Construction and operation of typical 200-MW wind project results in the injection of millions of dollars into the local economy throughout the life of the Project. These investments would benefit many local businesses in the community including hotels, restaurants, gas stations, mechanics, tire companies, grocery stores, and other local businesses.

In addition, the Project will result in a $297 million investment in Bon Homme, Hutchinson, and Charles Mix counties. Prevailing Wind Park will pay taxes on the Project, which will result in substantial revenue available for a variety of local needs.

6.1 Renewable Power Demand

Wind energy provides one of the most cost-effective energy sources for customers, making it desirable to utilities, as well as industrial and commercial entities. New wind energy facilities are less expensive to construction than new conventional energy sources, even without government subsidies. Table 6-1 provides a comparison of the unsubsidized levelized cost of energy for both alternative and conventional energy sources.

Table 6-1: Comparison of Energy Costs by Source

Energy Source		Levelized Cost ($/MW hour)
Alternative Energy	Wind	$30-60
	Solar PV - Thin Film Utility Scale	$43-48
	Solar PV – Crystalline Utility Scale	$46-53
	Biomass Direct	$55-114
	Geothermal	$77-117
	Solar Thermal Tower with Storage	$98-181
	Fuel Cell	$106-167
Conventional Energy	Coal	$60-143
	Natural Gas Reciprocating Engine	$68-106
	Nuclear	$112-183
	Gas Peaking	$156-210
	Diesel Reciprocating Engine	$197-281

Source: Lazard, 2016

6.1.1 National

In 2017, U.S. electricity customers consumed 3.7 billion MWh of energy (U.S. Energy Information Administration [EIA], 2018a). In its *Annual Energy Outlook 2017*, the EIA estimated that U.S. electricity demand would remain relatively flat and would rise 5 percent from 2016 to 2040 (EIA, 2017a). The U.S. Department of Energy (DOE)-Office of Energy Efficiency & Renewable Energy (EERE) *20% Wind Energy by 2030* report examined the technical feasibility of using wind energy to generate 20 percent of the nation's electricity demand by 2030 (DOE-EERE, 2008). To meet 20 percent of that demand, U.S. wind power capacity would have to reach more than 300 GW. As of April 2018, the total amount of wind energy capacity in the U.S. had grown to 89.4 GW (American Wind Energy Association [AWEA], 2018). Reaching 300 GW requires an increase of more than 210 GW in 12 years, or 17.6 GW per year.

In March 2015, the DOE released its *Wind Vision* report, which builds on and updates the 2008 *20% Wind Energy by 2030* report (DOE, 2015). The *Wind Vision* report analyzes the benefits of a study

scenario based on wind power penetration of 10 percent by 2020, 20 percent by 2030, and 35 percent by 2050, utilizing plausible variations from central values of wind power and fossil fuel costs. The Wind Vision study scenario is not designed to achieve any specific clean energy or carbon reduction goals. Nevertheless, the contributions of wind power in the study scenario support clean energy and carbon reduction goals.

The projected benefits associated with achieving the Wind Vision study scenario are:

- Avoidance of air pollution and reduction in greenhouse gas emissions (avoids 250,000 metric tons of air pollutants and 12.3 gigatons of greenhouse gases by 2050);
- Conservation of water resources (estimated at 260 billion gallons by 2050);
- Increased U.S. energy security by diversifying electricity portfolio;
- Reduced demand on fossil fuels and reduced energy costs to consumers ($280 billion dollars in consumer savings by 2050);
- Creation of new income for rural landowners and tax revenues for local communities ($3.2 billion annually in tax revenue by 2050); and
- Generation of well-paying jobs (600,000 jobs in manufacturing, installation, maintenance, and supporting services by 2050) (DOE, 2015).

The demand for renewable energy from wind is extremely high, with project costs declining and the capacity increasing (DOE-EERE, 2016). The lower cost of wind energy and wind energy fixed costs are driving need and demand. In many situations, wind energy and natural gas generation are being combined to produce the lowest cost baseload power. Wind energy is also being used as a long-term financial hedge against the price of electricity generated from natural gas. Most, if not all, of the region's power producers resource plans call for increasing use of fixed cost resources with zero fuel cost, zero pollution, and zero carbon emissions as a necessity to provide cost effective electricity to their customers. Demand is coming from power producers signing long-term PPAs with wind energy projects or purchasing wind projects outright. Electric utilities signed 60 percent of PPA capacity contracted for the year (3,317 MW) and announced plans to develop and own 4,190 MW of rate-based wind capacity (American Wind Energy Association, 2018). New demand for wind energy is also coming from non-utility buyers. Corporate and other non-utility customers, such as Microsoft, Google, IKEA, Apple, eBay, Facebook, General Motors, and Wal-Mart, all signed PPAs announced during the fourth quarter of 2017, comprising 40 percent of total capacity contracted for the year (2,178 MW), similar to the 39 percent share captured in 2016 (American Wind Energy Association, 2018).

Wind and natural gas are replacing aging coal and nuclear facilities that are being retired for regulatory and financial reasons. Between 2012 and 2016, net coal capacity declined by about 60 GW partly as a result of compliance with the U.S. Environmental Protection Agency's (EPA's) Mercury and Air Toxic Standards (EIA, 2018b). Coal-fired generating capacity may decrease by an additional 66 GW by the mid-2030s before leveling off in 2050, and virtually no new coal generation is planned for development. Similar to coal, more nuclear capacity is being retired than built. Nearly 30 GW of nuclear capacity are expected to be retired from 2018 through 2050 (EIA, 2017b). By contrast, the EIA projects that utility-scale wind capacity will grow by 20 GW from 2020 to 2050 (EIA, 2018b).

Wind energy is an inexhaustible source of clean, renewable electric power that can help fill this capacity shortfall. Operation of the wind turbines does not emit particulates, heavy metals, or greenhouse gases, and does not consume significant water resources. Long-term, fixed-price PPAs for wind generation reduce electric utilities' exposure to fuel price volatility and stabilize energy prices for consumers.

Beyond the market for wind energy, the public has also shown support for the use of renewable energy. According a Gallup National poll in March 2017, 73 percent of Americans "prefer an approach that focuses on developing alternative energy sources such as solar and wind power" compared to 21 in favor of emphasizing production of conventional energy sources (Gallup, Inc., 2018)

6.1.2 Regional and State

Over 25,000 MW of wind energy had been installed in the Midwest Wind Energy Center Region by the fourth quarter, including 977 MW in South Dakota [National Renewable Energy Laboratory (NREL), 2018a]. In 2016, wind energy provided 30 percent of all South Dakota in-state electricity production, enough to power over 290,000 homes. The DOE Wind Vision Scenario projects that South Dakota could produce enough wind energy by 2030 to power the equivalent of 895,000 average American homes. In 2016, the annual State water consumption savings were over 235 million gallons, the equivalent of 1.8 billon bottles of water saved (American Wind Energy Association, 2017).

Load growth for South Dakota and North Dakota was last projected to be at least 2,100 MW over the next 10 years. South Dakota's current electric generation is primarily from hydroelectric (approximately 40 percent), coal (approximately 30 percent), and wind power plants (approximately 30 percent) (EIA, 2018c). South Dakota relies on shipments of coal from Wyoming to meet its coal demand, and supplies of fossil fuels such as coal, oil, and natural gas are finite. Between 2011 and 2016, implementation of tighter EPA regulations on existing coal-fired plants accelerated retirements of outdated facilities. Since 2017, the decline in coal consumption has been attributed to availability of abundant, inexpensive natural gas

(EIA, 2018b). Construction of new coal, nuclear, or hydroelectric stations in the area is unlikely (EIA, 2018b).

South Dakota has one of the smallest populations of any state; however, due to its energy intensive industries (i.e., agriculture, manufacturing, and mining), hot summers, cold winters, and periodic droughts, the State is one of the top 10 in total energy consumption per capita. South Dakota is also one of the top seven states in wind potential. Although it is already ranked second in the nation after Iowa in the amount of net electricity generation provided by wind (approximately 30 percent in 2017), South Dakota's potential is just beginning to be developed (EIA, 2017c). The DOE's WIND Exchange platform indicates that South Dakota has approximately 418 GW of total potential wind capacity (NREL, 2018b); however, only 977 MW of wind energy generation has been installed as of the second quarter of 2017 (NREL, 2018b), which is less than 1 percent of its total potential capacity.

State legislatures and governors have adopted renewable portfolio standards (RPSs) in 29 states. These standards require utilities to sell a specified percentage or amount of renewable electricity. The requirement can apply only to investor-owned utilities, but many states also include municipalities and electric cooperatives, though their requirements are equivalent or lower. Eight states and one territory have voluntary renewable energy standards or targets. South Dakota falls into the latter category with a voluntary Renewable, Recycled and Conserved Energy Objective, established in 2008, with the goal that 10 percent of all electricity sold at retail within the State will be obtained from renewable energy and recycled energy sources by 2015 (SDCL 49-34A-101). The proposed Project would provide a new source of low cost energy in South Dakota and help the Nation move towards the goal of energy independence, while reducing pollution and carbon emissions. The SDPUC required that retail energy providers report annually on their attainment status; this requirement ended at the end of 2017.

6.1.3 Local

The Project would add significant revenue to the local economy. Rural landowners and farmers on whose land the Project is listed will receive annual lease payments for each turbine sited on their property plus payments based on acres in the Project Area. Because only a small portion of the land under lease will be used for the Project, farming operations can continue largely undisturbed.

The Project's use of only 45 acres within the larger Project Area would generate approximately $1.2 million annually in new income for landowners; approximately $742,500 in new annual tax revenues for

Bon Homme, Charles Mix, and Hutchinson counties, schools and townships[1]; and approximately $11.1 million in new tax revenues for State government[1] from Project operations.

As noted, construction, operations, and maintenance of the facility are expected to create approximately 245 jobs[2] during the peak construction phase and approximately 8 to 10 long-term operations and maintenance positions, which would benefit local businesses. Statewide and nationally, the wind industry generates well-paying jobs in the entire supply chain, including engineering, manufacturing, and construction.

6.2 Wind Resources Areas

To obtain an accurate representation of the wind resource within the Project Area, Prevailing Wind Park conducted a comprehensive analysis of the Project Area using the following data:

- Onsite data collected at the Project's 60-meter Roth meteorological tower
- Onsite data collected at the Project's 60-meter Link meteorological tower
- Onsite data collected at the Project's 60-meter Brandt meteorological tower
- Onsite data collected at the Project's 60-meter Burfeindt meteorological tower
- Long-term correlation from: Mitchell, Sioux Falls, Winner, SD, MERRA upper-air data points
- Project Area topographic and land cover data
- Up to 100 potential turbine locations within the Project Area
- Power curves from multiple turbine models and manufacturers
- State and County standards and setbacks

The Applicant used this data to develop a Wind Resource Analysis for the Project Area. The Applicant analyzed multiple hypothetical layouts for each representative turbine model to determine the potential energy output for the Project. Data from each unique hypothetical turbine layout and its energy output was used in a Project pro forma, along with Project indicative construction costs, operational costs, and costs of capital, to estimate Project energy costs for multiple scenarios. For any wind project to remain competitive, it must have the flexibility to use the latest technology at the lowest costs. This is due to the rapid changes in new turbine technology and price reductions in turbines.

Currently, the Applicant is considering turbines with an energy production range between 3.6 and 3.8 MW. The final decision will be made prior to construction to create the most viable, cost-effective, and

[1] Based on current State statutes.
[2] Based on estimates from wind energy project contractor construction practices.

optimal design for the Project given the known conditions of the Project Area and the turbines that are commercially available when the Project is constructed. The Application contains information regarding two representative turbines, the General Electric (GE) 3.8-137 and the Vestas V136-3.6 turbine models. The turbine location configuration shown in Figure 2 in Appendix A would be used for the turbine finally selected for the Project, whether the GE model, the Vestas model, or another comparable turbine model. Turbine specifications are discussed in Section 8.2.

The following is an example of the data generated from the Wind Resource Analysis for the Project Area. The example uses a sample layout for the GE 3.8-137 turbine model to create potential energy output for the Project Area. The turbine's power curve is used together with the Project's correlated onsite data to determine the Project's annual gross energy production and capacity factor for the Project Area. Table 6-2 depicts the estimated mean annual wind speed for the Project Area in meters per second (m/s) for both turbine models. As shown in the table, the Project Area has an average wind speed of 8.69 to 8.78 m/s at turbine hub heights of 105 meters (345 feet) and 110 meters (361 feet), respectively, indicating winds between 37.5 to 42.5 meters per second.

Table 6-2: Wind Resource Analysis

Turbine	Normalized Monthly and Annual Wind Speed Averages (m/s)
GE 3.8-137	8.78 (110-m wind speed)
Vestas 136-3.6	8.69 (105-m wind speed)

6.3 Consequences of Delay

If the Prevailing Wind Park Project is delayed, the Project's benefits to the local communities would be deferred. Specifically, delay of construction would delay expected local benefits of increased employment and spending in the local community. Delayed operation would likewise put off tax revenue benefits to local school districts, the counties, and the State. Further, the PPA requires the Project to be operational by the end of 2019, and failure to meet this in-service date may impact the PPA. Additionally, Project costs are subject to commodity flux and rise. Therefore, if the Project is delayed, the construction costs may increase.

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

ARSD 20:10:22:09. Estimated cost of facility. *The applicant shall describe the estimated construction cost of the proposed facility.*

The current estimated capital cost of the Project is approximately $297 million based on indicative construction and wind turbine pricing cost estimates. This estimate includes lease acquisition; permitting, engineering, procurement, and construction of turbines, access roads, underground electrical collector system, Project collector substation, interconnection facilities, O&M facility, supervisory control and data acquisition (SCADA) system, and meteorological towers; and project financing. Capital cost estimates could fluctuate for the Project, dependent on which turbine model is ultimately used, materials and labor costs, and interconnection costs.

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

ARSD 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.*

The Project would be located within 50,364 acres of land in Bon Homme, Charles Mix, and Hutchinson counties. Table 8-1 shows the sections that intersect the Project Area.

Table 8-1: Sections that Intersect the Project Area Boundary

County	Township	Range	Sections
Bon Homme	95N	60W	6
	95N	61W	1-18, 20-24
	95N	62W	1, 12-13
	96N	61W	1-3, 9-21, 28-33
	96N	62W	13, 24-25, 36
	97N	61W	34-36
Charles Mix	95N	62W	1-3, 10-15
	96N	61W	18
	96N	62W	1-4, 10-15, 22-27, 34-36
	97N	62W	33-36
Hutchinson	97N	61 W	25-27, 34-36

Figure 1 in Appendix A shows the locations of the State, county, and city boundaries with respect to the Project Area, as well as the major highways and roads that extend through the area. Figure 8 in Appendix A shows the locations of water bodies and streams within the Project Area. Figure 10 in Appendix A shows the locations of cemeteries and other public facilities (i.e., churches, public lands) within or adjacent to the Project Area. Figures 2.1-2.11 in Appendix R show the locations of places of historical significance within or near the Project Area. There are no active transportation facilities (i.e., railroads, airports) within or adjacent to the Project Area.

8.1 Wind Farm Facility

The Project would consist of up to 61 wind turbines with an aggregate nameplate capacity of 219.6 MW. The Applicant proposes to use a wind turbine model of 3.6 to 3.8 MW. The two representative turbines

are the GE 3.8-137 and the Vestas V136-3.6 MW. The permanent facilities for the Project would also include underground electric collector lines, a central collector substation, an O&M facility, access roads connecting to each turbine, up to four permanent meteorological towers, and a SCADA system (installed with the collector lines). Figure 2 in Appendix A shows the proposed layout of the Project facilities. Table 8-2 lists the sections within the Project Area containing proposed permanent wind farm facilities.

Table 8-2: Sections Containing Wind Farm Facilities

County	Township	Range	Sections
Bon Homme	95N	61W	1, 4-5, 9-12, 14-15, 22
	95N	62W	1
	96N	61W	1-2, 11-21, 28-33
	96N	62W	24, 36
	97N	61W	35-36
Charles Mix	95N	62W	1, 11-14
	96N	62W	10, 13, 15, 22-24, 26-27, 35-36
Hutchinson	97N	61 W	25, 35-36

Figure 2 in Appendix A shows 63 proposed wind turbine locations, of which only up to 61 turbines will be built.[3] As a result of final micrositing, minor shifts in the turbine locations may be necessary based on final design. For example, a shift may be needed to avoid newly identified cultural resources (cultural resource studies are expected to be completed in July 2018), or due to geotechnical evaluations of the wind turbine locations, landowner input, or other factors. Therefore, the Applicant requests that the permit allow turbines to be shifted within 500 feet of their currently proposed location, so long as specified noise and shadow flicker thresholds are not exceeded, cultural resource impacts and habitats for listed species are avoided, and wetland impacts are avoided to the extent practicable. If turbine shifts are greater than 500 feet, exceed the noted thresholds, or do not meet the other limitations specified, the Applicant would either use an alternate turbine location or obtain SDPUC approval of the proposed turbine location change. Alternate turbine locations are proposed to hedge against additional turbine locations becoming necessary during final micrositing. The alternate turbine locations prevent unforeseen findings from reducing the size of the Project or from significantly injuring the productivity of the Project. In all cases, the final turbine locations constructed will adhere to applicable local, State, and Federal regulations and requirements.

[3] Note that the turbine numbers go from 1 to 58 and 60 to 64. The turbine location 59 was eliminated.

Figure 2 in Appendix A also shows the proposed access road and underground collection system locations. As a result of final micrositing, shifts in the access roads and collector system, as well as changes in the locations of the O&M facility, Project substation, meteorological towers, concrete batch plant, and laydown/staging areas, may be necessary.

Therefore, the Applicant requests that the permit allows those facilities to be modified, as needed, as long as the new locations are on land leased for the Project, cultural resources and habitats for listed species are avoided, wetland impacts are avoided to the extent practicable, and other applicable regulations and requirements are met.

8.2 Major Wind Turbine Components

The Applicant plans to install up to 61 wind turbines for the Project; 2 to 6 alternate turbine locations are also proposed, depending on the turbine model selected. The representative turbine models are the GE 3.8-137 and Vestas 136-3.6 turbines. Table 8-3 provides specific turbine characteristics for each turbine model.

Table 8-3: Wind Turbine Characteristics

Characteristic	Turbine Model[a]	
	GE 3.8-137	Vestas 136-3.6
Nameplate capacity	3.83 MW	3.6 MW
Hub height	110 meters (361 feet)	105 meters (344 feet)
Rotor diameter	137 meters (449 feet)	136 meters (446 feet)
Total height	178.5 +/- 1 meters (586 +/- 3 feet)	173 +/- 1 meters (568 +/- 3 feet)
Cut-in speed[b]	3 m/s	3 m/s
Rated speed[c]	12 m/s	12 m/s
Cut-out speed[d]	25 m/s over 600s 30 m/s over 30s 34 m/s over 3s	22.5 m/s or 27.5 m/s with HWO package[e]
Rotor area	14,741 m^2	14,527 m^2
Rotor speed	Variable – max is around 13.6 rpm	5.6 to 15.3 rpm

(a) MW = megawatt; m/s = meters per second; m^2 = square meters; rpm = revolutions per minute
(b) Cut-in wind speed = wind speed at which turbine begins operation
(c) Rated speed = wind speed at which turbine reaches its rated capacity
(d) Cut-out wind speed = wind speed above which turbine shuts down operation
(e) High Wind Operation package

The proposed wind turbines consist of a nacelle, hub, blades, tower, and foundation (Figure 3 in Appendix A). The nacelle houses the generator, gear box, controls, braking systems, cooling systems,

hoist, cabling, transformer, lightning protection system, and other miscellaneous equipment. The hub consists of the blades, spinner, blade pitch motors, blade angle detection systems, and lightning protection system. The proposed turbine model has three blades composed of carbon fibers, fiberglass, and internal supports to provide a lightweight but strong component. The tip of each blade is equipped with a lightning receptor. The tower supports the nacelle, hub, and blades. The tower houses the nacelle access systems, power rail, controls, communication cables, control systems, and invertor, which are located at the base of the tower. Towers include a lift or lift assist systems for personnel accessing the nacelle. Towers are tubular steel (not latticed) and are painted a non-glare white per FAA requirements. Specialized electrical equipment is located at the base of each tower to condition the generated electricity to match the collection system requirements.

The expected turbine foundation would be a spread foundation design. Foundations for the towers would be approximately 2,700 square feet, with a depth of up to 10 feet. Except for approximately 12 inches that would remain aboveground to allow the tower to be appropriately bolted to the foundation, the tower foundation would be underground. A specific foundation design would be chosen based on soil borings conducted at each turbine location.

The excavated area for the turbine foundations would typically be approximately 65 feet in diameter (approximately 0.07 acre). During construction, a larger area (approximately 160-foot radius) may be used to lay down the rotors and maneuver cranes during turbine assembly. For purposes of calculating temporary impacts in this Application, the Applicant has assumed approximately 116 acres of total temporary disturbance from work/staging areas for 63 turbines. This is a conservative estimate, because a maximum of 61 turbines would be built. After construction, total permanent disturbance from the turbines would be reduced to approximately 3 acres, which would remain for the life of the Project.

The proposed turbine model also contains emergency power supplies to allow operation of the control systems, braking systems, yaw systems, and blade pitch systems and to shut the turbine down safely if grid power is lost. Wind turbine blades convert linear energy from wind into rotational energy, which the hub transfers to the gear box or directly to the generator located within the nacelle. The transferred mechanical force is converted into electrical energy by the generator. Heated mechanical and/or ultrasonic anemometers and weather vanes, located on the turbine nacelle, continuously collect real-time wind speed and direction data. Based on the data collected, the turbine yaw system constantly rotates the hub, blades, and nacelle into the wind, while the blade pitch system continuously adjusts the pitch of the blades to optimize the output of the generator. The pitch system also protects the turbine from over-speed events in high winds by pitching the blades perpendicular to the wind and aero-brakes the turbine to a stop in

normal shutdown conditions. The mechanical braking system, located within the nacelle, is used to stop the turbine's rotation in the event of a storm or other turbine fault. The mechanical brake and lock-out system is used to lock the blade rotor to prevent the blades from spinning during maintenance periods or other times when the turbine is out of service. The gear box adjusts shaft speeds to maintain generator speed in low and high wind speeds. Electrical energy produced by the generator is transmitted through insulated cables in the power rail to a safety switch, and then to a transformer located internally in the tower or externally on the base of the tower.

8.3 Roads

Where practicable, existing public roads, private roads, and field paths are being utilized to access Project components. The existing roads may require improvements before, during, or following construction. Where necessary, new access roads will be constructed between existing roadways and Project components. The new and improved access roads would be all-weather, gravel surfaced, and generally 16 feet in width. During construction, some of the access roads would be widened to accommodate movement of the turbine erection crane, with temporary widths of approximately 60 feet.

Separate access may be required for the cranes used to erect the wind turbines. In such cases, temporary crane paths would be constructed between turbine locations. Following completion of construction, the temporary crane paths would be removed, and the area would be restored, to the extent practicable.

The final access road design would be dependent on geotechnical information obtained during the engineering phase. It is anticipated that the access road network for the Project would include approximately 17 miles of new private roads (as shown on Figure 2) and 40 miles of upgraded public roads. For purposes of calculating access road impacts in this Application, the Applicant has assumed approximately 103 acres of temporary disturbance and 33 acres of disturbance during the life of the Project for new private access roads. In addition, up to 3 acres of temporary disturbance is assumed for upgraded public roads.

8.4 O&M Facility

The O&M facility would be located within the Project Area, in a location with proper transportation, communications facilities, and easy access to Project facilities. One potential O&M facility location, as shown on Figure 2 in Appendix A, has been identified. As discussed in Section 8.1, the Applicant requests that the permit allow the O&M facility location to be modified, as needed, as long as the final location is on land leased for the Project, cultural resources and habitats for listed species are avoided,

wetland impacts are avoided to the extent practicable, and all other applicable regulations and requirements are met.

The proposed O&M facility would house the equipment to operate and maintain the wind farm. A gravel parking pad would provide the building with a parking area and secured outside storage. For purposes of calculating temporary impacts in this Application, the Applicant has assumed approximately 6 acres of total temporary disturbance from O&M facility construction. After construction, total permanent disturbance from the O&M facility, including parking, would remain at approximately 6 acres.

Station power for Prevailing Wind Park facilities would be provided through the Project interconnection. Back-up power for the Project substation will be provided by the local electrical cooperative(s), providing power to operate communications, relaying, and control systems, indefinitely.

8.5 Meteorological Towers

The Applicant has deployed six temporary 60-meter meteorological towers within the Project Area, which are expected to be removed during or following Project construction. The Applicant anticipates that the Project would include permanent wind measurement equipment, which could consist of up to four permanent 80-meter meteorological towers. Four potential permanent meteorological tower locations, as shown on Figure 2 in Appendix A, have been identified. As discussed in Section 8.1, the Applicant requests that the permit allow the meteorological tower location to be modified, as needed, as long as the final locations are on land leased for the Project, cultural resources and habitats for listed species are avoided, wetland impacts are avoided to the extent practicable, and all other applicable regulations and requirements are met. The permanent meteorological towers would be self-supporting and would not have guy wires. The towers would be lighted and painted as necessary to comply with FAA guidelines and would be connected to the Project collection system for communications and power needs. The Applicant estimates that an area of approximately 200 feet by 200 feet would be required during construction to install each meteorological tower. Each tower would result in a permanent impact of approximately 42 feet by 42 feet. The four permanent meteorological towers combined would result in temporary impacts of approximately 4 acres and permanent impacts of 0.2 acre.

8.6 Temporary Laydown Areas/Batch Plant/Crane Walks

A temporary office trailer and laydown area has been selected within the Project Area. Construction materials, including turbine components, would be temporarily stored in an area covering approximately 12 acres before being installed or moved to the final turbine sites. The laydown area location, as shown on Figure 2 in Appendix A, has been identified. In addition, one or more temporary concrete batch plants

may be necessary during construction in order to prepare concrete for foundations onsite. It has not been determined at this time if onsite batch plants will be necessary for the Project. If they are utilized, each would temporarily impact approximately 3 to 5 acres of land, and it is anticipated that they would be located within the temporary 12-acre laydown area.

In addition to the approximately 12-acre laydown/batch plant area, temporary crane walk disturbances would also be necessary for the Project. Crane walks are estimated to be 60 feet wide and would generally be located along the same route as the collector system and access roads, except where topography or soils conditions prevent safe crane travel. For purposes of calculating temporary impacts in this Application, the Applicant has assumed that the temporary disturbance from the crane walks would be 393 acres. As discussed in Section 8.1, the Applicant requests that the permit allow the temporary laydown/batch plant areas and crane walk locations to be modified, as needed, as long as the final locations are on land leased for the Project, cultural resources and habitats for listed species are avoided, wetland impacts are avoided to the extent practicable, and all other applicable regulations and requirements are met.

8.7 Project Electrical System

Each of the wind turbines would have a transformer either pad-mounted outside the tower at the base of the turbine, mounted in the nacelle, or mounted within the tower. The proposed turbines would be connected to the Project collector substation by an underground 34.5-kV electrical collection system, including an occasional aboveground junction box. At the collector substation, the power would be converted from 34.5 to 115 kV and then transmitted via an aboveground 115-kV transmission line to WAPA's existing Utica Junction 230-kV substation, located approximately 27 miles east of the Project. A second 115-/230-kV substation would be constructed near the point of interconnection to step up the voltage to match that of WAPA's interconnection facilities.

8.7.1 Collector System

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

8.7.1.1 Underground 34.5-kV Collector System

An underground 34.5-kV collector system would be used to route the power from each turbine to the collector substation, where the electrical voltage would be stepped up from 34.5 to 115 kV. The

underground collector system bundle (containing three conductors, ground wire, and fiber optic conduit) would be placed in one trench and connect each of the turbines to the collector substation. The estimated trench length is approximately 65 miles. The temporary disturbance associated with the underground collector system is estimated to be 30 feet wide. For purposes of calculating temporary impacts in this Application, the Applicant has assumed that the temporary disturbance from the collector system trenches would be 236 acres.

The underground collector circuits would consist of three power cables contained in an insulated jacket and bare copper ground wire, all buried at a minimum depth of 4 feet that would not interfere with farming operations. Access to the underground collector lines would be located at each turbine site, at junction boxes located at points where the underground collector system cables are spliced, and where the cables enter into the collector substation. Due to the power carrying limits and minimization of power losses, there would be eight underground collector line circuits connecting 7 to 14 turbines each to the collector substation.

The underground electrical collector and communication system cable bundle would be generally installed by open trenching. Using this method, the disturbed soils are typically replaced over the buried cable within 1 day, and the drainage patterns and surface topography are restored to pre-existing conditions. In grassland/rangeland areas, the Applicant would re-vegetate the disturbed soils with a weed-free native plant seed mix.

8.7.1.2 Underground Communication System

The fiber optic communication conduits and cables for the Project would be installed in the same trench as the underground electrical collector cables and would connect the communication channels from each turbine to control facilities in the collector substation, O&M facility, and offsite locations.

8.7.2 Collector Substation

A new collector substation would be constructed in the center of the Project Area, on private land, where the 34.5-kV electric collection grid and fiber optic communication network would terminate. One potential collector substation location, as shown on Figure 2 in Appendix A, has been identified. The collector substation would include a main transformer to step up the voltage of the collection grid from 34.5 to 115 kV, aboveground bus structures to interconnect the substation components, breakers, a control building, relays, switchgear, cable storage, communications and controls, and other related facilities required for delivery of electric power to the 115-kV transmission line.

The design of the collector substation is not finalized, but the Applicant expects it would be enclosed by a chain link fence with dimensions of roughly 350 feet by 450 feet (4 acres). The substation components would be placed on concrete and steel foundations. For purposes of calculating temporary impacts in this Application, the Applicant has assumed approximately 5 acres of total temporary disturbance and approximately 4 acres of permanent impacts from collector substation construction. The collector substation would be designed in compliance with Federal, State and local regulations; National Electrical Safety Code (NESC) standards; and other applicable industry standards.

8.7.3 Station Power

During operation, wind turbine power consumption is in the range of 15 to 25 kilowatts (kW) per turbine. Turbines peak when they yaw, but they would not do so simultaneously. On the other hand, turbines might consume power simultaneously for heating if they are idling during cold and windless days. Turbine demand/consumption is supplied by back-feed power from the point of interconnection. It is assumed that 20 kW for each of the up to 61 turbines would be the typical power requirement. The Applicant would work with the local electric cooperatives to determine the number of turbines within each cooperative's territory and enter into service agreements with the transmission operator and the local electric cooperatives for station power energy and demand charges. The collector substation back-up power and power for the O&M building would be supplied through local distribution systems.

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

ARSD 20:10:22:12. Alternative sites. *The applicant shall present information related to its selection of the proposed site for the facility, including the following:*

(1) The general criteria used to select alternative sites, how these criteria were measured and weighed, and reasons for selecting these criteria;

(2) An evaluation of alternative sites considered by the applicant for the facility;

(3) An evaluation of the proposed plant, wind energy, or transmission site and its advantages over the other alternative sites considered by the applicant, including a discussion of the extent to which reliance upon eminent domain powers could be reduced by use of an alternative site, alternative generation method, or alternative waste handling method.

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

9.1 General Project Location Selection

When Prevailing Wind Park acquired the rights to develop the Project in 2017, feasibility studies had already been conducted for the purpose of siting a wind farm in the Project Area. Based on the information provided to Prevailing Wind Park, the purpose of the 2015 feasibility study was to identify a Project location. The initial Project feasibility studies first looked for potential wind energy locations along WAPA's Fort Randal to Utica Junction to Sioux City double-circuit 230-kV transmission line. The WAPA 230-kV line was chosen based on available transmission capacity identified in transmission studies completed previously and acquired from B&H Wind Holdings, LLC. The first objective was to find large contiguous areas of land with higher elevations near the WAPA 230-kV line that could support 200 MW of wind energy. Three locations identified were:

- Location #1 - Dry Choteau Creek Coteau near Avon, South Dakota
- Location #2 - Turkey Ridge Coteau south and southeast of Freeman, South Dakota
- Location #3 - Hills around Beresford, South Dakota

Figure 4 in Appendix A shows the locations of the alternative sites. Table 9-1 contains a summary of each alternative site evaluated by Prevailing Winds, LLC. The feasibility assessment of each site determined that Location #1 (Table 9-1, below) on the Dry Choteau Creek Coteau near Avon, South Dakota, was best suited for a 200-MW wind energy project interconnecting with WAPA's 230-kV line. Proximity to the

WAPA 230-kV line lowers Project costs, and the superior wind resource (because of elevation) increases Project energy output and revenues. Location #1 also has lower population density and lower environmental risks, which further reduce potential Project impacts. Combining these factors makes a wind project located at Location #1 more cost effective than the Location #2 and Location #3 alternative sites. Prevailing Winds completed further feasibility studies to determine the suitability of Location #1. Upon successful completion of the feasibility studies in February 2015, Prevailing Winds submitted an Interconnection Request to WAPA for 200 MW on the 230-kV line inside Location #1 and began development activities for the Project at this location.

Table 9-1: Summary of Alternative Sites

Factor	Location #1	Location #2	Location #3
Interconnection distance to WAPA 230-kV	0 miles	15 miles	26 miles
Area above 1,600 feet elevation	<60 square miles	36 square miles	0 square miles
Area above 1,700 feet elevation	<17 square miles	3 square miles	0 square miles
Highest elevation	1,880 feet	1,740 feet	1,550 feet
Population density	Low	Moderate	High
Primary ground cover	Tilled	Tilled	Tilled
Bat habitat	Low	Low/moderate	Moderate
Eagle habitat	Low	Low/moderate	Low/moderate
Avian habitat	Low	Low/moderate	Low
Wetlands	Low/moderate	Moderate	Low
Cultural resources sites	Low/none	Low/none	Low
Beam paths	Low	High	Moderate
Historical wind data	Yes	No	No

The Applicant also considered input from agencies and the public in siting the Project, specifically:

- Project distance from the Missouri River, where higher populations of many plant and animal species are present.
- Project distance from the Whooping Crane Migration Corridor.
- State and Federal lands within or near Project Area.
- Native grasslands, wetlands, and other habitats within or near Project Area.
- An existing eagle nest located near the Project Area.

9.2 Site Configuration Alternatives

The proposed configuration of turbine locations reflects an optimal configuration to best capture wind energy within the Project Area, while avoiding impacts to residences, known cultural resources, wetlands, grasslands, and sensitive species and their habitats.

As discussed in Section 8.1, final micrositing could result in minor turbine adjustments. However, the final Project layout will comply with applicable local, State, and Federal requirements and/or commitments. The local requirements include Large Wind Energy System (LWES) requirements established by Bon Homme County. Neither Charles Mix County nor Hutchinson County have wind energy facility-specific ordinance provisions. Prevailing Wind Park will meet the Bon Homme County requirements in Bon Homme County, and has also designed the Project to comply with the Bon Homme setback and noise level requirements in Charles Mix and Hutchinson counties.

With respect to shadow flicker, Bon Homme County's ordinance does not specify a standard, but indicates that the county may require the installation of a shadow flicker control system under certain circumstances. In lieu of a specific standard, Prevailing Wind Park commits to limit shadow flicker at non-participating residences in the Project Area to no more than 30 hours per year.

The buildable area for turbines, after considering the setbacks in Table 9-2, as well as further environmental setbacks, is visually depicted on the siting constraints map provided as Figure 5 in Appendix A.

Table 9-2: Prevailing Wind Park Siting Requirements/Commitments

Category	Requirements/Commitments
State Requirements	
Setbacks	Turbines shall be set back at least 500 feet or 1.1 times the height of the tower, whichever is greater, from any surrounding property line (SDCL 43-13-24).
Bon Homme County Requirements[a]	
Setbacks	(a) Distance from currently occupied off-site residences, business and public buildings shall be not less than one thousand (1,000) feet. Distance from the residence of the landowner on whose property the tower(s) are erected shall be not less than five hundred (500) feet or one point one (1.1) times the system height, whichever is greater. For the purposes of this section only, the term "business" does not include agricultural uses. (b) Distance from right-of-way of public roads shall be not less than five hundred (500) feet or one point one (1.1) times the system height, whichever is greater. (c) Distance from any property line shall be not less than five hundred (500) feet or one point one (1.1) times the system height, whichever is greater, unless appropriate easement has been obtained from adjoining property owner.

Category	Requirements/Commitments
Noise	Noise level produced by the LWES shall not exceed forty-five (45) dBA, average A-weighted sound pressure at inhabited dwelling existing at the time the permit application is filed, unless a signed waiver or easement is obtained from the owner of the dwelling. The permittees shall submit a report of predicted noise levels at habitable residential dwellings within one mile of proposed tower locations to the Board no less than forty-five (45) days prior to commencing construction.
Voluntary Commitments in Charles Mix and Hutchinson Counties	
Setbacks	(a) Distance from currently occupied off-site residences, business and public buildings will be not less than 1,000 feet. Distance from the residence of the landowner on whose property the tower(s) are erected will be not less than 500 feet or 1.1 times the system height, whichever is greater. The term "business" does not include agricultural uses. (b) Distance from right-of-way of public roads will be not less than 500 feet or 1.1 times the system height, whichever is greater. (c) Distance from any property line will be not less than 500 feet or 1.1 times the system height, whichever is greater, unless appropriate easement has been obtained from adjoining property owner.
Noise	Noise level produced by the wind turbines will not exceed 45 dBA, average A-weighted sound pressure at currently inhabited dwellings, unless a signed waiver or easement is obtained from the owner of the dwelling.
Shadow Flicker Commitment	
Shadow Flicker	Shadow flicker produced by the wind turbines will not exceed 30 hours per year at currently inhabited dwellings of non-participants.

(a) Bon Homme County, South Dakota, Zoning Ordinance (amended November 3, 2015)

As discussed in Section 8.1, final micrositing could result in minor turbine adjustments. However, the final Project layout will comply with all applicable local, State, and Federal requirements, including the State and local requirements and/or commitments set forth in Table 9-2.

9.3 Lack of Reliance on Eminent Domain Powers

Prevailing Wind Park will not use eminent domain powers to acquire easements for the wind energy facility. Thus, selection of an alternative site would not reduce reliance on eminent domain powers. Private land rights and public road rights-of-way would be used for all facilities. All private land rights required for the wind energy facility were obtained through voluntary leases with property owners. The Applicant will obtain necessary road permits from road authorities prior to construction. Further, the Applicant will coordinate with Federal, State, and local agencies to obtain appropriate permits for the Project.

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

ARSD 20:10:22:13. Environmental information. *The applicant shall provide a description of the existing environment at the time of the submission of the application, estimates of changes in the existing environment which are anticipated to result from construction and operation of the proposed facility, and identification of irreversible changes which are anticipated to remain beyond the operating lifetime of the facility. The environmental effects shall be calculated to reveal and assess demonstrated or suspected hazards to the health and welfare of human, plant and animal communities which may be cumulative or synergistic consequences of siting the proposed facility in combination with any operating energy conversion facilities, existing or under construction. The applicant shall provide a list of other major industrial facilities under regulation which may have an adverse effect on the environment as a result of their construction or operation in the transmission site, wind energy site, or siting area.*

Sections 10.0 through 15.0 and Sections 17.0, 18.0, and 20.0 provide a description of the existing environment at the time of the Application submittal, the potential changes to the existing environment that are anticipated as a result of Project construction and operation, and the irreversible changes that are anticipated to remain beyond the operational lifetime of the facility. These sections also identify the avoidance, minimization, and mitigation measures that will be implemented for the Project. Section 22.0 provides a discussion of the environmental effects which may be cumulative or synergistic consequences of siting the proposed facility in combination with any operating energy conversion facilities, existing or under construction.

For purposes of analyzing environmental impacts in this Application, all 63 proposed turbine locations are included, even though only up to 61 turbines would ultimately be constructed. Table 10-1 identifies the ground disturbance impacts (both temporary impacts during construction and operational impacts during the life of the Project) assumed for the Project.

Table 10-1: Summary of Prevailing Wind Park Ground Disturbance Impacts

Project Component	Construction Impacts (Temporary)		Operational Impacts (Long-Term)	
	Dimensions	Total Acreage	Dimensions	Total Acreage
Turbines[a]	160-foot radius	116 acres	25-foot radius	3 acres
Access roads[a]	50-foot wide	103 acres	16-foot wide	33 acres
Upgraded roads	N/A	3 acres	N/A	N/A
Crane paths[a]	60-foot wide	393 acres	N/A	N/A
Collector lines[a]	30-foot wide	236 acres	10-foot by 5-foot junction box	0.001 acre
Collection substation	5 acres	5 acres	4 acres	4 acres
Meteorological towers	200-foot by 200-foot area	4 acres	42-foot by 42-foot area	0.2 acre

Project Component	Construction Impacts (Temporary)		Operational Impacts (Long-Term)	
	Dimensions	Total Acreage	Dimensions	Total Acreage
O&M facility	6 acres	6 acres	6 acres	6 acres
Laydown/staging/ batch plant areas	12 acres	12 acres	N/A	N/A
	Total:	**734 acres[b]**	**Total:**	**45 acres[b]**

(a) Impact calculations are based on all 63 proposed turbine locations and associated facilities. These are conservative estimates, because a maximum of 61 turbines would be built.
(b) Total impact acreages are based on GIS calculations. Because there is some overlap in the disturbance areas for the individual Project components, the total impact acreages do not equal the sum of the impact acreages for the individual components presented in this table.

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

ARSD 20:10:22:14. Effect on physical environment. *The applicant shall provide information describing the effect of the proposed facility on the physical environment. The information shall include:*

(1) A written description of the regional land forms surrounding the proposed plant or wind energy site or through which the transmission facility will pass;
(2) A topographic map of the plant, wind energy, or transmission site;
(3) A written summary of the geological features of the plant, wind energy, or transmission site using the topographic map as a base showing the bedrock geology and surficial geology with sufficient cross-sections to depict the major subsurface variations in the siting area;
(4) A description and location of economic deposits such as lignite, sand and gravel, scoria, and industrial and ceramic quality clay existent within the plant, wind energy, or transmission site;
(5) A description of the soil type at the plant, wind energy, or transmission site;
(6) An analysis of potential erosion or sedimentation which may result from site clearing, construction, or operating activities and measures which will be taken for their control;
(7) Information on areas of seismic risks, subsidence potential and slope instability for the plant, wind energy, or transmission site; and
(8) An analysis of any constraints that may be imposed by geological characteristics on the design, construction, or operation of the proposed facility and a description of plans to offset such constraints.

The following sections describe the existing physical environment within the Project Area, the potential effects of the proposed Project on the physical environment, and measures that will be utilized to avoid, minimize, and/or mitigate potential impacts.

11.1 Geological Resources

The existing geological resources within the Project Area are described below, followed by a discussion of the potential effects of the proposed Project and mitigation and minimization measures.

11.1.1 Existing Geological Resources

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

11.1.1.1 Regional Landforms/Surficial Geology

The topography within the Project Area is generally characterized by smooth hills and ridges with rounded tops. Relief within the Project Area is low to moderate with site elevations ranging from approximately 1,500 to 1,900 feet above mean sea level (AMSL). Within the Project Area, shallow local drainages bisect the terrain. The Project Area is located atop a local topographic high point, from which drainage occurs to the northeast, east, southeast, south, and southwest. A number of the shallow drainages within the Project Area have been dammed to create small stock water ponds.

The majority of the Project Area is located within the Central Lowland province of the Interior Plains physiographic region. The Central Lowland province is characterized by flat lands and geomorphic remnants of glaciation. The western edge of the Project Area is located within the Great Plains province of the Interior Plains physiographic region. The Great Plains province is characterized by plateau-like flat plains with little relief throughout the area (National Park Service [NPS], 2017a).

The physiographic features of the Project Area, including smooth hills and ridges and shallow meandering drainages, were formed as the underlying bedrock was eroded by the action of wind and water. The surficial geology of the Project Area can be described as a thin veneer of residual soils underlain by the Pierre Shale bedrock. Residual soils generally exhibit similar mineralogy to their underlying parent materials, although the high degree of weathering usually causes the overall soil structure to differ. The following surficial geologic units are mapped within the Project Area (South Dakota Geological Survey [SDGS], 2017):

- Qal – Alluvium (Quaternary) – Clay- to boulder-sized clasts with locally abundant organic material. Thickness up to 75 feet (23 meters).
- Qlts – Till, stagnation, moraine (Upper Wisconsin) – Compact, silty, clay-rich matrix with sand- to boulder-sized clasts of glacial origin. A geomorphic feature characterized by hummocky terrain with abundant sloughs resulting from stagnation of ice sheets. Composite thickness of all Upper Wisconsin till may be up to 300 feet (91 meters).
- Qlte – Till, end moraine (Upper Wisconsin) - Compact, silty, clay-rich matrix with sand- to boulder-sized clasts of glacial origin. A geomorphic feature characterized by elevated linear ridges with hummocky terrain locally at former ice sheet margins. Composite thickness of all Upper Wisconsin till may be up to 300 ft (91 m).

Figure 6a in Appendix A illustrates the surficial geology within the Project Area (SDGS, 2017), and Figure 6b is a geologic cross section of the Project Area.

11.1.1.2 Bedrock Geology

The uppermost bedrock unit underlying most of the Project Area is the Pierre Shale. Pierre Shale, as described by the U.S. Geological Survey (USGS), is an Upper Cretaceous-aged blue-gray to dark-gray, fissile to blocky shale with persistent beds of bentonite, black organic shale, and light-brown chalky shale (USGS, 2017a). The Pierre Shale contains minor sandstone and conglomerate beds and abundant carbonate and ferruginous (iron-rich) concretions, and the unit ranges in thickness from 1,000 to 2,700 feet (205 to 823 meters).

The southeast and west sides of the Project Area are underlain by the Niobrara Formation. The Niobrara Formation, as described by the USGS (USGS, 2017b), is an Upper Cretaceous-aged white to dark gray argillaceous chalk, marl, and shale. It contains thin, laterally continuous bentonite beds, chalky carbonaceous shale, minor sand, and small concretions. The thickness of this formation ranges from 160 to 225 feet (49 to 69 meters).

The center-west side of the Project Area is underlain by the Carlile Shale. The Carlile Shale, as described by the SDGS Geologic Map of South Dakota (SDGS, 2017), is an Upper Cretaceous-aged dark gray to black, silty to sandy shale with several zones of septarial, fossiliferous, carbonate concretions. The Carlile Shale contains up to three sandstone beds near the middle of the formation and sandy calcareous marl at the base. The thickness of the Carlile Shale ranges from 345 to 620 feet (105 to 189 meters).

Siting of wind turbines is most likely to be within the higher elevations of the Project Area, thus within the Pierre Shale bedrock. Figure 6b in Appendix A depicts the geologic cross section information available for the Project Area.

11.1.1.3 Economic Deposits

Commercially viable mineral deposits within Charles Mix, Bon Homme, and Hutchinson counties include sand, gravel, and construction aggregates. Information from the South Dakota Department of Environment and Natural Resources (SDDENR) Minerals and Mining Program and a review of the USGS 7.5-minute quadrangle mapping indicates that a sand and gravel quarry was developed in the southern part of the Project Area, but it has been inactive since 1995. The nearest active gravel quarry is approximately 1.5 miles north of the Project Area (SDDENR, 2017a).

A review of information from the SDDENR Oil and Gas Initiative Program reveals that the majority of current and historic oil and gas development in South Dakota occurs in the western half of the State. The Project Area does not lie within an identified oil and gas field, and there are no active or historical oil and gas developments within or near the vicinity of the Project Area (SDDENR, 2017b).

11.1.1.4 Seismic Risks

The risk of seismic activity in the vicinity of the Project Area is low. The USGS Earthquake Hazards Program estimates a 1.1 to 1.4 percent probability that a magnitude 5 or greater earthquake will occur within 50 kilometers of the Project Area within the next 20 years. Further, the USGS 2014 Seismic Hazard Map for South Dakota indicates the peak ground acceleration (PGA) with a 2 percent chance of exceedance in 50 years is 0.06 to 0.1 g (USGS, 2017c).

According to the SDGS, no earthquakes have been recorded in the Project Area from 1872 to 2013 (SDGS, 2013). However, a magnitude 4.3 earthquake was recorded approximately 7 miles east of the Project Area in 1982. Available geologic mapping and information from the USGS Earthquake Hazards Program do not indicate any active or inactive faults within the Project Area (USGS, 2017d).

11.1.1.5 Subsidence Potential

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

11.1.2 Geological Resources Impacts/Mitigation

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

Soil borings are currently being completed at all wind turbine locations, the results of which will be used to develop the specific design and construction parameters. Laboratory testing of soil samples obtained from the site and geophysical surveys will be performed to determine the engineering characteristics of the site subgrade soils. If necessary, corrections to roadway and foundation subgrade will be prescribed for unsuitable soils.

As discussed in Section 24.0, the facility will be decommissioned after the end of the Project's operating life. Facilities would be removed in accordance with applicable State and county regulations, unless otherwise agreed to by the landowner. After decommissioning of the Project is complete, the portions of underground facilities located 48 inches below the surface will be abandoned in place and remain beyond the operational lifetime of the facility. However, these remaining facilities would not result in irreversible changes to the underlying geological conditions of the Project Area.

Due to the lack of developed or potential economic mineral resources within the Project Area, construction and operation of the proposed facility poses no impact to economic mineral resources. Therefore, no mitigation is required for impacts to mineral resources.

11.2 Soil Resources

The existing soil resources within the Project Area are described below, followed by a discussion of the potential effects of the proposed Project and mitigation and minimization measures.

11.2.1 Existing Soil Resources

This section describes the existing soil types, erosion potential and slopes, and prime farmland soils within the Project Area.

11.2.1.1 Soil Types

The soils within the Project Area primarily consist of loams, silty loams, and silty clay loams derived mostly from glacial till, alluvium, and the underlying Pierre Shale bedrock. The soils in the Project Area are not highly susceptible to erosion and are generally conducive to crop production (Natural Resources Conservation Service [NRCS], 2018).

Nearly half of the soils within the Project Area have the potential to be highly corrosive to buried steel, while nearly all the soils within the Project Area have the potential to be moderately corrosive to concrete. Soils are not interpreted to be expansive based upon indicated soil classifications. The majority of soils in the Project Area are well drained, and only approximately 7 percent of the soils have a significant hydric component (30 to 100 percent of the soil is hydric). Approximately 8 percent of the soils are considered to have a high potential for frost action (NRCS, 2017). Table 11-1 lists the soil types comprising more than 1 percent of the Project Area and the characteristics of these soils, and Figure 7 in Appendix A illustrates the soil types and distributions within the Project Area.

11.2.1.2 Erosion Potential and Slopes

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. The soils in the Project Area are moderately susceptible to erosion and have K Factors ranging from 0.05 to 0.37, with the majority between 0.24 and 0.32. The Project Area slope ranges from 0 to 40 percent, with the majority of slope at 1 to 6 percent.

Table 11-1: Soil Types Within the Project Area

Soil Type	Soil Taxonomy	Soil Texture	Parent Material	Natural Drainage Class	Depth to Restrictive Feature (inches)	Acres in Project Area	Percent of Project Area
HnB (Homme-Ethan-Onita complex, 1 to 6 percent slopes)	Fine-silty, mixed, superactive, mesic Typic Haplustolls	Silty clay loam	Periglacial loess over fine-loamy till	Well drained	Greater than 80	8,699	17.3
HmB (Homme-Ethan-Onita complex, 1 to 6 percent slopes)	Fine-silty, mixed, superactive, mesic Typic Haplustolls; fine-loamy, mixed, superactive, mesic Typic Calciustolls; and fine, smectitic, mesic Pachic Argiustolls	Silty clay loam	Glacial drift, glacial till, or alluvium	Well drained	Greater than 80	8,350	16.6
HpB (Homme-Ethan-Tetonka complex, 0 to 6 percent slopes)	Fine-silty, mixed, superactive, mesic Typic Haplustolls; Fine-loamy, mixed, superactive, mesic Typic Calciustolls; Fine, smectitic, mesic Argiaquic Argialbolls	Silty clay loam	Glacial drift, glacial till, or alluvium	Poorly to well drained	Greater than 80	3,401	6.8
EpC (Ethan-Homme complex, 6 to 9 percent slopes)	Fine-loamy, mixed, superactive, mesic Typic Calciustolls and fine-silty, mixed, superactive, mesic Typic Haplustolls	Silty clay loam	Glacial till	Well drained	Greater than 80	2,869	5.7
EuC (Ethan-Homme complex, 6 to 9 percent slopes)	Fine-loamy, mixed, superactive, mesic Typic Calciustolls	Loam	Fine-loamy till	Well drained	Greater than 80	2,450	4.9
EnC (Ethan-Bonilla loams, 1 to 9 percent slopes)	Fine-loamy, mixed, superactive, mesic Typic Calciustolls and Pachic Haplustolls	Loam	Glacial till	Well drained	Greater than 80	2,116	4.2
HrB (Homme-Onita silty clay loams, 1 to 6 percent slopes)	Fine-silty, mixed, superactive, mesic, Typic Haplustolls and fine, smectitic, mesic Pachic Argiustolls	Silty clay loam	Glacial drift, alluvium	Well drained	Greater than 80	1,988	3.9

Soil Type	Soil Taxonomy	Soil Texture	Parent Material	Natural Drainage Class	Depth to Restrictive Feature (inches)	Acres in Project Area	Percent of Project Area
HoB (Homme-Onita silty clay loams, 1 to 6 percent slopes)	Fine-silty, mixed, superactive, mesic Typic Haplustolls	Silty clay loam	Periglacial loess over fine-loamy till	Well drained	Greater than 80	1,942	3.9
EoD (Ethan-Davis loams, 9 to 15 percent slopes)	Fine-loamy, mixed, superactive, mesic Typic Calciustolls and Pachic Haplustolls	Loam	Glacial till	Well drained	Greater than 80	1,108	2.2
HoA (Homme-Onita silty clay loams, 0 to 2 percent slopes)	Fine-silty, mixed, superactive, mesic Typic Haplustolls	Silty clay loam	Periglacial loess over fine-loamy till	Well drained	Greater than 80	1,102	2.2
On (Mobridge silt loam, 0 to 2 percent slopes)	Fine-silty, mixed, superactive, mesic Pachic Argiustolls	Silt loam	Colluvial-alluvial sediments	Well drained	Greater than 80	1,092	2.2
EtD (Ethan-Betts loams, 9 to 15 percent slopes)	Fine-loamy, mixed, superactive, mesic Typic Calciustolls	Loam	Fine-loamy till	Well drained	Greater than 80	974	1.9
HtB (Homme-Onita complex, 2 to 6 percent slopes)	Fine-silty, mixed, superactive, mesic Typic Haplustolls	Silty clay loam	Periglacial loess over fine-loamy till	Well drained	Greater than 80	953	1.9
CsB (Clarno-Ethan-Bonilla loams, 2 to 6 percent slopes)	Fine-loamy, mixed, superactive, mesic Typic Haplustolls, Typic Calciustolls, Pachic Haplustolls	Loam	Glacial till	Well drained	Greater than 80	896	1.8
Te (Tetonka silt loam, 0 to 1 percent slopes)	Fine, smectitic, mesic Argiaquic Argialbolls	Silt loam	Alluvium	Poorly drained	Greater than 80	785	1.6

Soil Type	Soil Taxonomy	Soil Texture	Parent Material	Natural Drainage Class	Depth to Restrictive Feature (inches)	Acres in Project Area	Percent of Project Area
Bo (Bon loam, channeled)	Fine-loamy, mixed, superactive, mesic Cumulic Haplustolls	Loam	Local alluvium	Moderately well drained	Greater than 80	744	1.5
BeE (Betts-Ethan loams, 9 to 25 percent slopes)	Fine-loamy, mixed, superactive, messic Typic Cacliustepts, and Typic Calciustolls	Loam	Glacial till	Well drained	Greater than 80	725	1.4
CeB (Clarno-Ethan loams, 2 to 6 percent slopes)	Fine-loamy, mixed, superactive, mesic Typic Haplustolls	Loam	Fine-loamy till	Well drained	Greater than 80	720	1.4
HmA	Fine-silty, mixed, mesic Typic Haplustolls	Silty clay loam	Silty drift over loamy till	Moderately well drained	Greater than 80	674	1.3
Tn (Tetonka-Chancellor silty clay loams)	Fine, smectitic, mesic Argiaquic Argialbolls and Vertic Argiaquolls	Silty clay loam	Alluvium	Poorly drained	Greater than 80	644	1.3
HtA	Fine-silty, mixed, superactive, mesic Typic Haplustolls	Silty clay loam	Periglacial loess over fine-loamy till	Well drained	Greater than 80	639	1.3
CmB (Clarno-Bonilla loams, 2 to 6 percent slopes)	Fine-loamy, mixed, superactive, mesic Typic and Pachic Haplustolls	Loam	Glacial till	Moderately to well drained	Greater than 80	545	1.1

Source: NRCS, 2018

11.2.1.3 Prime Farmland Soils

NRCS farmland classifications include "prime farmland" (land that has the best combination of physical and chemical characteristics for the production of crops), "farmland of statewide importance" (land other than prime farmland that has a good combination of physical and chemical characteristics for the production of crops), and "not prime farmland" (land that does not meet qualifications for prime farmland), among other classifications. The majority of the farmland in the Project Area is classified as either "prime farmland" (32 percent) or "farmland of statewide importance" (36 percent). Approximately 15 percent is categorized as "not prime farmland." The remaining 17 percent is divided among "prime farmland" categories with stipulations. Farmland types within the Project Area are shown in Table 11-2.

Table 11-2: Farmland Types Within the Project Area

Farmland Type	Area (acres)	Percentage of Project Area
Prime farmland	16,004	32%
Farmland of statewide importance	18,171	36%
Not prime farmland	7,409	15%
Prime farmland if drained	4,958	10%
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	632	1%
Prime farmland if irrigated	3,190	6%
Total	50,364	100%

11.2.2 Soil Resources Impacts/Mitigation

The following sections describe the potential effects of the proposed Project on soil resources. Where applicable, planned measures to avoid, minimize, or mitigate impacts are noted.

11.2.2.1 Potential for Impacts to Soil Resources

Construction of up to 61 wind turbine foundations and associated access roads, collector lines, substations, and O&M facilities would result in approximately 734 acres of temporary disturbance and approximately 45 acres of permanent impacts to soils within the Project Area. During construction, the minimum amount of existing vegetation would be removed in the areas associated with the proposed Project components, potentially temporarily increasing the risk of erosion, which is discussed in more detail below. As discussed in Section 24.0, the Project would be decommissioned after the end of the its operating life. Facilities would be removed in accordance with applicable State and County regulations, unless otherwise agreed to by the landowner. Disturbed surfaces would be graded, reseeded, and restored

as nearly as possible to their preconstruction conditions. After decommissioning of the Project is complete, no irreversible changes to soil resources would remain beyond the operating life of the Project.

11.2.2.2 Erosion, Slope Stability, and Sedimentation

The Applicant will design the Project layout to limit construction cut and fill work and limit construction in steep slope areas. Wind turbines are generally located at higher elevations to maximize exposure to wind and sited to avoid steep slope areas for foundation installation. The current layout has sited access roads to avoid steep slopes as much as practicable, and the underground collector lines similarly avoid crossing steep ravines whenever feasible.

Surface disturbance caused by construction of the wind turbines and infrastructure improvements would result in the soil surface becoming temporarily more prone to erosion. Another potential issue is soil compaction, which can occur by use of heavy equipment. Silt and clay soils are especially susceptible to this. Measures to reduce impacts to soils would be implemented during construction. These may include the use of erosion and sediment control during and after construction, noxious weed control, segregating topsoil from subsurface materials, reseeding of disturbed areas, the use of construction equipment appropriately sized to the scope and scale of the Project, confirming access road grades fit closely with the natural terrain, proper onsite disposal of soil cuttings from turbine foundation construction, and maintaining proper drainage.

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

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

ARSD 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 groundwater;

(5) A description of designs for storage, reprocessing, and cooling prior to discharge of heated water entering natural drainage systems; and

(6) If deep well injection is to be used for effluent disposal, a description of the reservoir storage capacity, rate of injection, and confinement characteristics and potential negative effects on any aquifers and groundwater users which may be affected.

The following sections describe the existing hydrology within the Project Area, the potential effects of the proposed Project on hydrology, and measures that will be utilized to avoid, minimize, and/or mitigate potential impacts.

12.1 Groundwater Resources

The existing groundwater resources within the Project Area are described below, followed by a discussion of the potential effects of the proposed Project and avoidance, minimization, and/or mitigation measures.

12.1.1 Existing Groundwater Resources

The groundwater system underlying the parts of South Dakota that are east of the Missouri River, including the Project Area, is nearly exclusively based on glacial outwash aquifers. According to the SDGS, there are approximately 444 public water supply systems east of the Missouri River, and 392 of them utilize glacial outwash aquifers (Iles, 2008). This is consistent with the types of the soils in the area, many of which were formed from glacial till or glacial drift. Glacial drift and alluvium aquifers in South Dakota vary in depth from 0 to 400 feet, with a range of yield from 3 to 50 gallons per minute (Chadima, 1994). Unlike bedrock-type aquifers, glacial outwash aquifers are extremely difficult to predict at the subsurface; however, the quality of water from glacial outwash aquifers tends to exceed that of water derived from bedrock-type aquifers.

12.1.2 Groundwater Resources Impacts/Mitigation

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

Groundwater dewatering is not anticipated to be a major concern within the Project Area, because wind turbines will most likely be placed at higher elevation where the water table tends to be deeper. Should groundwater be encountered that must be dewatered, the necessary permits would be obtained, and the duration of dewatering would be limited to the extent possible. Dewatered groundwater would be properly handled to allow sediments to settle out and be removed before the water is discharged, to reduce soil erosion and sedimentation of surface waters.

12.2 Surface Water Resources

The existing surface water resources within the Project Area are described below (and shown on Figure 8), followed by a discussion of the potential effects of the proposed Project, and avoidance, minimization, and/or mitigation measures.

12.2.1 Existing Surface Water Resources

This section describes the existing hydrology, floodplains, NPS Nationwide Rivers Inventory (NRI) resources, and impaired waters within the Project Area.

12.2.1.1 Hydrology

The Project Area is located within the Missouri River Basin surface water drainage system. Based on information obtained from the U.S. Army Corps of Engineers' (USACE) *Final Environmental Impact Statement, Master Water Control Manual, Review and Update Study for the Missouri River*, this drainage system has a total drainage area of approximately 529,350 square miles, including approximately 9,700 square miles in Canada (USACE, 2004). The Missouri River flows from the confluence of the Jefferson, Madison, and Gallatin rivers in southwestern Montana, approximately 2,320 miles prior to converging with the Mississippi River directly upstream of St. Louis, Missouri (USACE, 2004). Six mainstem reservoir system dams (including the major streams and tributaries) are associated with the Missouri River Basin: (1) Fort Peck, (2) Garrison, (3) Oahe, (4) Big Bend, (5) Fort Randall, and (6) Gavins Point.

The Missouri River Basin surface water drainage system consists of region, sub-region, basin, and sub-basin drainages. The Project Area is associated with the Missouri-Big Sioux Sub-Region of the Missouri Region. The Project Area is in the Lewis and Clark Lake Sub-Basin. Choteau Creek, located west of the Project Area, is part of the Lewis and Clark Lake Sub-Basin drainage system. Drainage generally flows from the northwest to the southeast within this Sub-Basin. Named streams of the Lewis and Clark Lake Sub-Basin that extend through the Project Area include Dry Choteau Creek and Little Emanuel Creek (Figure 8 in Appendix A).

12.2.1.2 National Park Service Nationwide Rivers Inventory

The NRI is a "listing of more than 3,400 free-flowing river segments in the U.S. that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance. Under a 1979 Presidential Directive, and related Council on Environmental Quality procedures, all Federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI segments" (NPS, 2017b). There are no NRI-listed rivers within the Project Area. The nearest NRI-listed river is the James River, located approximately 16 miles east of the Project Area.

12.2.1.3 Impaired Waters

The CWA requires states to publish biannually a list of streams and lakes that are not meeting their designated uses because of excess pollutants. These streams and lakes are considered impaired waters (EPA, 2017a). The list, known as the 303(d) list, is based on violations of water quality standards. States establish priority rankings for waters on the 303(d) list and develop the total maximum daily load (TMDL) of a pollutant that the water can receive and still safely meet water quality standards. There are no 303(d)-listed water bodies within the Project Area, but the nearest downstream 303(d)-listed water body to the Project Area, Emanuel Creek, is located approximately 2 miles east and is within the Lewis and Clark Lake Sub-Basin (SDDENR, 2016).

12.2.1.4 Floodplains

Based on available Federal Emergency Management Agency (FEMA) flood maps, there are no FEMA-mapped floodplains within the Project Area. FEMA flood maps are available for Charles Mix and Hutchinson counties but have not been produced for Bon Homme County. The nearest mapped floodplains to the Project area are along Choteau Creek, over 1 mile southwest of the Project Area (Figure 8 in Appendix A).

12.2.2 Surface Water Resources Impacts/Mitigation

Potential impacts to water resources from the construction and operation of wind projects include deterioration of surface water quality through sedimentation, impacts to drainage patterns, impacts to flood storage areas, and increased runoff due to the creation of impervious surfaces. Project facilities have been designed to avoid impacts on surface water resources to the extent practicable. Therefore, the Project is not expected to cause significant changes in runoff patterns or volume of runoff, nor is it expected to have adverse impacts on existing hydrology. During construction, BMPs will be implemented to control erosion and reduce potential for sediment runoff from exposed soils during precipitation events.

In general, because wind turbines would be located at higher elevations within the Project Area to maximize wind exposure, impacts to ephemeral streams and drainage ways are not anticipated from turbine sites. The underground collection system may temporarily impact surface drainage patterns during construction if the collection system is trenched through drainage ways; however, these impacts would be short-term, and existing contours and drainage patterns are expected to be restored within 24 hours of trenching. Where stream/drainage crossings cannot be avoided for construction of access roads, appropriately designed culverts or low water crossings would be placed to maintain the free flow of water. The permanent use of approximately 45 acres of land for the wind farm facilities would be spread throughout the 50,364-acre Project Area and are not expected to change existing drainage patterns.

The creation of impervious surfaces reduces the capacity of an area to absorb precipitation into the soil and can increase the volume and rate of storm water runoff. The Project would create up to 45 acres of impermeable surface through the construction of turbine pads, access roads, meteorological equipment, the O&M facility, and the collector substation. The wind turbine pads, access roads, and O&M facility and substation yards would be constructed of compacted gravel and would not be paved. However, this level of compaction may inhibit infiltration and may increase runoff in these areas.

The 45 acres of permanent disturbance represents less than 0.1 percent of the total area within the Project Area. Therefore, the Project is not expected to cause significant changes in runoff patterns or volume. As noted above, appropriate storm water management BMPs would be implemented during the construction and operation of the Project. These BMPs are anticipated to adequately mitigate for runoff due to the increase in impervious surface.

12.2.2.1 Impacts to NRI-Listed Rivers and Mitigation

Due to the lack of NRI-listed rivers within the Project Area, construction and operation of the proposed facility poses no impact to these resources. Therefore, no mitigation is required for impacts to NRI-listed rivers.

12.2.2.2 Impacts to Impaired Waters and Mitigation

Due to the lack of 303(d)-listed water bodies within the Project Area, construction and operation of the proposed facility will not impact these resources. Therefore, no mitigation is required for impacts to 303(d)-listed water bodies. As discussed in Section 11.2.2.2, construction of the Project would require development and implementation of a SWPPP and BMPs in accordance with the General Permit for Storm Water Discharges Associated with Construction Activities issued by the SDDENR.

12.2.2.3 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, Project facilities have been designed to avoid impacts on surface water resources to the extent practicable. No FEMA-mapped floodplains are located within the Project Area, and, therefore, no mitigation is proposed for impacts to flood storage areas.

12.2.3 Current and Planned Water Uses

The current and planned water uses within the Project Area are described below, followed by a discussion of the potential effects of the proposed Project, and avoidance, minimization, and/or mitigation measures.

12.2.3.1 Current and Planned Water Uses within Project Area

B-Y Water District in Tabor supplies rural water to the Project Area and maintains a network of distribution lines within the Project Area. Private wells that supply water for domestic and irrigation purposes are also located throughout the Project Area. Streams within the Project Area, including Dry Choteau Creek and Little Emanuel Creek (Figure 8 in Appendix A), as well as lakes and ponds, provide habitat for fish and wildlife and support recreational activities, such as fishing.

12.2.3.2 Effect on Current or Planned Water Use

The proposed Project facilities would not have impacts on either municipal or private water uses in the Project Area. Water storage, reprocessing, or cooling is not required for either the planned construction or

operation of the facilities. The Project facilities would not require deep well injection. The Project operation would not require the appropriation of surface water or permanent dewatering. The Applicant would connect the O&M facility to the rural water system. Water usage at the O&M facility would be similar to household volume, fewer than 5 gallons per minute.

The Applicant would coordinate with the B-Y Water District to locate and map its network of distribution lines within the Project Area and determine if a rural water supply connection is necessary for the Project. Disruption to existing water lines would be avoided by Project design and construction. The Applicant would obtain crossing permits or approvals from from the B-Y Water District, as needed.

Alternatively, a water supply well would be required if rural water service is not available. The Applicant would work with the SDDENR to obtain the necessary water rights permit. The specific aquifer to be used and the characteristics of that aquifer would depend on the location of the water supply well. Water usage at the O&M facility would be negligible (similar to household volume, as stated above). Therefore, regardless of the water supply well location and aquifer source, the Project would not affect aquifer recharge rates. The Project would comply with applicable permit requirements for water rights and the protection of groundwater quality.

The construction of wind farm facilities can interrupt the availability of groundwater through construction dewatering. Construction dewatering may temporarily lower the water table such that nearby wells may lose some of their capacity. However, the Project is not expected to require major dewatering; therefore, interruption of groundwater availability caused by dewatering is unlikely. In the event potential temporary dewatering wells are necessary during construction activities, the temporary wells would be installed and then decommissioned as required by South Dakota law.

The Project would have no impact on surface water availability or use for communities, agriculture, recreation, fish, or wildlife. As discussed in Section 13.3.2, minimal permanent impacts to wetlands and streams are anticipated. Following construction, temporary impacts to wetlands and streams would be restored to pre-construction conditions.

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

ARSD 20:10:22:16. Effect on terrestrial ecosystems. *The applicant shall provide information on the effect of the proposed facility on the terrestrial ecosystems, including existing information resulting from biological surveys conducted to identify and quantify the terrestrial fauna and flora potentially affected within the transmission site, wind energy site, or siting area; an analysis of the impact of construction and operation of the proposed facility on the terrestrial biotic environment, including breeding times and places and pathways of migration; important species; and planned measures to ameliorate negative biological impacts as a result of construction and operation of the proposed facility.*

The following sections describe the existing terrestrial ecosystems within the Project Area, potential effects of the proposed Project on these terrestrial systems, and mitigation and minimization measures planned to lessen or avoid potential impacts to terrestrial systems. Terrestrial ecosystem data were collected from literature searches, Federal and State agency reports, natural resource databases, and field surveys completed for the Project. Specific resources discussed in the following sections include vegetation, wetlands, and wildlife, including federally and state-listed species.

13.1 Vegetation

The existing vegetation within the Project Area is described below, followed by a discussion of the potential effects of the proposed Project and mitigation and minimization measures.

13.1.1 Existing Terrestrial Ecosystem

The Project Area is located within two Level IV Ecoregions: Southern Missouri Coteau and Southern Missouri Coteau Slope (Bryce, et al., 1996).

The Southern Missouri Coteau is located in the southern fringe of continental glaciation and exhibits muted coteau topography with gentle undulations rather than steep hummocks. It also contains a small amount of high wetland density and more stream erosion backcutting into areas of internal drainage. For this reason, there is more tilled land on the Southern Missouri Coteau because of the gentler topography. Specifically, soybeans and corn are major crops planted due to the gentler topography and milder climate with increased precipitation. Natural vegetation in the region includes western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella virifula*), needle and thread (*Hesperostipa comata*), and porcupine grass (*Miscanthus sinensis*). Prairie cordgrass (*Spartina pectinata*) and northern reedgrass (*Calamagrostis stricta*) are present in poorly drained areas.

The Southern Missouri Coteau Slope contains mesic soils rather than frigid soils and a substantial cap of rock-free loess. Sunflowers, wheat, millet, and barley are planted in the level to rolling uplands of the Southern Missouri Coteau Slope. Corn is a marginal crop that does well in wet years. Willows (*Salix*

spp.), green ash (*Fraxinus pennsylvanica*), and elm (*Ulmus* spp.) grow in the riparian areas, and western wheatgrass, green needlegrass, big bluestem (*Andropogon gerardi*), and needle and thread are scattered throughout the region. Stream drainages tend to be grazed.

The majority of the Project Area has been converted to agricultural use, with crop production and livestock grazing as the main agricultural practices. Trees and woodlands are found mainly in planted shelter belts and within draws and on hillslopes. Wetlands are scattered throughout the Project Area.

13.1.1.1 Native Grassland

Native grasslands provide important habitat for various wildlife species including songbirds and ground-nesting raptors and owls. In the context of wind farm development, habitat fragmentation can occur during siting of access roads, which may bisect existing, larger areas of habitat. Wind turbines themselves do not generally pose the same concern for habitat fragmentation because they are not linear. The USFWS and SDGFP consider untilled grasslands, which include pastures and fallow fields, as native grasslands that may provide important wildlife habitat (USFWS and SDGFP pers comm, 2018)

In 2016, a desktop review of potential native/untilled grasslands was conducted by reviewing the U.S. Department of Agriculture (USDA) National Agriculture Imagery Program imagery (USDA, 2015a), the 2015 USDA Cropland Data Layer (USDA, 2015b) and the *Quantifying Undisturbed (Native) Lands in Eastern South Dakota: 2013* (Bauman et al., 2013) digital data layer to further evaluate potential for past disturbances. Untilled grasslands were then field verified in the fall of 2016 by visiting locations identified during the desktop review as potential untilled/native grasslands, which included pastures. In 2018, the Applicant completed an updated analysis to identify potential native grasslands within the current Project Area (Appendix B). Areas of untilled grasslands were again identified based on a review of the USDA National Agriculture Imagery Program imagery (USDA, 2016a), the latest available USDA Cropland Data Layer (USDA, 2016b) and the *Quantifying Undisturbed (Native) Lands in Eastern South Dakota: 2013* (Bauman et al., 2013) digital data layer. In 2018, a total of 4,882 acres of untilled grasslands within the Project Area were identified based on the desktop analysis. The 2018 potential untilled grassland areas are displayed on Figure 9 in Appendix A. Areas of potential untilled grasslands will be field verified again during the May-June 2018 wetland delineation surveys. Areas that were added to the Project Area since the 2016 field verification (primarily in the northwest and northeast corners) will be field verified, as well as areas that show recent signs of being tilled or disturbed based on the updated desktop analysis.

13.1.1.2 Noxious Weeds

Noxious weeds are regulated by State (SDCL 38-22) and Federal (U.S. CFR 2006) rules and regulations designed to stop the spread of plants that are detrimental to the environment, crops, livestock, and/or public health. According to the South Dakota Department of Agriculture (SDDOA), 14 listed species of noxious weeds have the potential to occur and are regulated within Charles Mix, Hutchinson and/or Bon Homme counties (SDDOA, 2012) (Table 13-1).

Table 13-1: State and Local Noxious Weeds of South Dakota

Common Name	Scientific Name	Weed Status
Canada thistle	*Cirsium arvense*	State noxious weed
Hoary cress	*Cardaria draba*	State noxious weed
Leafy spurge	*Euphorbia esula*	State noxious weed
Perennial sow thistle	*Sonchus arvensis*	State noxious weed
Purple loosestrife	*Lythrum salicaria*	State noxious weed
Russian knapweed	*Centaurea repens*	State noxious weed
Salt cedar	*Tamarix aphylla, T. chinensis, T. gallica, T. parviflora, and T. ramosissima*	State noxious weed
Absinth wormwood	*Artemisia absinthium*	Local noxious weed – Bon Homme/ Hutchinson counties
Bull thistle	*Cirsium vulgare*	Local noxious weed – Hutchinson County
Common mullein	*Verbascum thapsus*	Local noxious weed – Hutchinson County
Field bindweed	*Convolvulus arvensis*	Local noxious weed – Bon Homme/ Hutchinson counties
Musk thistle	*Carduus nutans*	Local noxious weed – Bon Homme/ Hutchinson counties
Plumeless thistle	*Carduus acnthoides*	Local noxious weed – Bon Homme/ Hutchinson counties
Spotted knapweed	*Centaurea maculosa*	Local noxious weed – Bon Homme/ Hutchinson counties

13.1.2 Vegetation Impacts/Mitigation

The proposed Project would result in approximately 734 acres of temporary disturbance and 45 acres of disturbance to vegetation (predominantly cropland and grassland/pasture) during the operational life of the Project. Direct impacts would occur due to construction of the wind turbine foundations, access roads, collector substation, meteorological equipment, O&M facility, and collector lines. These impacts would result in a temporary loss of production of crops and pasture grasses. Impacts that would occur to

cultivated lands are not considered biologically significant, because these lands are frequently disturbed by tilling, planting, and harvesting activities associated with crop production. For further discussion of impacts to agricultural cropland, see Section 15.1.2.

Temporary impacts would be mitigated through BMPs, such as re-vegetation and erosion control measures. These measures would reduce temporary impacts to vegetative communities adjacent to the Project facilities. Specific BMPs would be used for any construction within grassland/pasture and would include the following measures:

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

The Project would not involve any major tree clearing activities. Turbines were sited in open upland areas. When feasible, access roads, collector lines and crane paths were sited to avoid crossing tree rows. Some minor clearing of brush may be required for collector lines and access roads. In areas where access roads may need to cross windrows due to engineering restrictions or the layout of leased lands, the Applicant would work with the landowner in order to develop an appropriate alignment that would be the least intrusive.

13.1.3 Native Grassland

The Project facilities have been sited to avoid native grasslands (i.e., untilled grasslands; primarily pastures), to the extent practicable. Based on the 2018 desktop review of potential untilled grassland areas, 1 of the 63 turbine locations is located in untilled grassland (Figure 9). Only approximately 1 acre (2 percent) of long-term Project disturbance would occur in untilled grasslands. In areas where impacts cannot be avoided, temporary impacts would be minimized through construction BMPs (i.e., re-vegetation and erosion control measures).

13.1.4 Noxious Weeds

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. Noxious weeds would be controlled, and impacts would be minimized using weed-free seed mixes and controlled spraying, as necessary.

13.2 Special Status Plant Species

The special status plant species identified within the Project Area are described below, followed by a discussion of the potential effects of the proposed Project, and avoidance, minimization, and/or mitigation measures.

13.2.1 Existing Special Status Plant Species

Based on initial Project scoping conducted for the Project on the USFWS Information for Planning and Conservation (IPaC) online review tool, one special status plant species, the western prairie fringed orchid, has the potential to occur in the Project Area (USFWS, 2018a). The western prairie fringed orchid is federally listed as threatened under the ESA. The orchid occurs in moist tallgrass prairies and sedge meadows and was historically found throughout the tallgrass regions of North America, including South Dakota.

13.2.2 Special Status Plant Species Impacts

No impacts are likely to occur to western prairie fringed orchid, as this species is possibly extirpated from South Dakota. However, a habitat assessment will be completed during the wetland delineation work scheduled to be completed in in June 2018; if suitable habitat is identified, areas of ground disturbance will be surveyed during the orchid's blooming period (July) prior to construction. If the species cannot be avoided, USFWS will be contacted for guidance.

13.3 Wetlands and Waterbodies

The wetlands and waterbodies identified within the Project Area are described below, followed by a discussion of the potential effects of the proposed Project, and avoidance, minimization, and/or mitigation measures. While aquatic in nature, wetlands and waterbodies are important functional components of the terrestrial ecosystem and are thus discussed in this section.

13.3.1 Existing Wetlands and Waterbodies

Wetlands are defined in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987) as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." The Manual identifies three wetland criteria that must be met in order for a wetland to be present: dominance of hydrophytic vegetation, hydric soils, and sufficient

hydrology. Some wetlands, as well as other waterbodies are considered waters of the U.S. under Section 404 of the CWA and are, therefore, regulated by the USACE with respect to discharge of fill material into the water features.

The Applicant conducted desktop wetland determination reviews for the proposed Project to identify potential wetlands in the Project Area (see Appendix C). A total of 2,696 acres of known and potential wetlands were identified within the Project Area based on this review (Figure 8 in Appendix A). Table 13-2 summarizes the types and proportions of wetlands found within the Project Area, per the Cowardin Classification System.

Table 13-2: Wetland Types Mapped Within the Project Area

Cowardin Classification	Proportion
Palustrine Emergent (PEM)	75%
Palustrine Aquatic Bed (PAB)	11%
Riverine Intermittent/Ephemeral (R4/R5)	6%
Lacustrine Aquatic Bed (L2AB)	5%
Palustrine Forested (PFO)	3%
Palustrine Unconsolidated Bottom (PUB)	<1%

Source: Wetland Desktop Determination (Appendix C)

A field wetland delineation will be completed in June 2018 to confirm the presence or absence of wetlands and their boundaries where Project infrastructure (temporary and permanent) is proposed.

13.3.2 Wetland and Waterbody Impacts/Mitigation

Impacts to wetland resources could occur by directly filling wetlands due to Project construction, or by otherwise negatively altering their quality. The Applicant anticipates that the Project would avoid permanent impacts to most wetland areas. Based on the desktop wetland determination, the Project would potentially result in permanent impacts to two wetlands (0.0042 acre and 0.0002 acre of impacts, respectively) and would cross three intermittent streams (62.4 linear feet of stream segments). These permanent impacts are a result of access road crossings of these wetlands and streams. Culverts would be installed as needed at stream crossings to allow continued water flow. The Project would potentially result in temporary impacts to 62 wetlands and streams for a total of 3.7 acres of impacts. These temporary impacts are associated with temporary disturbance from installation of Project facilities. Following construction, temporarily disturbed areas in wetlands and streams would be restored to pre-construction conditions. To further protect wetlands, BMPs for sediment and erosion control, as prescribed by the Project SWPPP, would be implemented. In order to limit the risk of contamination of wetlands due to

accidental spilling of fuels or other hazardous substances, construction equipment would be refueled in areas away from wetlands or drainage areas, and a spill kit would be available at the construction site.

The field wetland delineation will be completed in June 2018. If the results of the field delineation indicate that the Project will result in impacts to wetland or waters of the U.S., the Applicant will obtain necessary Section 404 permits from the USACE to authorize these impacts. Based on the desktop wetland determination, it is anticipated that Project impacts to wetlands and streams would be authorized under a USACE Nationwide Permit (NWP) 12.

13.4 Wildlife

In order to reduce the potential impacts of wind energy facilities on wildlife species and habitat, the USFWS has developed the Land-Based Wind Energy Guidelines (WEG; USFWS, 2012) and the Eagle Conservation Plan Guidance (ECPG; USFWS, 2013a). These voluntary guidelines provide a structured, scientific approach for assessing wildlife risks at wind energy facilities, promote communication between project proponents and Federal/State agencies, and provide a practical approach to address wildlife conservation concerns at all stages of land-based wind energy development. SDGFP, in cooperation with the South Dakota Bat Working Group, has also developed siting guidelines for wind energy projects to address potential impacts to natural resources (South Dakota Bat Working Group and SDGFP, undated). These guidelines are generally consistent with the WEG, but also provide guidance for other non-wildlife resources (e.g., land use, noise, visual resources, soil erosion and water quality).

The Applicant followed the processes outlined in the WEG, ECPG, and SD siting guidelines for developing, constructing, and operating wind energy projects. The Applicant has engaged in ongoing coordination with the USFWS and SDGFP to seek input on wildlife resources potentially occurring within the Project Area and to seek guidance on the appropriate studies to evaluate risk and inform development of impact avoidance and minimization measures for the Project. Summaries of coordination meetings are included in Section 27.2.

13.4.1 Existing Wildlife

The wildlife identified within the Project Area is described below, followed by a discussion of the potential effects of the proposed Project's construction and operation and mitigation and minimization measures.

13.4.1.1 Initial Site Assessment

In accordance with Tiers 1 and 2 of the WEG, Stage 1 of the ECPG, and the SD Siting Guidelines, a review of readily available desktop information was completed in 2015 to assess potential adverse effects

to species of concern and their habitats. Data sources included the USFWS IPaC website; the South Dakota Natural Heritage Database; the USGS Breeding Bird Survey; aerial imagery; and non-governmental organization websites (e.g., Audubon Society, American Wind Wildlife Institute Landscape Assessment Tool, e-Bird, and the Hawk Migration Association of North America). The area covered by the desktop review was considerably larger than the 2015 Project boundary and covered the entire current Project Area and much of the surrounding areas.

Wildlife species associated with croplands, grasslands, and shrublands are the most common types of species observed and expected to occur within the Project Area. The information presented in this section and additional information on wildlife in the Project Area is provided in the *Tiers 1 and 2 Report for the Prevailing Winds Wind Project* included in Appendix D of this Application. The Project boundary at the time the Tiers 1 and 2 assessment was completed is shown on Figure 1 of the report in Appendix D. While the Project boundary has evolved and moved further north since 2015, the results of the 2015 Tiers 1 and 2 assessment are representative of the current Project Area given the topography, vegetation, and habitat types present.

Migratory Birds

Although not protected under the ESA, numerous bird species have been identified by the USFWS as Birds of Conservation Concern (BCC; USFWS, 2008). These are "species, subspecies, and populations of migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973" (USFWS, 2008). The Project Area lies within Bird Conservation Region (BCR) 11 (Prairie Potholes), a landscape dotted with many small depressional wetlands called potholes.

A total of 27 bird species are listed as BCC within BCR 11 (USFWS, 2008; Appendix B of the Tiers 1 and 2 Report, Appendix D), many of which would have potential for occurrence within the Project Area (Jennings et al., 2005). Three diurnal raptors are among the BCC within BCR 11 with potential to occur in the Project Area: bald eagle (*Haliaeetus leucocephalus*), Swainson's hawk (*Buteo swainsoni*), and peregrine falcon (*Falco peregrinus*). In addition to bald eagles, golden eagles (*Aquila chrysaetos*) have the potential to occur in the Project Area during some time of the year. Bald and golden eagles are protected by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). Swainson's hawks may breed in the Project Area, and peregrine falcons potentially migrate through the Project Area (Jennings et al., 2005). The remaining BCC species are a mix of shorebirds, waterbirds, owls, woodpeckers, and passerines, all of which likely have some potential for impacts from

wind energy development (*Bird Species of Conservation Concern within the Prairie Potholes Region* in Appendix B of the Tiers 1 and 2 Report, Appendix D).

Raptors

The following diurnal raptor and vulture species could potentially breed in or near the Project Area: American kestrel (*Falco sparverius*), bald eagle, golden eagle, Cooper's hawk (*Accipiter cooperii*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk (*B. regalis*), Swainson's hawk, broad-winged hawk (*B. platypterus*), peregrine falcon, osprey, and turkey vulture (*Cathartes aura*) (Jennings et al., 2005). Owls with the potential to breed in or near the Project Area include barn owl (*Tyto alba*), burrowing owl (*Athene cunicularia*), eastern screech owl (*Megascops asio*), long-eared owl (*Asio otus*), short-eared owl (*Asio flammeus*), and great horned owl (*Bubo virginianus*) (Jennings et al., 2005).

Diurnal raptor species that may also occur within the Project Area outside of the breeding season (migration, winter, or post-breeding dispersal) include northern goshawk (*Accipiter gentilis*), Cooper's hawk, golden eagle, bald eagle, merlin (*Falco columbarius*), peregrine falcon, prairie falcon (*F. mexicanus*), gyrfalcon (*F. rusticolus*), red-tailed hawk, rough-legged hawk (*Buteo lagopus*), and sharp-shinned hawk (*Accipiter striatus*) (Jennings et al., 2005). Owls that may occur outside of the breeding season include the eastern screech owl, great horned owl, northern saw-whet owl (*Aegolius acadicus*), long-eared owl, and short-eared owl (Jennings et al., 2005).

The Project Area has potential for raptor migration. Several factors influence the migratory pathways of raptors, the most significant of which is geography. Two geographical features often used by raptors during migration are ridgelines and the shorelines of large bodies of water (Liguori, 2005). Updrafts formed as wind hits the ridges, and thermals, created as warmer air rises, make for energy-efficient travel over long distances (Liguori, 2005). For this reason, raptors sometimes follow corridors or pathways, for example, along prominent ridges with defined edges, during migration. Raptors likely migrate through the Project Area in a broad front pattern with some potential for more localized use of the ridge on the southwestern portion of the Project Area (Figure 3 of the Tiers 1 and 2 Report, Appendix D). Trees, shrubs, and water impoundments, which are scattered throughout the Project Area and region, may provide some stopover habitat for migrating raptors (Figure 4 of the Tiers 1 and 2 Report, Appendix D).

Bats

Seven bat species are potential residents and/or migrants in the Project Area and include big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), silver-haired bat

(*Lasionycteris noctivagans*), northern long-eared bat, little brown bat (*Myotis lucifugus*), and western small-footed bat (*Myotis ciliolabrum*). Species occurring in South Dakota and potentially in the Project Area are listed in Table 13-3.

Table 13-3: Bat Species Occurring in South Dakota and Potentially in Project Area

Common Name	Scientific Name	Habitat	Presence in Project Area
Big brown bat	*Eptesicus fuscus*	Common in most habitats, abundant in deciduous forests and suburban areas with agriculture; maternity colonies beneath bark, tree cavities, buildings, barns, and bridges.	Likely
Eastern red bat	*Lasiurus borealis*	Abundant tree bat; roosts in trees; solitary.	Likely
Hoary bat	*Lasiurus cinereus*	Usually not found in man-made structures; roosts in trees; very wide-spread.	Likely
Silver-haired bat	*Lasionycteris noctivagans*	Common bat in forested areas, particularly old growth; maternity colonies in tree cavities or hollows; hibernates in forests or cliff faces.	Likely
Northern long-eared bat	*Myotis septentrionalis*	Associated with forests; chooses maternity roosts in buildings, under loose bark, and in the cavities of trees; caves and underground mines are their choice sites for hibernating. On western edge of range.	Unlikely
Little brown bat	*Myotis lucifugus*	Commonly forages over water; roosts in attics, barns, bridges, snags, and loose bark; hibernacula in caves and mines.	Probable
Western small-footed bat	*Myotis ciliolabrum*	Found in mesic conifer forest, also riparian woodland; roosts in rock outcrops, clay banks, loose bark, buildings, bridges, caves, and mines.	Probable

Source: Tiers 1 and 2 Report (Appendix D)

13.4.1.2 Federal and State Special-Status Terrestrial Species

Federal and State listed threatened and/or endangered species could potentially occur in the Project Area. Based on habitats found within the proposed Project Area, five animal species have the potential to occur in the Project Area during some portion of the year, including: federally endangered interior least tern (USFWS, 2013b) and whooping crane (USFWS, 2015a); and federally threatened piping plover (USFWS, 2013c), red knot (USFWS, 2014a), and northern long-eared bat (USFWS 2016, 2015c). Table 13-4 identifies the potential for each of the listed terrestrial species to occur in the Project Area. These species are discussed in further detail below.

Table 13-4: Federal and State-Listed Terrestrial Species Potentially Occurring in Project Area

Species	Scientific Name	Federal Status	State Status	Potential to Occur
Northern long-eared bat	*Myotis septentrionalis*	Threatened	--	Low. Limited suitable habitat in Project Area. None documented during 2016 acoustic surveys encompassing most current Project Area.
Interior least tern	*Sterna antillarum athalassos*	Endangered	Endangered	Low. No suitable habitat. None observed during avian surveys. Possible migrant.
Whooping crane	*Grus americana*	Endangered	Endangered	Low. Within the SD migration corridor when considered specific to South Dakota. None observed during avian surveys.
Piping plover	*Charadrius melodus*	Threatened	Threatened	Low. No suitable habitat. None observed during avian surveys. Possible migrant.
Red knot	*Calidris canutus rufa*	Threatened	--	Low. No suitable habitat. None observed during avian surveys. Possible migrant.

Sources: IPaC, April 2018; South Dakota Natural Heritage Database, April 2018

Interior Least Tern

The interior least tern nests along sand and gravel bars within wide, unobstructed river channels and open flats along shorelines of lakes and reservoirs (Texas Parks and Wildlife Department [TPWD], 2015). Unnatural water fluctuations, permanent flooding, or vegetation coverage of nesting habitat caused by water management may contribute to nest failure.

Whooping Crane

The whooping crane migrates from its breeding grounds in Wood Buffalo National Park, Canada, to its wintering areas in Aransas National Wildlife Refuge (NWR), Texas (USFWS, 2009). Threats to wild cranes include habitat destruction, chemical spills in its wintering habitat, lead poisoning, collisions with manmade objects such as fences and power lines, disease (e.g., avian cholera and parasites), and shooting (USFWS, 2015a). Cranes typically utilize shallow wetlands and marshes, the edges and sandbars of shallow rivers, and agricultural fields near a water source during migration (USFWS, 2015a).

Piping Plover

The piping plover is typically found on sandy beaches, mudflats, and exposed areas around wetlands and lakes. Suitable nesting habitat includes barren sandbars in large river systems and on alkaline lake shores (USFWS, 2002). Piping plover populations are threatened by habitat loss due to vegetation encroachment,

shoreline development, anthropogenic and animal disturbances, and water management activities, such as dam construction and channelization.

Red Knot

The red knot is a medium-sized shorebird that migrates from its breeding grounds in Canada's Arctic region to multiple wintering grounds, including the northeast Gulf of Mexico, the southeastern U.S., northern Brazil, and Tierra del Fuego at the southern point of South America. During the breeding season, red knots are typically found in sparsely vegetated, dry tundra areas (Harrington, 2001; All About Birds, 2017). Outside of the breeding season, red knots are usually found along intertidal, marine beaches (Harrington, 2001). During migration, some red knots can be found flying over inland areas, but these cases are rare (Sibley, 2003). The red knot population is threatened by habitat loss in migration and wintering areas, reduction of quality and quantity of food resources, asynchronies in timing throughout its breeding and migration range, and high predation on the breeding grounds every 3 to 4 years (USFWS, 2014a).

Northern Long-Eared Bat

The NLEB was listed as a threatened species on April 2, 2015. It is found in the U.S. from Maine to North Carolina on the Atlantic Coast, westward to eastern Oklahoma, and north through part of South Dakota (Bat Conservation International, Inc. [BCI], 2015). The Project Area is on the western fringe of the estimated range for the species (BCI, 2015). This species hibernates in caves and abandoned mines during winter (BCI, 2015); however, no known hibernacula exist in the Project Area, with the closest being located in the Black Hills on the South Dakota/Wyoming border, approximately 275 miles west. During the summer, individuals may roost alone or in small colonies beneath exfoliating bark, or in cavities or crevices of both live and dead trees (BCI, 2015).

13.4.1.3 Studies Conducted to Date

Various wildlife studies were completed for the Project between 2015 and 2018. The Project boundary has evolved and moved further north since wildlife studies began in 2015. The wildlife surveys cover most of the current Project Area. In those portions of the current Project Area that have not been surveyed, the topography, vegetation, and habitat types present are very similar to the conditions within the surveyed areas. Therefore, the wildlife survey data is representative of conditions throughout the current Project Area. The Applicant met with USFWS and SDGFP in December 2017 to reintroduce the Project and provide updated survey results. At that meeting, neither agency recommended additional survey work.

Federal protection is provided for bald and golden eagles, as well as species of migratory birds, through the BGEPA and the MBTA. Both laws are intended to prohibit "take" and regulate impacts to eagles and other migratory birds from direct mortality, habitat degradation, and/or displacement of individual birds. To determine the presence of bird species that occur within the Project Area, the Applicant completed various surveys in accordance with Tier 3 of the WEG, Stage 2 of the ECPG, and USFWS and SDGFP guidance. Surveys included aerial raptor nest surveys and eagle/avian use surveys. In addition to avian surveys, surveys for the federally threatened northern long-eared bat (NLEB) were completed in summer 2015 and summer 2016. The reports detailing the methods and results of the bird and bat surveys are included in Appendices E through K and summarized below.

Raptor and Eagle Nest Surveys

Aerial raptor nest surveys were completed in April 2016 (Appendix E) to characterize the raptor nesting community and locate nests for all raptors within the Project boundary and 1-mile buffer, and for eagles within 10 miles of the Project. The Project boundary at the time the survey was completed is shown on Figure 2 of the report in Appendix E. The current Project Area is within the 10-mile survey buffer for eagles. Aerial surveys were completed prior to leaf-out and during the breeding season when raptors would be actively tending nests, incubating eggs, or brood-rearing. Raptor nest surveys focused on locating stick nest structures in suitable raptor nesting substrate (trees, transmission lines, cliff faces, etc.) within each respective survey area. The 2016 survey area for eagles included the current Project Area and the surrounding lands; the survey area in 2016 for other raptors covered much, but not all of the current Project Area. Unsurveyed areas will be surveyed for raptor nests prior to the re-initiation of construction in spring 2019.

During the April 2016 survey, a total of 44 non-eagle raptor nests (15 occupied and 29 unoccupied) were located within the Project Area and 1-mile buffer. The occupied nests were primarily common species (10 red-tailed hawk, 3 great horned owl, and 2 unknown non-eagle raptor), and none of the unoccupied nests exhibited characteristics of eagle nests.

Three occupied bald eagle nests were recorded during the April 2016 survey, all outside the current Project Area. A total of six bald eagle nests (three occupied; three unoccupied) were documented during the survey; with three occupied bald eagle nests corresponding to known historic nests. The nearest occupied bald eagle nest to the Project Area is located approximately 0.5 mile from the current Project Area boundary. The nest is located approximately 2 miles from the nearest proposed turbine. This nest was confirmed to be active in March 2018 (pers. comm. Clayton Derby, WEST, 2018).

Avian Use Surveys

Two years of avian/eagle use point-count surveys were completed for the Project from March 25, 2015, to April 19, 2017, to evaluate species composition, relative abundance, and spatial characteristics of avian use in accordance with agency recommendations (Appendices F and G). Due to changes in the Project boundary between the first and second years of the point-count surveys, several new point count locations were added in the northern portion of the updated Project boundary for the second year of surveys. Changes to the Project Area in 2018 included the addition of some lands in the northwest and northeast corners of the Project in Charles Mix and Hutchinson counties, respectively. The topography, vegetation, and habitat types present in these additional areas are very similar to the conditions within the surveyed areas. Therefore, the avian use survey data is representative of avian use in the current Project Area.

Fixed-point bird use surveys (variable circular plots) were conducted using methods described by Reynolds et al. (1980), to estimate the seasonal and spatial use of the study area by birds, particularly diurnal raptors (defined here as kites, accipiters, buteos, harriers, eagles, falcons, and osprey). The surveys recorded data for small and large bird species, eagles, and species of concern (i.e., federally or State-threatened and endangered species [Endangered Species Act 1973], USFWS Birds of Conservation Concern [BCC; USFWS, 2008], and South Dakota Species of Greatest Conservation Need [SGCN; SDGFP, 2014]).

Fixed-point bird use surveys were conducted approximately twice per month in the spring (March 4 – May 20) and fall (September 9 – November 28), and monthly during winter (November 29 – March 3) and summer (May 21 – September 8). Sixteen points were selected to survey representative habitats and topography of the Project, while achieving relatively even coverage of the survey area. In Year One, 271 surveys were conducted during 18 visits. In Year Two, 205 surveys were conducted during 13 visits. Each survey plot was an 800-meter (2,625-ft) radius circle centered on the point. Each survey plot was surveyed for 60 minutes. Analysis of the survey results included calculating bird diversity, species richness, mean use, percent of use, frequency of occurrence, flight height and spatial use.

During Year One of the fixed-point bird use surveys, 72 unique bird species including 8,194 observations in 914 separate groups (defined as one or more individuals), were recorded. Regardless of bird size, six identified species (8.3 percent of all species) accounted for approximately half (52 percent) of all observations: Canada goose (*Branta canadensis*; 858 observations in 10 groups), European starling (*Sturnus vulgaris*; 787 observations in 13 groups), sandhill crane (*Antigone canadensis*; 735 observations in four groups), Franklin's gull (*Leucophaeus pipixcan*; 713 observations in five groups), snow goose (*Chen caerulescens*; 590 observations in four groups), and red-winged blackbird (*Agelaius phoeniceus*;

574 observations in 42 groups). All other species each accounted for less than 6 percent of the total observations. Eighty-nine diurnal raptor observations within 83 groups were recorded, representing eight unique species. Red-tailed hawk (55 observations in 51 groups) and northern harrier (11 observations within 11 groups) were the most commonly observed raptor species, accounting for 61.8 percent and 12.4 percent of all raptor observations, respectively. No federally or State-listed species were observed during Year One fixed-point bird use surveys conducted at the Project. No golden eagles were observed during the survey; one bald eagle was recorded in the winter.

During Year Two of the fixed-point bird use surveys, 90 unique bird species including 9,276 observations in 1,090 separate groups. Regardless of bird size, two identified species (2.2 percent of all species) accounted for approximately one-third (29 percent) of all observations: common grackle (*Quiscalus quiscula*; 1,590 observations in 30 groups) and red-winged blackbird (1,105 observations in 84 groups). All other species each accounted for less than 6 percent of the total observations. Sixty-nine diurnal raptor observations within 61 groups were recorded during the first 20 minutes of the Year Two fixed-point bird use surveys conducted at the Project, representing five unique species. Red-tailed hawk (34 observations in 32 groups) and northern harrier (11 observations in 10 groups) were the most commonly observed raptor species, accounting for 49.3 percent and 15.9 percent of all raptor observations, respectively. One State-listed species (peregrine falcon) was recorded during Year Two of 60-minute fixed-point bird use surveys conducted at the Project; no federally listed species were observed during the study period. Seven bald eagles and one unidentified eagle were observed during the surveys.

Bald Eagle Nest Monitoring

Bald eagle nest monitoring surveys were conducted in accordance with agency recommendations to document flight paths and use within the vicinity of an active bald eagle nest identified during aerial raptor nest surveys conducted for the Project (Appendix H). The nest was located east of the Project (see Figure 1 in the Eagle Nest Monitoring Report in Appendix H) and corresponds with the active nest currently located approximately 0.5 mile from the current Project Area and 2 miles from the nearest proposed turbine. A fixed-point survey location was established to allow documentation of the activity of bald eagles utilizing the nest. Surveys commenced when adult eagles were incubating eggs and ended when eaglets fledged from the nest or the nest failed or otherwise was determined to be no longer occupied. Dates of survey were March 31 through July 21, 2015, and May 4 through September 7, 2016.

In 2015, bald eagles were observed during all but one survey. The first bald eagle observation occurred on March 31, 2015, and the last bald eagle was observed on July 7, 2015. A total of 27 eagle observations were made during the 12 hours of surveys (Table 1 in Appendix H); individual eagles, both adults and

young-of-year birds, were observed multiple times. Of the bald eagles observed, most were perched on or near the nest. Eagles were observed flying for only 11 minutes. Flight paths were generally to the west of the nest, in a northern and northwesterly direction (Figure 3 in Appendix H).

In 2016, bald eagle nest monitoring began May 4 when other eagle/avian use surveys were initiated, missing the initial eagle activity at the nest. Once surveys began, bald eagles were observed in 6 of the 10 surveys. Eleven eagle observations were made during the 10 hours of surveys (Table 1 in Appendix H). As in 2015, individual eagles, both adults and young of year birds, were observed multiple times. Eagles were observed flying for 10 minutes. Most eagles were observed perched on or near the nest. The few flight paths were generally to the southwest of the nest and showed no apparent pattern (Figure 4 in Appendix H).

Whooping Crane Habitat Assessment

There is potential whooping crane habitat within the Project Area, but this habitat is not unique compared to adjacent areas. This conclusion is based on a 2016 desktop review and analysis of potential whooping crane habitat resources within the August 2016 Project boundary (covers most of current Project Area except for the northeastern portion in Hutchinson County). The 2016 analysis compared resources within the 2016 Project boundary to surrounding habitat to the north, south, east, and west (Appendix K). The analysis showed that both roosting (i.e., wetlands) and foraging (i.e., croplands) habitats are available in the 2016 Project boundary and outside the Project boundary (shown on Figure 1 in Appendix K). Potential whooping crane habitat within the 2016 Project boundary appears to be most similar to habitat outside of the Project Area to the north, east, and west, and is more suitable than habitat found to the south of the Project Area. Based on the USGS's recent determination of whooping crane stopover use sites adjacent to the proposed Project Area, whooping cranes will likely migrate over or through the Project Area during some migration period. The current Project Area is within the areas analyzed for the 2016 analysis, and, therefore, the whooping crane habitat assessment results can be applied to the current Project Area.

Bat Surveys

Of the seven bat species with potential to occur in the Project Area, the NLEB is the only State and federally listed bat with the potential to occur within the area. The NLEB was listed as a threatened species under the ESA in 2015. The Project Area is on the western fringe of the estimated range for the species (BCI, 2015). Two separate presence/absence surveys were completed in summer 2015 and summer 2016 (Appendices I and J). The surveys were conducted following the NLEB survey recommendations found in the USFWS Northern Long-eared Bat Interim Conference and Planning

Guidance (USFWS, 2014b) and 2015 Range-Wide Indiana Bat Summer Survey Guidelines (USFWS, 2015b).[4] The USFWS guidelines require one survey site for every 123 acres of suitable habitat for a minimum of four detector nights (USFWS, 2014b). Two sampling locations at each survey site should then be surveyed for a minimum of two detector/nights each. Bats were surveyed using SD1 or SD2 AnaBat™ ultrasonic detectors (Titley Electronics Pty Ltd., NSW, Australia), or SM2 Song Meter detectors (Wildlife Acoustics, Inc., Concord, Maine).

The 2015 acoustic survey was conducted in the 2015 Project boundary (see Figure 1 in Appendix I) consisting of approximately 1,180 acres of forested habitat, which equated to 20 survey locations. Acoustic surveys were conducted from July 21 to August 10, 2015. The NLEB was qualitatively verified as occurring at two acoustical survey stations surveyed in 2015. The surveys concluded that there is potential for NLEB to be present within suitable habitat within the 2015 Project boundary during the summer months.

The 2016 survey included eight locations due to the 440 acres of wooded habitat within the revised 2016 Project boundary, which moved the Project generally to the north and away from the forested riparian habitat along Missouri River. Acoustic surveys were conducted from July 12 to August 4, 2016. No northern long-eared bat calls were recorded at any station during the sampling period. Changes to the Project Area in 2018 included the addition of some lands in the northwest and northeast corners of the Project in Charles Mix and Hutchinson counties, respectively. Based on a lack of suitable woodland habitat in these additional areas, no additional bat surveys were warranted. In those portions of the current Project Area that have not been surveyed for bats, the topography, vegetation, and habitat types present are very similar to the conditions within the areas surveyed in 2016. Therefore, the 2016 bat acoustic surveys results are representative of conditions throughout the current Project Area.

13.4.2 Wildlife Impacts/Mitigation

Terrestrial wildlife species could be impacted at various spatial and temporal scales during the construction phase of the Project. Direct disruption of habitat and potentially direct mortality could occur during the construction phase of the Project. Permanent habitat loss due to construction of wind turbines would be minimal across the Project Area and localized.

Construction crews would be instructed to avoid disturbing or harassing wildlife, and direct mortalities would not likely impact wildlife populations. Following construction, wildlife species are expected to habituate to routine facility operation and maintenance activities in a manner similar to relationships with

[4] The range of the Indiana bat does not include South Dakota.

existing ranching operations. BMPs would be practiced by construction personnel to reduce attractants to scavengers and would-be nest predators.

13.4.2.1 Federal and State Special-Status Terrestrial Species

This section describes the potential impacts of the proposed Project on the federally and State-listed terrestrial species that could potentially occur in the Project Area.

13.4.2.1.1 Interior Least Tern

No suitable nesting habitat was identified within the Project Area, but the interior least tern could potentially nest along the Missouri River, approximately 13 miles to the south, or pass through the Project Area during spring and fall migration.

13.4.2.1.2 Whooping Crane

Suitable whooping crane stopover habitat is present in the Project Area and includes shallow livestock ponds surrounded by agricultural and grassland parcels and freshwater emergent wetlands. However, this habitat is not unique compared to adjacent areas. The Applicant will comply with all applicable avoidance, minimization, and mitigation measures specified in the PEIS.

13.4.2.1.3 Piping Plover

No suitable piping plover habitat was observed in the Project Area. Piping plovers are unlikely to breed within the Project Area, but the species could potentially migrate through the Project Area. The nearest designated critical habitat for the piping plover is located approximately 13 miles south of the Project Area along the Missouri River (Figure 6 of the Tiers 1 and 2 Report, Appendix D; USFWS, 2015c).

13.4.2.1.4 Red Knot

No suitable red knot habitat was observed in the Project Area. Red knots are unlikely to breed within the Project Area, but the species could potentially migrate through the Project Area.

13.4.2.1.5 Northern Long-Eared Bat

The Project Area is on the western fringe of the estimated range for the NLEB (BCI, 2015). Some habitat features for the species are located in the Project Area. Although white-nose syndrome (WNS; caused by the fungus *Pseudogymnoascus destructans*) is the primary threat to NLEB populations (USFWS, 2015d), there is also concern about the impacts of wind facilities on bat species. However, under the final 4(d) rule published on January 14, 2016 (USFWS, 2016), it was determined that wind-energy development has not led to significant declines in this species, nor is there evidence that regulating the incidental take that is occurring would meaningfully change the conservation or recovery potential of the species in the face

of WNS. In other words, take of the species by a wind facility is not currently considered a violation of Section 9 of the ESA. This will change if the species becomes listed as endangered or if the 4(d) rule is rescinded. The Applicant will comply with all applicable avoidance, minimization, and mitigation measures specified in the PEIS.

13.4.2.2 Birds

Potential impacts to avian species from the construction and operation of the Project include indirect impacts, such as the removal, degradation, and fragmentation of habitat; and direct impacts, such as turbine blade strikes. Indirect impacts will be minimized by siting facilities within previously disturbed areas and avoiding untilled grassland habitats and forested areas to the extent practicable. Additionally, all areas of temporary disturbance will be reclaimed by seeding with vegetation consistent with the surrounding vegetation types.

Direct impacts to birds, including special status species, from the operation of this Project are anticipated to be low based on pre-construction survey results. Seven BCC species and three SGCN[5] species were documented at relatively low numbers, indicating low risk of significant impacts to these species. The most commonly observed species during the avian use surveys represent common, widespread species. Raptor use documented for the Project Area was low compared to other wind project sites sited in similar habitat, and species documented consisted primarily of common raptors, suggesting risk of impacts are not likely to be significant at the local or regional population level (see data on bird use and fatality estimates in Avian Use Survey Reports [Appendices F and G]). To prevent potential bird strikes with electric lines, collector lines will be buried underground and the Project will incorporate other avian safe practices consistent with guidelines from the Avian Power Line Interaction Committee (APLIC, 2012). The majority of bird species observed during the surveys are widespread and abundant, and most are at low risk of collision with turbines or other impacts due to the high quantity of agricultural lands and localized habitat fragmentation. Analysis of the data collected during the avian surveys generally indicated that potential impacts to birds, including species of concern, diurnal raptors, grassland species and eagles are expected to be low as evidenced by data from regional wind projects operating in similar habitats (see Avian Use Survey Report [Appendices F and G]). Additional avoidance and minimization measures are identified in Section 13.4.2.4.

[5] Bald eagle is both a BCC and a SGCN

13.4.2.3 Bats

Bat casualties have been reported from most wind energy faculties where post-construction fatality data are publicly available. Reported estimates of bat mortality at wind energy facilities have ranged from 0.01 to 47.5 fatalities per turbine per year (0.9 to 43.2 bats per MW per year) in the U.S., with an average of 3.4 per turbine or 4.6 per MW (National Wind Coordinating Collaborative [NWCC], 2004). The majority of the bat casualties at wind energy facilities to date are migratory species that undertake long migrations between summer roosts and wintering areas. The species most commonly found as fatalities at wind energy facilities include hoary bats, silver-haired bats, and eastern red bats (Johnson, 2005). The highest numbers of bat fatalities found at wind energy facilities to date have occurred in eastern North America on ridge tops dominated by deciduous forest (NWCC, 2004). However, Gruver et al. (2009), BHE Environmental (2010, 2011), Barclay et al. (2007), and Jain (2005) reported relatively high fatality rates from facilities in Wisconsin, Iowa, and Alberta, Canada, that were located in grassland and agricultural habitats. Unlike the eastern U.S. wind energy facilities that reported higher bat fatality rates, the Wisconsin, Alberta, and Iowa facilities are located in open grasslands and crop fields.

Construction of the Project may result in the mortality of some bats. Based on the data obtained to date, it is assumed that the magnitude of these fatalities and the degree to which bat species would be affected would be within the average range of bat mortalities found throughout the U.S. The Project Area was shifted to the north and away from the Missouri River, where more woodland habitat and higher populations bats are present.

13.4.2.4 Avoidance, Minimization, and Mitigation

Project facilities have been sited to avoid, to the extent practicable, impacts to federally listed and other special-status wildlife species. Project micrositing, as well as wetland delineations and cultural surveys for the Project, is ongoing. The Applicant would implement applicable avoidance, minimization, and mitigation measures in the PEIS. The Applicant would construct and operate the Project in accordance with Federal and State requirements.

As discussed in Section 3.0, WAPA is preparing an EA for the Project interconnection. As part of the EA process, the Applicant is coordinating with WAPA and the USFWS to identify additional mitigation measures that would be implemented for the Project as a condition of EA approval.

The Application has prepared a Bird and Bat Conservation Strategy (Appendix L) in accordance with the USFWS WEG that will be implemented to minimize impacts to avian and bat species during construction and operation of the Project. The following impact minimization and avoidance measures, in addition to

those in the PEIS, will be implemented for the Project to ameliorate potential negative biological impacts as a result of design, construction, and operation of the proposed facility:

Design minimization and avoidance measures are:

- Turbines and roads will be sited mostly in cultivated fields and hayland. Standard, State and County-required, setbacks for non-participating landowners, residences, noise, airports, etc., will be implemented.
- Existing roads and field accesses will be used or improved for access roads when practicable.
- Electrical collection systems within the Project will be buried underground.
- Wind turbines designed with tubular towers and no external ladders or platforms on the towers or nacelles will be used so bird perching and nesting opportunities are minimized.
- The number of turbines with visibility lighting will be minimized, within FAA requirements.
- Implementation of FAA-approved lighting that uses the shortest allowable flash duration, the minimum allowed flashes per minute, and synchronized flashing, will reduce the potential for nocturnal migrating birds to be disoriented by lights.
- Lighting at the operations and maintenance facility, Project substation, and other installations will be minimized and designed such that light is directed downward (toward the access or work area), and is hooded to prevent light from shining into the sky and attracting or disorienting nocturnal migrants. Motion or heat-activated lighting will be used where practicable.
- Meteorological towers without guy wires will be used, installing the minimum number needed within the Project Area to minimize collision risk for birds.

Construction minimization and avoidance measures are:

- Ground disturbance/clearing of untilled grasslands will be minimized;
- Siting turbines in wetland/waterbodies will be avoided to the extent practicable;
- A Site Environmental Plan, specific to the operational activities of the Project, will be developed and implemented by the site supervisor or his/her designated environmental manager including, but not limited to:
    - Exhibits identifying sensitive resources and associated set-backs.
    - An employee orientation program to raise awareness of any wildlife issues on the site, as well as how to treat sensitive resource areas.
    - Instructions for employees and contractors to drive at an appropriate speed on all public and private roads within the Project Area, in consideration of potential wildlife that may be present and to promote general site safety.

  - Instructions for employees to avoid harassing or disturbing wildlife, especially during the breeding seasons.
  - Federal and State measures for handling toxic substances to minimize contamination of water and wildlife resources.
  - Local policies for noxious weed control (e.g., cleaning vehicles and equipment arriving from areas with known invasive species issues, using locally sourced topsoil, identification and annual removal, etc.).
  - Parts and equipment that may be used as cover by prey will not be stored in the vicinity of wind turbines.
- Tree removal will be avoided from June 1 through July 31 to minimize risk of impact to NLEB maternal roosts and other tree roosting habitat.

Operation minimization and avoidance measures are:

- During normal operational activities, if facility personnel discover carrion on or near Project facilities, reasonable measures will be taken to minimize attracting predators/scavengers such as raptors and vultures.
- A Wildlife Response and Reporting System or similar program will be implemented to establish protocols for identifying and communicating bird and bat fatalities.

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

ARSD 20:10:22:17. Effect on aquatic ecosystems. *The applicant shall provide information of the effect of the proposed facility on aquatic ecosystems, and including existing information resulting from biological surveys conducted to identify and quantify the aquatic fauna and flora, potentially affected within the transmission site, wind energy site, or siting area, an analysis of the impact of the construction and operation of the proposed facility on the total aquatic biotic environment and planned measures to ameliorate negative biological impacts as a result of construction and operation of the proposed facility.*

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

14.1 Existing Aquatic Ecosystem

Surface waters are described in Section 12.2 and shown on Figure 8 in Appendix A. The Project facilities are located in the Lewis and Clark Lake Sub-Basin drainage system. As described in Section 13.3.1, approximately 2,696 acres of known and potential wetlands are within the Project Area (approximately 5.3 percent of the total Project Area). The wetlands in the Project Area consist of freshwater emergent and forested wetlands, freshwater ponds, and a small freshwater lake.

14.2 Federal and State Special-Status Aquatic Species

Federally listed threatened and/or endangered aquatic species could potentially occur in the Project Area (Table 14-5). Based on habitats found within the proposed Project Area, three aquatic species have the potential to occur in the Project Area during some portion of the year, including: the State threatened northern river otter (*Lontra canadensis*), the Federal and State endangered pallid sturgeon (USFWS, 2013d), and the federally endangered Topeka shiner (USFWS, 2013e).

Table 14-5: Federal and State-Listed Aquatic Species Potentially Occurring in Project Area

Species	Federal Status	State Status	Potential to Occur
Northern river otter	--	Threatened	Low. Riparian vegetation along wetland margins; low likelihood based on limited suitable habitat in Project
Pallid sturgeon	Endangered	Endangered	None. Limited to large, silty river bottoms with braided channels, sand bars, sand flats, and gravel bars.
Topeka shiner	Endangered	--	Low. Limited to the James River and tributaries. Topeka shiners live in small to mid-size prairie streams in the central United States where they are usually found in pool and run areas. Suitable streams tend to have good water quality and cool to moderate

14.2.1 Northern River Otter

The northern river otter (*Lontra canadensis*) is a semiaquatic mammal of the Mustelid family. River otters inhabit permanent water with abundant fish or crustacean prey and relatively high water quality (Boyle, 2006). Because of their high mobility and low densities, river otters require relatively long reaches of streams and rivers. Complexity of river and lake shorelines provides greater areas of shallow water and wetlands, which provide shallow water habitats for otter prey, including slower-swimming fish, amphibians, reptiles, and invertebrates (Boyle, 2006). The physical habitat attribute most important to river otters besides water is riparian vegetation, which provides security cover when they are feeding, denning, or moving on land (Boyle, 2006). Another essential habitat component is structural diversity and complexity provided by objects such as fallen trees, logjams, stumps, undercut banks, and rocks (Melquist and Dronkert, 1987). Principal threats are habitat destruction and degradation, and human-caused mortality. Habitat destruction and degradation include water development resulting in stream flow and channel morphology alteration, water pollution, loss of riparian vegetation, and human settlement and recreational use along rivers and lakes (Boyle, 2006).

14.2.2 Pallid Sturgeon

Pallid sturgeon (*Scaphirhynchus albus*) requires large, free-flowing, warm-water, and turbid rivers with a diverse assemblage of dynamic physical habitats (USFWS, 2014c). Pallid sturgeons evolved and adapted to living close to the bottom of large, silty rivers with natural a hydrograph. Their preferred habitat has a diversity of depths and velocities formed by braided channels, sand bars, sand flats, and gravel bars (USFWS, 2018b). It can be found in the Missouri River, which is located approximately 13 miles south of the Project.

14.2.3 Topeka Shiner

Topeka shiner (*Notropis topeka*) is a small minnow native to the streams of the prairie and prefers small, quiet streams with clean gravel or sand substrates and vegetated banks (Shearer, 2003). Suitable streams tend to have good water quality and cool to moderate temperatures. In Iowa, Minnesota, and portions of South Dakota, Topeka shiners also live in oxbows and off-channel pools. The shiner can be found in the James River and tributaries, which are about 17 miles northeast of the Project (SDGFP, 2015). The Topeka shiner is threatened by habitat destruction, degradation, modification, and fragmentation resulting from siltation (the buildup of silt), reduced water quality, tributary impoundment, stream channelization, and stream dewatering. The species also is impacted by introduced predaceous fishes (USFWS, 1998).

14.3 Impacts to Aquatic Ecosystems and Mitigation

As described in Section 13.3.2, impacts to wetlands would be minimal, because wetlands would be avoided to the extent practicable when locating access roads, collector lines, and other Project facilities. The primary potential for impact to aquatic ecosystems would be from increased sedimentation or increased TSS 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.

It is unlikely that the northern river otter, pallid sturgeon, or Topeka shiner would be affected by the development of and operations associated with a wind facility. The Project Area is unlikely to provide habitat for the northern river otter; however, removal of riparian vegetation will be avoided to the extent practicable. Although not in the Project Area, the Missouri River does have tributaries reaching into the Project Area. BMPs would be designed to control sedimentation and erosion during construction of the Project to prevent downstream water quality impacts to the Missouri River and any streams in the Project Area that may provide habitat for the northern river otter. The Project Area is not located within the James River watershed, and, therefore, no direct or indirect impacts to the Topeka shiner would occur. The Project Area is located approximately 13 miles from the Missouri River, and, therefore no direct or indirect impacts to the pallid sturgeon would occur.

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

ARSD 20:10:22:18. Land use. *The applicant shall provide the following information concerning present and anticipated use or condition of the land:*

(1) A map or maps drawn to scale of the plant, wind energy, or transmission site identifying existing land use according to the following classification system:
- *(a) Land used primarily for row and nonrow crops in rotation;*
- *(b) Irrigated lands;*
- *(c) Pasturelands and rangelands;*
- *(d) Haylands;*
- *(e) Undisturbed native grasslands;*
- *(f) Existing and potential extractive nonrenewable resources;*
- *(g) Other major industries;*
- *(h) Rural residences and farmsteads, family farms, and ranches;*
- *(i) Residential;*
- *(j) Public, commercial, and institutional use;*
- *(k) Municipal water supply and water sources for organized rural water systems; and*
- *(l) Noise sensitive land uses;*

(2) Identification of the number of persons and homes which will be displaced by the location of the proposed facility;

(3) An analysis of the compatibility of the proposed facility with present land use of the surrounding area, with special attention paid to the effects on rural life and the business of farming; and

(4) A general analysis of the effects of the proposed facility and associated facilities on land uses and the planned measures to ameliorate adverse impacts.

The following sections describe the existing land use, sound, and aesthetics within the Project Area and potential land use impacts of the Project, and measures that will be utilized to avoid, minimize, and/or mitigate potential impacts.

15.1 Land Use

The existing land uses within the Project Area are described below, followed by a discussion of the potential effects of the proposed Project's construction and operation on land use, and avoidance, minimization, and/or mitigation measures.

15.1.1 Existing Land Use

Land use within the Project Area is predominantly agricultural, consisting of a mix of cropland, hayland, pastureland, and rangeland. Occupied farm sites and rural residences are within the Project Area, and other scattered rural residences are adjacent to, but outside of, the Project Area. Figure 9 in Appendix A is a land use map of the Project Area based on the classification system specified in ARSD 20:10:22:18(1). The following land use classifications occur within the Project Area:

- Land used primarily for row and non-row crops in rotation

- Pasturelands and rangelands
- Haylands
- Undisturbed native grasslands
- Rural residences and farmsteads, family farms, and ranches
- Public, commercial, and institutional use
- Noise sensitive land uses

The following land use classifications were not identified within the Project Area:

- Irrigated lands
- Existing and potential extractive nonrenewable resources
- Other major industries
- Residential
- Municipal water supply and water sources for organized rural water systems

In Charles Mix County in 2012 (the latest available year for the USDA Census of Agriculture), approximately 64 percent of the land area was cropland, with soybeans for beans being the most common crop (USDA, 2012a). Corn was the second most common cultivated crop in the county. Cultivated cropland in Charles Mix County increased by 11 percent from 403,374 acres in 2007 to 448,940 acres in 2012 (USDA, 2012a). Specific acreages of different crops within the Project Area, which change from year to year, are not available. In Charles Mix County in 2012, approximately 33 percent of the land area was pastureland (USDA, 2012a, 2012b). Pastureland decreased 12 percent from 263,605 acres in 2007 to 231,622 acres in 2012.

In Bon Homme County in 2012, approximately 77 percent of the land area was cropland, with soybeans for beans being the most common crop (USDA, 2012c). Corn is the second most common cultivated crop in Bon Homme County. Cultivated cropland in Bon Homme County increased by 26 percent from 219,754 acres in 2007 to 277,172 acres in 2012 (USDA, 2012c). Specific acreages of different crops within the Project Area, which change from year to year, are not available. In Bon Homme County in 2012, approximately 16 percent of the land area was pastureland (USDA, 2012b, 2012c). Pastureland decreased 31 percent from 86,714 acres in 2007 to 59,285 acres in 2012.

In Hutchinson County in 2012, approximately 80 percent of the land area was cropland, with soybeans for beans being the most common crop (USDA, 2012d). Corn is the second most common cultivated crop in Hutchinson County. Cultivated cropland in Hutchinson County increased by 4 percent from 394,680 acres

in 2007 to 409,677 acres in 2012 (USDA, 2012d). Specific acreages of different crops within the Project Area, which change from year to year, are not available. In Hutchinson County in 2012, approximately 17 percent of the land area was pastureland (USDA, 2012b, 2012d). Pastureland decreased 31 percent from 86,714 acres in 2007 to 59,285 acres in 2012.

15.1.2 Land Use Impacts/Mitigation

Construction of the Project will result in conversion of a small portion of the land within the Project Area from existing agricultural land uses into a renewable energy resource during the life of the Project. Temporary impacts associated with construction staging and laydown areas and underground collector lines will also result. Following construction, the areas will be returned to pre-construction land uses, which primarily consist of cultivated croplands and pastureland/grassland.

The proposed Project is compatible with the existing agricultural land uses in areas surrounding the Project facilities. Agricultural uses will continue within the Project Area during construction and operation. It is estimated that approximately 734 acres of land (676 acres agricultural land; 58 acres non-agricultural) would be temporarily impacted by Project construction, and 45 acres of land (41 acres agricultural land; 4 acres non-agricultural) would be permanently impacted (less than 0.1 percent of the total land within the Project Area). Areas disturbed due to construction that ultimately would not contain Project facilities would be re-vegetated with vegetation types matching the surrounding agricultural landscape. Agricultural impacts are discussed further in Section 20.2.2. As discussed in Section 24.0, the facility would be decommissioned after the end of the Project's operating life. Facilities would be removed in accordance with applicable State and county requirements, unless otherwise agreed to by the landowner. Disturbed surfaces would be graded, reseeded, and restored as nearly as possible to their preconstruction conditions. After decommissioning for the Project is complete, no irreversible changes to land use would remain beyond the operating life of the Project.

There are 83 occupied residences within the Project Area. Based on the proposed Project layout of turbines, access roads, collector lines, and associated facilities, there would be no displacement of residences or businesses due to construction of the Project facilities.

15.2 Public Lands and Facilities

The existing public lands and conservation easements within the Project Area are described below, followed by a discussion of the potential effects of the proposed Project's construction and operation, and potential avoidance, minimization, and mitigation measures.

15.2.1 Existing Public Lands and Facilities

Figure 10 in Appendix A is a map showing public lands and facilities within the Project Area.

15.2.1.1 *USFWS Lands*

Based on correspondence with the USFWS Lake Andes NWR, three wetland and two grassland conservation easements managed by the USFWS are within the Project Area. The actual area of protected land is limited to the boundaries of the resource (e.g., wetland) within the mapped area (pers. comm. Bryant, 2018). USFWS wetland and grassland easements are part of the NWR System and are managed for the protection of wildlife and waterfowl habitat.

Two Waterfowl Production Areas (WPAs), managed by the USFWS Lake Andes Wetland Management District, are located within the Project Area. The Cosby WPA is located in Bon Homme County, and the Juran WPA is located in Charles Mix County. WPAs are satellite areas of the NWR System and are managed for the preservation of wetlands and grasslands critical to waterfowl and other wildlife.

15.2.1.2 *SDGFP Areas*

Two Game Production Areas (GPAs) are located within the Project Area – Mach GPA in Bon Homme County and Rolling Hills GPA in Hutchinson County. GPAs are State lands managed by the SDGFP for the production and maintenance of wildlife.

There are five parcels of privately owned lands within the Project Area that are leased for public walk-in hunting access by SDGFP (referred to as Walk-In Areas).

15.2.1.3 *Public Facilities*

Two cemeteries are located within the Project Area (Figure 10 in Appendix A). One church is located outside the Project Area, approximately 0.25 mile east (Figure 10 in Appendix A).

15.2.2 Impacts/Mitigation to Public Lands and Facilities

The Applicant coordinated with the USFWS regarding the exact boundaries of the USFWS wetland conservation easements within the larger easement parcels shown on Figure 10 in Appendix A. The actual easement area is a subset of these parcels (i.e., actual wetland areas for wetland easements and the area defined in the lease amendments for the conservation easements). The Project has been designed such that no Project facilities (e.g., turbines, collector lines, access roads) would be placed on these USFWS wetland or grassland easements, and thus, no direct impacts to these easement areas would occur. In addition, no Project facilities would be placed on the USFWS WPAs, SDGFP GPAs, or SDGFP Walk-In Areas identified above.

15.3 Sound

A sound study was conducted for the Project in April 2018 and is included in Appendix M. Following is information from the report on the existing sound levels within the Project Area, the potential effects of the proposed Project's construction and operation, and potential avoidance, minimization, and mitigation measures.

15.3.1 Acoustical Terminology

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

Sound is physically characterized by amplitude and frequency. The amplitude of sound is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 microPascals). The reference sound pressure corresponds to the typical threshold of human hearing. To the average listener, a 3-dB change in a continuous broadband sound is generally considered "just barely perceptible"; a 5-dB change is generally considered "clearly noticeable"; and a 10-dB change is generally considered a doubling (or halving, if the sound is decreasing) of the apparent loudness.

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

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

Sound Pressure Level (dBA)[a]	Subjective Evaluation	Environment	
		Outdoor	Indoor
140	Deafening	Jet aircraft at 75 feet	--
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 feet	--
120	Threshold of feeling	Elevated train	Hard rock band
110		Jet flyover at 1,000 feet	Inside propeller plane
100	Very loud	Power mower, motorcycle at 25 feet, auto horn at 10 feet, crowd noise at football game	--
90	--	Propeller plane flyover at 1,000 feet, noisy urban street	Full symphony or band, food blender, noisy factory
80	Moderately loud	Diesel truck (40 mph)[a] at 50 feet	Inside auto at high speed, garbage disposal
70	Loud	B-757 cabin during flight	Close conversation, vacuum cleaner
60	Moderate	Air-conditioner condenser at 15 feet, near highway traffic	General office
50	Quiet	--	Private office
40	--	Farm field with light breeze, birdcalls	Soft stereo music in residence
30	Very quiet	Quiet residential neighborhood	Bedroom, average residence (without TV and stereo)
20	--	Rustling leaves	Quiet theater, whisper
10	Just audible	--	Human breathing
0	Threshold of hearing	--	--

Source: Adapted from *Architectural Acoustics*, M. David Egan, 1988 and *Architectural Graphic Standards*, Ramsey and Sleeper, 1994.
(a) dBA = A-weighted decibels; mph = miles per hour

Sound metrics have been developed to quantify fluctuating environmental sound levels. These metrics include the exceedance sound level. The exceedance sound level, L_x, is the sound level exceeded during "x" percent of the sampling period and is also referred to as a statistical sound level. L_{90} levels are presented throughout this study. The L_{90} is a common L_x value and represents the sound level with minimal influence from short-term, loud transient sound sources. The L_{90} represents the sound level exceeded for 90 percent of the time period during which sound levels are measured. The L_{90} value is regarded as the most accurate tool for measuring relatively constant background noise and for minimizing the influence of isolated spikes in sound levels (i.e., barking dog, door slamming).

15.3.2 Regulations

Bon Homme County has adopted a zoning ordinance that pertains to wind energy systems. The ordinance limits sound levels of WES to 45 dBA at occupied receptors unless the landowner provides a written waiver. Neither Charles Mix County nor Hutchinson County has an ordinance relating to turbine noise. Therefore, the Bon Homme County ordinance sound level limit was used as a design goal for all areas of the Project. The results of the sound study detailed below show a maximum sound level of 41.9 dBA within the Project Area.

15.3.3 Ambient Sound Survey

The Applicant conducted an ambient sound survey of surrounding Project areas on March 12 and 13, 2018. Ambient far-field measurements were made at 16 locations, labeled measurement point MP1 through MP16, as shown in Figure 4-1 of the Sound Study (Appendix M). The measurement points were selected because they were accessible and representative of existing ambient sound levels in the vicinity of noise-sensitive receivers.

The far-field sound level measurements were 5 minutes in duration, and measured values were logged by the sound meter at each measurement point. The sound levels varied at each measurement point due to the extraneous sounds that occurred during each measurement. The overall A-weighted L_{eq} and L_{90} sound levels collected during the ambient far-field measurements are shown in Table 4-1 of the Sound Study (Appendix M). Sound levels measured were in the range of 21.5 to 45.0 dBA L_{90}. Extraneous sounds during the measurement periods included high speed traffic, birds, wind noise, and farm equipment. The measured sound levels and noise sources are presented in Appendix A of the Sound Study.

15.3.4 Sound Impacts/Mitigation

Following is information on the anticipated sound levels from construction and operation of the Project.

15.3.4.1 Construction and Decommissioning

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

The impacts that various construction and decommissioning-related activities might have would vary considerably based on the proximity to the facilities. Generic sound data ranges are available for various types of equipment at certain distances. Table 15-2 lists generic activities and the associated sound levels at a distance of 50 feet.

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

Generic Construction Equipment	Minimum Sound at 50 Feet	Maximum Sound at 50 Feet
Backhoes	74	92
Compressors	73	86
Concrete mixers	76	88
Cranes (movable)	70	94
Dozers	65	95
Front loaders	77	96
Generators	71	83
Graders	72	91
Jack hammers and rock drills	80	98
Pumps	69	71
Scrapers	76	95
Trucks	83	96

Source: FHWA Highway Construction Noise and the HEARS database
(a) dBA = A-weighted decibels

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

15.3.4.2 Operation

The sound commonly associated with a wind turbine is described as a rhythmic “whoosh” caused by aerodynamic processes. This sound is created as air flow interacts with the surface of rotor blades. As air flows over the rotor blade, turbulent eddies form in the surface boundary layer and wake of the blade. These eddies are where most of the “whooshing” sound is formed.

Additional sound is generated from vortex shedding produced by the tip of the rotor blade. Air flowing past the rotor tip creates alternating low-pressure vortices on the downstream side of the tip, causing sound generation to occur. Older wind turbines, built with rotors which operate downwind of the tower (downwind turbines), often have higher aerodynamic impulse sound levels. This is caused by the interaction between the aerodynamic lift created on the rotor blades and the turbulent wake vortices produced by the tower. Modern wind turbine rotors are mostly built to operate upwind of the tower (upwind turbines). Upwind wind turbines are not impacted by wake vortices generated by the tower and, therefore, overall sound levels can be as much as 10 dBA less.

The rhythmic fluctuations of the overall sound levels are less perceivable the farther one gets from the turbine. Additionally, multiple turbines operating at the same time will create the whooshing sound at different times. These non-synchronized sounds will blend together to create a more constant sound to an observer at most distances from the turbines. Another phenomenon that reduces perceivable noise from turbines is the wind itself. Higher wind speed produces noise in itself that tends to mask (or drown out) the sounds created by wind turbines.

Advancement in wind turbine technology has reduced pure tonal emissions of modern wind turbines. Manufacturers have reduced distinct tonal sounds by reshaping turbine blades and adjusting the angle at which air contacts the blade. Pitching technology allows the angle of the blade to adjust when the maximum rotational speed is achieved, which allows the turbine to maintain a constant rotational velocity. Therefore, sound emission levels remain constant as the velocity remains the same.

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

Acoustical Model Inputs

Predicted sound levels were modeled using industry-accepted sound modeling software. The program used to model the turbines was the Computer Aided Design for Noise Abatement (CadnaA), Version 2017, published by DataKustik, Ltd., Munich, Germany. The CadnaA program is a scaled, three-dimensional program that accounts for air absorption, terrain, ground absorption, and ground reflection for each piece of noise-emitting equipment and predicts downwind sound pressure levels. The model calculates sound propagation based on International Organization for Standardization (ISO) 9613-2:1996,

General Method of Calculation. ISO 9613, and therefore CadnaA, assesses the sound pressure levels based on the Octave Band Center Frequency range from 31.5 to 8,000 Hz. Compliance with the regulations for all turbines operating should equate to compliance for any combination of the turbines operating. Predictive modeling was conducted to determine the impacts at the occupied residences shown in Appendix B of the Sound Study.

Acoustical modeling was conducted for the entire Project for both of the representative turbine models (GE 3.8-137 and Vestas V136-3.6). Wind turbine heights and acoustical emissions were input into the model. The expected worst-case sound power levels for the modeled GE 3.8-137 and Vestas V136-3.6 turbines at each of the 63 proposed sites were contained in documents provided by GE and Vestas based on various wind speeds. The sound emissions data supplied was developed using the International Electrotechnical Commission (IEC) 61400-11 acoustic measurement standards.

Acoustical Modeling Results

Sound pressure levels were predicted for the identified receivers in the CadnaA noise modeling software using the manufacturer-specified sound power levels at each frequency and the assumptions listed in Section 5.2 of the Sound Study. CadnaA modeling results have been demonstrated in previous studies to conservatively approximate real-life measured noise from a source when extraneous noises are not present.

As previously mentioned, decibels are a logarithmic ratio of a sound pressure to a reference sound pressure. Therefore, they must be logarithmically added to determine a cumulative impact (i.e., logarithmically adding 50 dBA and 50 dBA results in 53 dBA). Logarithmically adding each of the individual turbine's impacts together at each receiver provides an overall Project impact at each receiver.

The maximum model-predicted L_{eq} sound pressure levels at each receiver (the logarithmic addition of sound levels from each frequency from every turbine) are included in Appendix C of the Sound Study. The results show a maximum sound level of 41.9 dBA. These values represent only the noise emitted by the wind turbines and do not include any extraneous noises (traffic, etc.) that could be present during physical noise measurements. There are no expected exceedances of the identified regulations due to operation of any of the proposed wind turbine locations of the Project.

Appendix D of the Sound Study contains graphical representation of the Project's impact on the surrounding area for both GE and Vestas turbines. The figure depicts the maximum sound levels attributable to the new turbines.

Because the wind turbines have been sited to avoid exceeding county regulatory sound level limits, no further mitigation for sound is required.

15.4 Visual Resources

The existing visual resources within the Project Area are described below, followed by a discussion of the potential effects of the proposed Project's construction and operation and mitigation and minimization measures.

15.4.1 Existing Visual Resources

Cropland, grassland, large open vistas, and gently rolling topography visually dominate the Project Area landscape. Vegetation in and near the Project Area is predominantly cropland and grassland/pasture. Existing structures in the Project Area consist of occupied residences dispersed throughout as well as scattered farm buildings. Two WAPA transmission lines bisect the Project Area from east to west, and one East River Electric transmission line traverses the Project Area, also from east to west. State Highways 50, 46, and 37 extend through the Project Area. The existing Beethoven Wind Farm, comprised of 43 wind turbines, is located adjacent to the northern portion of the Project Area.

Visual impacts to the landscape attributable to the Project would depend on the extent to which the existing landscape is already altered from its natural condition, the number of viewers (residents, travelers, visiting recreational users, etc.) within visual range of the area, and the degree of public or agency concern for the quality of the landscape. There are 83 occupied residences (0.7 residence per square mile) within the Project Area and other scattered rural residences and towns that are near, but outside of, the Project Area (Figure 9 in Appendix A). Travelers through the Project Area would include local or regional traffic along State Highways 50, 46, and 37. USFWS and SDGFP public hunting areas (discussed in Section 15.2.1) are present within the Project Area.

15.4.2 Visual Impacts/Mitigation

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

Construction, operation, and decommissioning of the proposed Project would potentially introduce visual contrasts in the Project Area that would cause a variety of visual impacts. The types of visual contrasts of concern include the potential visibility of wind turbines, electric transmission structures and conductors,

and associated facilities such as roads; marker lighting on wind turbines and transmission structures as well as security and other lighting; modifications to landforms and vegetation; vehicles associated with transport of workers and equipment for construction, operations and maintenance, and facility decommissioning; and the construction, operation, maintenance, and decommissioning activities themselves. A subset of potential visual impacts associated with wind turbine generator structures are blade movement, blade glinting[6], and shadow flicker[7]. Shadow flicker is discussed further in Section 15.5.

The primary visual impacts associated with the Project would result from the introduction of the numerous vertical lines of the wind turbines into the generally strongly horizontal landscape found in the Project Area. Based on the representative turbine models (Table 8-3), the total height of the turbines would be approximately 586 feet (GE 3.8-137 turbine) or 568 feet (Vestas 136-3.6 turbine). The visible structures would potentially produce visual contrasts by virtue of their design attributes (form, color, and line) and the reflectivity of their surfaces and potential glare. In addition, marker lighting could cause visual impacts at night.

For nearby viewers including the rural residences dispersed throughout the Project Area, the large sizes and strong geometric lines of both the individual turbines themselves and the array of turbines could dominate views, and the large sweep of the moving rotors would tend to command visual attention. Structural details, such as surface textures, could become apparent, and the O&M facility and other structures could be visible as well, as could reflections from the towers and moving rotor blades (blade glint).

As discussed above, viewers within the Project Area include the occupied residences, travelers along State Highways 50, 46, and 37, and hunters utilizing the public hunting areas. For these viewers, the magnitude of the visual impacts associated with the Project would depend on certain factors, including:

- Distance of the proposed wind energy facility from viewers
- Duration of views (highway travelers vs. permanent residents)
- Weather and lighting conditions
- The presence and arrangements of lights on the turbines and other structures
- Viewer attitudes toward renewable energy and wind power

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

To minimize visual impacts of the Project, the Applicant has incorporated setback requirements and commitments into the design of the Project. As identified in Table 9-2, turbines would be set back at least 1,000 feet from currently occupied offsite residences, businesses, and public buildings and at least 500 feet or 1.1 times the turbine height from residences with turbines, per Bon Homme County requirements. Turbines would also be set back at least 500 feet or 1.1 times the height of the turbines from rights-of-way of public roads and from any surrounding property line. In accordance with FAA regulations, the towers would be painted off-white to reduce potential glare and minimize visual impact.

At the end of the Project's operating life, the facility would be decommissioned (see Section 24.0), and all wind turbines, electrical cabling, electrical components, roads, and any other associated facilities would be removed in accordance with applicable State and County regulations, unless otherwise agreed to by the landowner. As such, no visual impacts would remain beyond the operating life of the Project.

Scenic resources with sensitive viewsheds can include national parks, monuments, and recreation areas; national historic sites, parks, and landmarks; national memorials and battlefields; national wild and scenic rivers, national historic trails, national scenic highways, and NWRs; State- or locally designated scenic resources, such as State-designated scenic highways, State parks, and county parks; and other scenic resources that exist on Federal, State, and other non-Federal lands, including traditional cultural properties important to tribes. The nearest scenic resources to the Project Area are the Lake Andes NWR, located approximately 12 miles west of the Project Area, and the Missouri River, designated as a National Recreation River by the NPS, located approximately 13 miles south of the Project Area. At these distances, adverse visual impacts are not anticipated. Depending on topography and atmospheric conditions, the Project turbines could be visible from the NWR or the river. However, the Project would not cause large visual contrasts in the landscape at this distance and would not be noticeably visible, if visible at all.

15.5 Shadow Flicker

A shadow flicker analysis was conducted for the Project in May 2018 and is included in Appendix N. Following is information from the report on the potential shadow flicker effects of the Project and potential avoidance, minimization, and mitigation measures.

15.5.1 Shadow Flicker Overview

Shadow flicker occurs when wind turbine blades pass in front of the sun to create recurring shadows on an object. Such shadows occur only under very specific conditions, including sun position, wind direction, time of day, and other similar factors.

The intensity of shadow flicker varies significantly with distance, and as separation between a turbine and receptor increases, shadow flicker intensity correspondingly diminishes. Shadow flicker intensity for distances greater than 10 rotor diameters (i.e., 1,370 meters for the representative GE 3.8-137 layout and 1,360 meters for the representative V136-3.6 layout) is generally low and considered imperceptible. At such distances, shadow flicker is typically only caused at sunrise or sunset, when cast shadows are sufficiently long.

Shadow flicker impacts are not currently regulated in applicable State or Federal law, nor are there requirements in the current Charles Mix County or Hutchinson County ordinances. Section 1741 of the Bon Homme County zoning ordinance states the following:

> *When determined appropriate by the County, a Shadow Flicker Control System shall be installed upon all turbines which will cause a perceived shadow effect upon a habitable residential dwelling. Such system shall limit blade rotation at those times when shadow flicker exceeds thirty (30) minutes per day or thirty (30) hours per year at perceivable shadow flicker intensity as confirmed by the Zoning Administrator are probable.*

Thus, although the Project turbines fall within all three counties (Bonne Homme, Charles Mix, and Hutchinson), the existing Bon Homme County requirements of 30 hours per year and 30 minutes per day were used as a baseline for the shadow flicker study.

15.5.2 Shadow Flicker Impacts/Mitigation

Shadow flicker was modeled at the Project Site using WindPRO, an industry-leading software package for the design and planning of wind energy projects. This package models the sun's path with respect to every turbine location during every minute over a complete year. The model accounted for topography and obstacles with certain receptors. Each receptor was modeled in "green-house" mode within the WindPRO model. This approach provides a conservative estimate of the amount of time when shadow flicker could occur for each receptor. Any shadow flicker caused by each turbine is then aggregated for each receptor for the entire year. All 63 turbine positions were evaluated, although only up to 61 turbines would be installed.

Using the inputs and parameters defined in Section 2.0 of the Shadow Flicker Analysis, the WindPRO model was used to calculate shadow flicker for the receptors at the Project Site. Table 15-3 presents a summary of these results for the GE 3.8-137 turbine, and Table 15-4 presents a summary of these results for the V136-3.6 turbine; results in each table are presented by landowner status for the applicable receptor. Detailed tables are included within Appendix F of the Shadow Flicker Analysis that present

shadow flicker durations by receptor, including estimated hours per year and maximum minutes per day. Additionally, maps are provided in Appendix G of the Shadow Flicker Analysis which illustrate the shadow flicker vectors (in hours per year) caused by each Project turbine.

Table 15-3: Summary of Shadow Flicker Analysis Results (GE 3.8-137)

Landowner Status	No. of Sites Studied[a]	No. of Receptors	No. of Receptors, Flicker ≥ 30 hr/yr	No. of Receptors, Flicker ≥ 30 min/day
Participating	63	46	2	12
Non-participating		92	1	13

(a) 63 turbine sites were studied; however, only up to 61 turbines would be installed

Table 15-4: Summary of Shadow Flicker Analysis Results (V136-3.6)

Landowner Status	No. of Sites Studied[a]	No. of Receptors	No. of Receptors, Flicker ≥ 30 hr/yr	No. of Receptors, Flicker ≥ 30 min/day
Participating	63	46	2	11
Non-participating		92	1	12

(a) 63 turbine sites were studied; however, only up to 61 turbines would be installed

As noted in Tables 15-3 and 15-4, one non-participating receptor exceeded 30 hours per year. This receptor is located in Charles Mix County. With the V136-3.6 turbine model, the annual shadow flicker duration at this receptor was 33.93 hours. With the GE 3.8-137 turbine model, the annual shadow flicker duration at this receptor was 34.73 hours. Prevailing Wind Park will be conducting additional shadow flicker modeling with more realistic assumptions for this receptor. For example, rather than modeling the home as having windows on all sides that are always perpendicular to the sun, actual window locations would be considered along with the actual angle of the sun. If updated modeling results still show more than 30 hours per year of shadow flicker, Prevailing Wind Park will work with the landowner to implement mitigation techniques, such as screening or implement operational controls to ensure experienced shadow flicker levels are below 30 hours per year.

15.6 Electromagnetic Interference

The Applicant completed an analysis of the effects upon Federal Communications Commission (FCC)-licensed radio frequency (RF) facilities (RF Impact Study) due to construction and operation of the Project (Appendix O). Using industry standard procedures and FCC databases, a search was conducted to determine the presence of any existing microwave paths crossing or near the Project Area. The study was conducted for 64 potential turbines sites; however, 1 turbine was subsequently dropped from further consideration resulting in the current layout consisting of 63 potential turbine sites. The analysis addressed the potential conflicts that may be caused by the proposed Project turbines. The analysis

consisted of three sections: microwave point-to-point path analysis; airports, radar stations, and military aircraft operations; and National Telecommunication Information Agency (NTIA) notification.

15.6.1 Microwave Links

An extensive analysis was undertaken to determine the likely effect of the Project upon existing microwave paths, consisting of a Fresnel x/y/z axis study. For this microwave study, Worst Case Fresnel Zones (WCFZ) were calculated for each microwave path. In general, the WCFZ is defined by the cylindrical area whose axis is the direct line between the microwave link endpoints. This is the zone where the siting of obstructions should be avoided. Fifteen unique point-to-point microwave paths and three point-to-multipoint microwave links from the FCC database were identified within 0.5 mile of the Project Area. These microwave facilities are listed in Table 1 and mapped in Figures 1 and 2 of the RF Impact Study (Appendix O).

Eleven point-to-point microwave paths cross the Project Area. Three point-to-multipoint microwave link stations are inside the Project Area. As seen in Figures 3 through 7 of the RF Impact Study, several of the planned turbines would be located within 250 meters of the microwave paths (as measured from the turbine tower to the center of the path); however, as Figures 7 through 11 of the RF Impact Study show, the analysis strongly indicates that these turbines would not penetrate the microwave worst-case Fresnel zones.

15.6.2 Department of Defense Radar Concerns

The Department of Defense (DoD) and the Department of Homeland Security Long Range Radar Joint Program Office (JPO) has adopted a “pre-screening tool” to evaluate the impact of wind turbines on air defense long-range radar. This tool was applied to the Prevailing Wind Park area, and it returned a result of “no anticipated impact” (green) to Air Defense and Homeland Security radars.

15.6.3 NEXRAD

A pre-screening tool has been developed to evaluate the potential impact of obstructions to the NEXRAD Weather Surveillance Doppler Radar Stations. This tool was applied to the Prevailing Wind Park area, and it returned a result of “impacts not likely” to weather radar operations.

15.6.4 Military Airspace

A preliminary review of the Prevailing Wind Park proposal does not return any likely impacts to military airspace.

15.6.5 National Telecommunication Information Agency Notification

Operation of RF frequencies for Federal government use is managed by the NTIA, which is part of the U.S. Department of Commerce. The technical specifications for most government facilities are unavailable to the public. The NTIA has set in place a review process, wherein the Interdepartmental Radio Advisory Committee (IRAC), consisting of representatives from various government agencies, reviews new proposals for wind turbine projects for impact on government frequencies. In almost all cases, no adverse impact is found, and IRAC usually issues a determination in about 60 days.

On April 6, 2018, a notification of the Prevailing Wind Park was sent to the NTIA, and a determination is expected around the beginning of June 2018.

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

ARSD 20:10:22:19. Local land use controls. *The applicant shall provide a general description of local land use controls and the manner in which the proposed facility will comply with the local land use zoning or building rules, regulations or ordinances. If the proposed facility violates local land use controls, the applicant shall provide the commission with a detailed explanation of the reasons why the proposed facility should preempt the local controls. The explanation shall include a detailed description of the restrictiveness of the local controls in view of existing technology, factors of cost, economics, needs of parties, or any additional information to aid the commission in determining whether a permit may supersede or preempt a local control pursuant to SDCL 49-41B-28.*

The Project would be constructed on agricultural land in Bon Homme, Charles Mix, and Hutchinson counties. Land use in Charles Mix County is not regulated by zoning regulations. Land use in Hutchinson County is regulated by the Hutchinson County Zoning Ordinance, adopted on April 4, 2000. Hutchinson's ordinance does not include regulation specific to wind energy systems. The Project will obtain Conditional Use Permits for the wind turbines under Section 509 of the ordinance. Land use in Bon Homme County is regulated by the Bon Homme County Zoning Ordinance, adopted on November 3, 2015, and effective December 9, 2015. Bon Homme's ordinance includes a wind energy system regulation for permitting of a wind energy system. Bon Homme's ordinance specifies standards for siting large wind energy systems in the County (Bon Homme County Zoning Ordinance, Article 17). Prevailing Wind Park has designed the Project to meet the setback and noise requirements set forth in the Bon Homme zoning ordinance and the shadow flicker commitment set forth in Table 9-2.

Prevailing Wind Park, LLC will comply with all terms and conditions of the land use permits from Hutchinson County and Bon Homme County. Prevailing Wind Park also plans to enter into road use and maintenance agreements with each county governing the use, improvement, repair, and restoration of roads within the applicable county, as needed. In addition, Prevailing Wind Park will obtain from each road authority any road crossing, approach, and/or utility permits required for the Project.

The Applicant met with each of the three counties between April 17 and 19, 2018 to introduce sPower, describe Project updates, and discuss road use agreement requirements. Additional details about county and agency coordination are provided in Section 27.2.

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

ARSD 20:10:22:20. Water quality. *The applicant shall provide evidence that the proposed facility will comply with all water quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.*

Groundwater and surface water resources are discussed in Section 12.0. As discussed in Section 12.2.2, the excavation and exposure of soils during the construction and decommissioning of wind turbines, access roads, underground collector lines, and other Project facilities may temporarily cause sediment runoff during rain events. This sediment may temporarily increase the TSS loading in receiving waters. However, erosion control BMPs would keep sediments onsite that might otherwise increase sediment loading in receiving waters.

As discussed in Section 11.2.2.2, construction of the Project would require coverage under the General Permit for Storm Water Discharges Associated with Construction Activities issued by the SDDENR. A condition of this permit is the development and implementation of a SWPPP. The SWPPP would be developed during civil engineering design of the Project and would prescribe BMPs to control erosion and sedimentation. The BMPs may include silt fence, wattles, erosion control blankets, temporary storm water sedimentation ponds, re-vegetation, and/or other features and methods designed to control storm water runoff and mitigate erosion and sedimentation. The BMPs would be implemented to reduce the potential for impacts to drainage ways and streams by sediment runoff. Because erosion and sediment control would be in place for construction, operation, and decommissioning of the Project, impacts to water quality are not expected to be significant.

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

ARSD 20:10:22:21. Air quality. *The applicant shall provide evidence that the proposed facility will comply with all air quality standards and regulations of any federal or state agency having jurisdiction and any variances permitted.*

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

18.1 Existing Air Quality

The entire State of South Dakota is in attainment for all NAAQS criteria pollutants (EPA, 2018). The nearest ambient air quality monitoring site to the Project Area is located near Santee, Knox County, Nebraska, which is south and east of the Project Area (EPA, 2017b). The primary emission sources that exist within the Project Area include agricultural-related equipment and vehicles traveling along State Highways 50, 46, and 37.

18.2 Air Quality Impacts/Mitigation

During construction of the Project, fugitive dust emissions would temporarily increase due to truck and equipment traffic in the Project Area. Additionally, there would be short-term emissions from diesel trucks and construction equipment. Air quality effects caused by dust would be short-term, limited to the time of construction or decommissioning, and would not result in NAAQS exceedances for particulate matter. Implementation of the Project components would not result in a violation to Federal, State, or local air quality standards and, therefore, would not result in significant impacts to air quality. Temporary minor sources of air pollution emissions from Project construction equipment, such as a concrete batch plant, would be permitted by the balance-of-plant contractor or concrete batch plant operator through the SDDENR. The operation of the Project would not produce air emissions that would impact the surrounding ambient air quality. Potential complaints regarding fugitive dust emissions would be addressed in an efficient manner (i.e., implementation of best management practices to suppress fugitive dust emissions during construction such as spraying the roads with water).

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

ARSD 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.*

The Applicant expects to have the Project operational in the fourth quarter of 2019. A preliminary permitting and construction schedule is included in Table 19-1. Although conditions beyond the Applicant's control, such as, but not limited to, delays in interconnection studies, transmission upgrades, or Project financing may delay Project construction and operational date.

Table 19-1: Preliminary Permitting and Construction Schedule

Milestone[a]	Date
Submit SDPUC application	Second Quarter 2018
WAPA completes NEPA review	Fourth Quarter 2018
SDPUC permit award	Fourth Quarter 2018
Other Federal, State, and local permits	Fourth Quarter 2018
Sign wind turbine supply agreement	Second Quarter 2018
Commence construction	Fourth Quarter 2018
Trenching of underground collector system	Fourth Quarter 2018
Collector substation construction	Fourth Quarter 2018
115-kV transmission line construction	Fourth Quarter 2019
Wind turbine erection and pre-commissioning	Second-Third Quarters 2019
Back-feed station power	Second Quarter 2019
Testing and final assembly	Third Quarter 2019
COD	Fourth Quarter 2019

(a) SDPUC = South Dakota Public Utilities Commission, WAPA = Western Area Power Administration, NEPA = National Environmental Policy Act, kV = kilovolt, COD = commercial operation date

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

ARSD 20:10:22:23. Community impact. *The applicant shall include an identification and analysis of the effects the construction, operation, and maintenance of the proposed facility will have on the anticipated affected area including the following:*

(1) A forecast of the impact on commercial and industrial sectors, housing, land values, labor market, health facilities, energy, sewage and water, solid waste management facilities, fire protection, law enforcement, recreational facilities, schools, transportation facilities, and other community and government facilities or services;

(2) A forecast of the immediate and long-range impact of property and other taxes of the affected taxing jurisdictions;

(3) A forecast of the impact on agricultural production and uses;

(4) A forecast of the impact on population, income, occupational distribution, and integration and cohesion of communities;

(5) A forecast of the impact on transportation facilities;

(6) A forecast of the impact on landmarks and cultural resources of historic, religious, archaeological, scenic, natural, or other cultural significance. The information shall include the applicant's plans to coordinate with the local and state office of disaster services in the event of accidental release of contaminants from the proposed facility; and

(7) An indication of means of ameliorating negative social impact of the facility development.

The following sections describe the existing socioeconomic and community resources within the Project Area, the potential community impacts of the proposed Project, and measures to avoid, minimize, and/or mitigate potential impacts.

20.1 Socioeconomic and Community Resources

The existing socioeconomic resources within the Project Area are described below, followed by a discussion of the potential effects of the proposed Project and mitigation and minimization measures.

20.1.1 Existing Socioeconomic and Community Resources

The Project Area is located in southeastern South Dakota in Charles Mix, Bon Homme, and Hutchinson counties. Charles Mix, Bon Homme and Hutchinson counties had estimated populations of 9,129, 7,070 and 7,368, respectively, in 2016 (U.S. Census Bureau, 2016). Wagner, with an estimated 2016 population of 1,566, is the largest city in Charles Mix County (U.S. Census Bureau, 2016). Wagner is located approximately 3.3 miles west of the Project Area. Tripp is the nearest municipality in Hutchinson County to the Project Area and is located approximately 2 miles northeast of the Project area. Avon is the nearest municipality to the Project Area in Bon Homme County and is located 1 mile south of the Project Area. Springfield is the largest municipality in Bon Homme County with a 2016 population estimate of 1,989. The populations of these communities, as well as other communities in Charles Mix, Bon Homme, and Hutchinson counties and their distances from the Project Area, are shown in Table 20-1.

Table 20-1: Population Estimates of Communities in Charles Mix, Bon Homme and Hutchinson Counties and Distance from Project Area

Community	2016 Population Estimate	County	Distance and Direction from Project Area
Dante	108	Charles Mix	1 mile west
Wagner	1,482	Charles Mix	6 miles west
Ravinia	98	Charles Mix	13 miles west
Lake Andes	846	Charles Mix	18 miles west
Pickstown	162	Charles Mix	18 miles west
Geddes	220	Charles Mix	26 miles northwest
Platte	1,531	Charles Mix	36 miles northwest
Avon	666	Bon Homme	1 mile south
Tyndall	1,067	Bon Homme	6 miles southeast
Springfield	1,938	Bon Homme	12 miles southeast
Scotland	791	Bon Homme	13 miles east
Tabor	390	Bon Homme	17 miles southeast
Tripp	668	Hutchinson	2 miles northeast
Kaylor	66	Hutchinson	7 miles east
Parkston	1,826	Hutchinson	13 miles north
Olivet	64	Hutchinson	16 miles northeast

Source: U.S. Census Bureau, 2016

The population in Charles Mix County is predominantly white (63.8 percent), while 32.0 percent of the population is American Indian, and 4.2 percent is some other race. In Bon Homme County, 89.2 percent of the population is white, while 5.0 percent is American Indian. The remaining 5.8 percent is some other race. The population in Hutchinson County is 96.5 percent white and 2.5 percent American Indian, and 1.0 percent is some other race. In the State of South Dakota as a whole, 84.8 percent of the population is white, 8.7 percent is American Indian, and 6.5 percent is some other race (U.S. Census Bureau, 2016).

The median household income in 2016 in Charles Mix, Bon Homme and Hutchinson counties was $43,376, $48,023 and $47,358, respectively. In 2016, 21.5, 10.8 and 13.4 percent of the population, respectively, were below the poverty level in Charles Mix, Bon Homme and Hutchinson counties. By comparison, the median household income for the State was higher ($52,078) than all three counties, and the poverty level (14.0 percent) was between the reported percentages for the counties.

In Charles Mix County, the top industries in terms of employment in 2013 were: (1) educational services, health care, and social services (comprising 25.9 percent of employment); (2) arts, entertainment, and recreation, and accommodation and food services (12.0 percent); and (3) agriculture, forestry, fishing and

hunting, and mining (11.8 percent). In Bon Homme County, the top industries in terms of employment in 2016 were: (1) educational services, health care, and social services (comprising 25.1 percent of employment); (2) agriculture, forestry, fishing and hunting, and mining (14.9 percent); and (3) manufacturing (12.4 percent). In Hutchinson County, the top industries in terms of employment in 2016 were: (1) educational services, health care, and social services (comprising 23.9 percent of employment); (2) agriculture, forestry, fishing and hunting, and mining (17.6 percent); and (3) manufacturing (9.7 percent). The unemployment rates in Charles Mix, Bon Homme and Hutchinson counties in November 2017 were 3.8, 3.2 and 2.9 percent, respectively, and the South Dakota unemployment for that same month was 3.3 percent (South Dakota Department of Labor and Regulation [SDDLR], 2016).

20.1.2 Socioeconomic and Community Impacts

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

20.1.2.1 Economic Impacts

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

The Project would generate approximately $60 million in direct economic benefits and would use approximately 45 acres of land to produce economic benefits for local landowners, local communities, and the State of South Dakota. Over the life of the Project (30 years), it would create direct payments of more than:

- Approximately $37 million to landowners, including an average of $1,230,000 annually from lease payments
- Approximately $6 million to Bon Homme County, or $201,000 annually from taxes paid
- Approximately $4.2 million to Charles Mix County, or $140,000 annually from taxes paid
- Approximately $913 thousand to Hutchinson County, or $30,500 annually from taxes paid
- Approximately $1.5 million to area school district(s), or $371,000 annually from taxes paid
- Approximately $11.1 million to the State of South Dakota, or $336,000 annually from taxes paid

The Project would purchase station power for the turbines, substation, and O&M building from two local rural electric cooperatives in a portion of their service territories where customers are decreasing and cost to maintain the systems continues to increase.

In addition to the direct payments, construction of the Project would create a $14.9 million boost to the local economy. Prevailing Wind Park estimates that $220,000 of food, supplies, and fuel would be purchased locally by the Project and Project staff annually (or $20.4 million over the life of the Project).

The construction crews would include skilled labor, such as foremen, carpenters, iron workers, electricians, millwrights, and heavy equipment operators, as well as unskilled laborers. This diverse workforce would be needed to install all of the Project components, including wind turbines, access roads, underground collector system, O&M building, collector substation, etc. Table 20-2 list the anticipated construction jobs for the Project. Job estimates are based on the recent construction of the Beethoven wind project and an estimate from a wind energy contractor's construction estimate.

Table 20-2: Anticipated Construction Jobs

Total construction days	195
Total man-hours	510,000
Peak construction jobs	245[a]

(a) Estimated peak construction jobs; average may be lower.

20.1.2.2 Population and Housing

The Applicant anticipates that there would not be sufficient trained local labor to fill the number of jobs available. The majority of the non-local construction workforce would probably travel within a 65-mile radius, and within that radius, the largest city that would provide workers would be Sioux Falls, South Dakota. Workers within the 65-mile radius would likely not need additional temporary or permanent housing at the Project Area but would commute to the jobs. The Project would have a less than significant impact on overall population and occupation distribution in the Project Area.

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

20.1.2.3 Property Value Impacts

Extensive statistical studies have demonstrated that large-scale wind energy facilities do not substantially affect the value of adjoining or abutting property. The Massachusetts Clean Energy Center published a report in January 2014 entitled *Relationship between Wind Turbines and Residential Property Values in Massachusetts*. This study analyzed more than 122,000 home sales near the current or future location of a wind farm in Massachusetts and found no net effect on prices attributed to the proximity of the dwelling to the wind energy project. Jennifer Hinman at Illinois State University completed a study based on 3,851 property transactions over a 9-year period near a 240-turbine wind energy facility in Illinois. This study, entitled *Wind Farm Proximity and Property Values: A Pooled Hedonic Regression Analysis of Property Values in Central Illinois* found a negative location effect on property values before the wind farm was approved, a concept known as anticipation stigma, but the study found that property values rebounded to levels higher in real terms than before the wind farm was approved (Hinman, 2010).

In 2009, the Ernest Orlando Lawrence Berkeley National Laboratory published a study entitled *The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis* (see Appendix P). This study analyzed data from approximately 7,500 sales of single-family homes within 10 miles of 24 existing wind facilities in nine different states and found "no evidence… that home prices surrounding wind facilities are consistently, measurably, and significantly affected by either the view of wind facilities or the distance of the home to those facilities." The author of this study, Ben Hoen, completed a second study on this topic at the Ernest Orlando Lawrence Berkeley National Laboratory in 2013 entitled *A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States* (see Appendix Q). This study is based on more than 50,000 home sales within 10 miles of 67 different wind facilities in 27 states, and found "no statistical evidence that home prices near wind turbines were affected in either the post-construction or post-announcement/pre-construction periods."

In the Crocker Wind Farm, LLC docket, EL17-055, appraiser Mike MaRous completed a study evaluating the potential impact of an up to 400-MW wind farm on residential and agricultural land values. Mr. MaRous investigated property sales in six South Dakota counties where more than 25 turbines were operational, conducted a paired sales analysis, and concluded that there was no market evidence that proximity to a turbine would adversely impact land values [Rebuttal Testimony of Mike MaRous and Market Impact Analysis (April 13, 2018) and Sur-Surrebuttal Testimony of Mike MaRous (May 9, 2018)].

20.2 Commercial, Industrial, and Agricultural Sectors

No commercial or industrial sectors occur within the Project Area. The existing agricultural sector within the Project Area is described below, followed by a discussion of the potential effects of the proposed Project and mitigation and minimization measures.

20.2.1 Existing Agricultural Sector

The Project Area is predominantly agricultural, consisting of a mix of cropland, rangeland, and pastureland. No commercial or industrial land uses are located within the Project Area. In 2012, Charles Mix County's 759 farms (totaling 692,319 acres of land) produced $227.9 million in agricultural products (USDA, 2012a). Fifty-five percent was from livestock sales, and 45 percent was crop sales. Turkeys were the top livestock inventory item in the county, and soybeans (for beans) was the top crop in terms of acreage. Charles Mix County ranked 14 out of the 66 South Dakota counties in total value of agricultural products sold (USDA, 2012a).

In 2012, Bon Homme County's 651 farms (totaling 351,596 acres of land) produced nearly $107.9 million in agricultural products (USDA, 2012c). Sixty-two percent was from livestock sales, and 38 percent was crop sales. Cattle and calves were the top livestock inventory item in the county, and soybeans (for beans) was the top crop in terms of acreage. Bon Homme County ranked 43 out of the 66 South Dakota counties in total value of agricultural products sold (USDA, 2012c).

In 2012, Hutchinson County's 802 farms (totaling 513,352 acres of land) produced $186.2 million in agricultural products (USDA, 2012d). Sixty-two percent was from livestock sales, and 38 percent was crop sales. Turkeys were the top livestock inventory item in the county, and soybeans (for beans) was the top crop in terms of acreage. Charles Mix County ranked 20 out of the 66 South Dakota counties in total value of agricultural products sold (USDA, 2012a).

20.2.2 Agricultural Impacts

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

Approximately 676 acres of agricultural land (including cropland and grassland) and 58 acres of non-agricultural land would be temporarily impacted by Project construction. It is estimated that approximately 41 acres of agricultural land and 4 acres of non-agricultural land would be impacted during

the life of the Project, which constitutes less than 0.1 percent of the total land within the Project Area. Areas disturbed due to construction and that would not host permanent Project facilities would be re-vegetated with vegetation types matching the surrounding agricultural landscape.

20.3 Community Facilities and Services

The existing community facilities and services within the Project Area are described below, followed by a discussion of the potential effects of the proposed Project and mitigation and minimization measures.

20.3.1 Existing Community Facilities and Services

The majority of community facilities and services (hospitals, police, fire and ambulance services, schools, churches, and parks and recreational facilities) near the Project Area are located in the nearby towns identified in Table 20-1. Two cemeteries are located within the Project Area, and one church is located outside the Project Area, approximately 0.25 mile east (Figure 10).

Electrical service in the Project Area is provided by Charles Mix Electric, Bon Homme Yankton Electric, and Southeastern Electric Cooperative. The B-Y Water District supplies rural water to the Project Area and maintains a network of distribution lines within the Project Area.

20.3.2 Community Facilities and Services Impacts/Mitigation

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

20.3.3 Emergency Response

The proposed wind farm is located within a rural portion of Bon Homme, Charles Mix and Hutchinson counties. During the Project construction period and during subsequent operation, it is expected that the Project would have no significant impact on the security and safety of the local communities and the surrounding area. Some additional risk for worker or public injury may exist during the construction phase, as it would for any large construction project. However, work plans and specifications would be prepared to address worker and community safety during Project construction. During Project construction, the Project's general contractor would identify and secure all active construction areas to prevent public access to potentially hazardous areas.

During Project construction, the Project contractor would work with local and county emergency management to develop procedures for response to emergencies, natural hazards, hazardous materials incidents, manmade problems, and potential incidents concerning Project construction. The contractor would provide site maps, haul routes, Project schedules, contact numbers, training, and other requested Project information to local and county emergency management.

During Project operations, the Project operator would coordinate with local and county emergency management for the purpose of protecting the public and the property related to the Project during natural, manmade or other incidents. The Project would register each turbine location and the O&M building with the rural identification/addressing (fire number) system and 911 systems.

20.4 Transportation

The existing transportation resources within the Project Area are described below, followed by a discussion of the potential effects of the proposed Project and mitigation and minimization measures.

20.4.1 Existing Transportation

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

20.4.1.1 Surface Transportation

Table 20-3 lists the major roads that intersect the Project Area. The primary access to the Project Area is via U.S. Highway 18 and South Dakota State Highways 50, 46, and 37 (Figure 1 in Appendix A). The U.S. Highway as well as all three State highways are paved. Secondary access to turbine locations would be via existing county and township gravel roads. Paved county roads would be avoided wherever possible due to their light construction. Roads would be assessed for strength and condition prior to construction, and the condition of the roads would be documented through high-resolution video prior to construction. County and township gravel roads determined to be insufficient for construction use would be upgraded and strengthened prior to construction, at the Project's expense. County and township gravel roads would be maintained by the Project's contractor during construction, at the Project's expense. Paved roads would be returned to preconstruction or better condition if damage occurs. The Project would enter into Road Use Agreements with each road authority to define use and restoration of roads utilized during construction of the Project.

Table 20-3: Project Area Roads

Road	Surface Type	Surface Width	Total Lanes
U.S. Highway 18	Paved asphalt	24 feet	2
State Highway 50	Paved asphalt	24 feet	2

Road	Surface Type	Surface Width	Total Lanes
State Highway 46	Paved asphalt	24 feet	2
State Highway 37	Paved asphalt	24 feet	2
Secondary County roads	Gravel or crushed rock / Bituminous	20 to 22	2
Secondary Township roads	Gravel or crushed rock	16 to 20	2

Source: South Dakota Department of Transportation (SDDOT), 2016

In 2016, Average Daily Traffic (ADT) volume was 1,246 trips along State Highway 50 through the Project Area, and 780 trips along State Highway 46. ADT along 292nd Street through the Project Area was 113 (collected in 2015), and ADT along 401st Avenue was not available (SDDOT, 2016).

20.4.1.2 Aviation

There are no airports located within the Project Area. The closest airport is Wagner Municipal Airport, which is a public airport located in Wagner, South Dakota, approximately 7 miles west of the Project Area. The closest private airport to the Project Area is the Plihal Farms airstrip, located near Tyndall, South Dakota, approximately 6 miles southeast of the Project Area. The nearest U.S. air military installation is Offutt Air Force Base, located approximately 170 miles southeast of the Project Area (U.S. Air Force, 2016). The nearest South Dakota National Guard Air National Guard installation is the 114th Fighter Wing, located approximately 68 miles northeast of the Project Area at Joe Foss Field Base, in Sioux Falls, South Dakota. The Project would be located inside and adjacent to the boundaries of the Lake Andes Military Operations Area, but below the operating floor of 6,000 feet AMSL.

20.4.2 Transportation Impacts/Mitigation

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

20.4.2.1 Ground Transportation

The Project Area contains one two-lane paved U.S. Highway, three two-lane paved State Highways, three two-lane paved county roads, and several county and township roads. During construction, it is anticipated that several types of light, medium, and heavy-duty construction vehicles would travel to and from the site, as well as private vehicles used by the construction personnel. The movement of equipment and materials to the site would cause a relatively short-term increase in traffic on local roadways during the construction period. Most equipment (e.g., heavy earthmoving equipment and cranes) would remain at the site for the duration of construction activities. Shipments of materials, such as gravel, concrete, and water would not be expected to substantially affect local primary and secondary road networks. That volume would occur during the peak construction time when the majority of the foundation and tower

assembly is taking place. At the completion of each construction phase, this equipment would be removed from the site or reduced in number.

The Project would not result in any permanent impacts to the area's ground transportation resources. There would be improvements to most gravel roads and temporary impacts to local roads during the construction phase of the Project. The Applicant would work with each county and township on road use agreements during the permitting process so that all parties understand how the Project would proceed prior to construction starting. Within the Project Area, oversized and overweight loads would be strictly confined to roads designated in a road use agreement. The Applicant would work with SDDOT; Charles Mix, Bon Homme and Hutchinson counties; and Choteau Creek and Lone Tree townships to obtain the appropriate access and use permits, and to reduce and mitigate the impacts to area transportation. The Application would be responsible for road repairs.

20.4.2.2 Air Traffic

The air traffic generated by the airports listed above would not be impacted by the proposed Project. The Applicant would follow FAA guidelines for marking towers and would implement the necessary safety lighting. Notification of construction and operation of the wind energy facility would be sent to the FAA, and steps would be taken to comply with FAA requirements. The FAA considers all structures above 499 feet (above ground level) to be obstructions until they have received feedback from the aviation community and completed aeronautical studies. If the aviation community and studies do not bring up any adverse impacts to aviation, the FAA will then issue Determinations of No Hazard on structures above this height.

The Applicant filed Notices of Proposed Construction (Form 7460-1) with the FAA for all wind turbines and permanent meteorological tower(s) locations. The total turbine heights of both turbine models exceeded 499 feet[8]. Prevailing Wind Park submitted Notices of Proposed Construction for an assumed turbine height of 590 feet. In accordance with its requirements for structures of this height, the FAA on May 17, 2018, issued a public notice advising that it is undertaking an aeronautical study (Appendix T). The study will include all 63 proposed representative turbine sites.[9] The notice provided a comment period through June 23, 2018. The notice further stated:

> *Preliminary FAA study indicates that the above-mentioned structure would:*

[8] The GE 3.8-137 is 586 +/-4 feet, and the Vestas 136-3.6 is 568 +/-3 feet.
[9] At the time of the FAA Notice of Proposed Construction, the Project included turbine location 59 which is no longer being proposed.

- *have no effect on any existing or proposed arrival, departure, or en route instrument flight rules (IFR) operations or procedures.*
- *not exceed traffic pattern airspace.*
- *have no physical or electromagnetic effect on the operation of air navigation and communications facilities.*
- *have no effect on any airspace and routes used by the military.*

The Applicant would also file Tall Structures Aeronautical Hazard Applications with the South Dakota Aeronautics Commission for a permit approving the proposed wind turbines and permanent meteorological tower(s) locations.

Air traffic may be present near the Project Area for crop dusting of agricultural fields. Crop dusting is typically carried out during the day by highly maneuverable airplanes or helicopters. The installation of wind turbine towers in active croplands and installation of aboveground collector and transmission lines would create potential hazards for crop-dusting aircraft. However, aboveground collection and transmission lines are expected to be similar to existing distribution lines (located along the edges of fields and roadways), and the turbines and meteorological tower(s) themselves would be visible from a distance and lighted and marked according to FAA guidelines.

20.5 Cultural Resources

The following sections provide information on the cultural resources potentially affected by the construction, operation, and maintenance of Project facilities and how impacts to these resources will be avoided and/or minimized.

20.5.1 Existing Cultural Resources

The Applicant conducted a Level I Cultural Resources Records Search for the Project Area and 1-mile buffer ("Study Area") in April 2018 (Appendix R). HDR, Inc. (HDR) contacted the South Dakota Archaeological Research Center (SDARC) to acquire data for previously recorded archaeological sites and surveys, bridges, cemeteries, structures, and miscellaneous cultural features within the Project's cultural resources study area. In addition to examining the SDARC files, HDR also reviewed General Land Office (GLO) maps.

The cultural resources record search identified 24 cultural resources surveys within the Study Area (Table 2 and Figures 2.1–2.11 in the Literature Search Memo [Appendix R]). These surveys included investigations for a mortuary study, private land parcels, proposed home sites, shelterbelts, community

building installations, bridge replacements, underground telephone lines, fiber optic lines, microwave facilities, water lines and pumping stations, and a wind farm and associated components.

SDARC's files revealed 11 previously identified archaeological sites within the Study Area (Table 3 and Figures 2.1–2.11 in Appendix R). Sites include one school foundation, one railroad segment, one historic foundation and dump, one dump, one farmstead and Euro-American artifact scatter, two Euro-American burials, two precontact artifact scatters, and two precontact isolated finds. One site, a railroad segment (39BO2007), is considered eligible for the NRHP. The remaining sites have been determined not eligible or have not been evaluated.

SDARC's files revealed 27 previously inventoried architectural structures within the study area (Table 4 and Figures 2.1–2.11 in Appendix R). These structures may be associated with as yet unrecorded districts, defined by the NRHP as a concentration of historic buildings, structures, sites, or objects united historically or aesthetically by plan or physical development (NPS, 1997:12). In rural South Dakota, structures associated with districts are usually part of farmsteads with multiple buildings.

Structures identified during the records search include school buildings, individual homes, and farmsteads. Of the 27 previously inventoried architectural structures, one structure (CH00000024) is eligible for the NRHP. Structure CH00000024 is the Wagner House (a.k.a., The Ferdinand Wagner & Ann Homestead), constructed in 1919. This structure is an excellent example of the Craftsman style and is eligible under Criterion C ("That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction"). Of the remaining 26 structures, 3 are determined not eligible and 23 are unevaluated.

The files provided by SDARC revealed the presence of seven previously inventoried cemeteries within the study area (Table 5 and Figures 2.1–2.11 in Appendix R). One of the seven previously inventoried cemeteries is determined not eligible for the NRHP and the remaining cemeteries have not been evaluated.

The files provided by SDARC revealed the presence of 20 previously inventoried bridges within the study area (Table 6 and Figures 2.1–2.11 in Appendix R). Of the 20 previously inventoried bridges, 2 are determined eligible for the NRHP (BO00000248 and CH00000261). The remaining 18 bridges are not eligible for the NRHP.

This information from the Literature Review (Appendix R) was used to develop a Geographic Information System-based (GIS-based) construction guidance grid (construction grid) (Appendix S). The purpose of the construction grid was to assist the Applicant with siting facilities in areas that have a lower likelihood for containing intact cultural resources. The construction grid also identifies areas that have a higher likelihood for containing intact cultural resources eligible for listing on the NRHP, including Traditional Cultural Properties (TCPs).

The cultural resources study area includes 245 Public Land Survey Section (PLSS) Sections, and a PLSS quarter-section layer was used as the base for the construction grid layout. In total, 980 quarter-sections were reviewed and assigned an alphanumeric attribute based on the presence or absence of previously identified cultural resources from the SDARC datasets, cultural features identified on GLO maps, and land use. Of the 980 quarter-sections, 41 were coded as Red (Area of Caution), 365 were coded as Yellow (Area of Concern), and 574 were coded as Green (Area of Minimal Concern) (Figures 2.1 and 2.2 of the Construction Grid Memo in Appendix S).

20.5.2 Cultural Resource Impacts/Mitigation

The Applicant used the results of the cultural resources Construction Grid analysis to inform siting of Project facilities. No Project facilities, including temporary disturbance during construction, are located in areas identified as Red (Area of Caution) on the Construction Grid.

As part of the NEPA process for approval of the WAPA interconnection, the Project will require compliance with Section 106 of the National Historic Preservation Act of 1966, as amended. As such, the Applicant is coordinating with WAPA to determine the most appropriate inventory strategy for the Project. WAPA is consulting with SHPO and interested tribes as part of the Section 106 compliance process.

The Applicant will conduct a Level III Archaeological Survey for all areas that will be physically impacted by the Project beginning in June 2018. These areas may include but are not limited to the proposed footprint of the turbines, substation, temporary work areas, staging areas, access roads, and cable routes. In accordance with WAPA requirements, the following minimum survey parameters will be followed:

- 250-foot radius from the center point of turbine locations
- 100-foot-wide corridor for collector lines and access roads
- Footprint of any building, laydown/staging areas, batch plant, etc. plus 200 feet

In addition to a Level III Archaeological Survey, the Applicant will conduct a Historic Architectural Resources Reconnaissance Survey using a 2-mile area of potential effect. The Historic Architectural Resources Reconnaissance Survey will focus on locating standing historic-era structures to assess the visual impacts of the Project on their integrity of setting.

All work will be conducted in accordance with the South Dakota Guidelines for Cultural Resource Surveys and Survey Reports (South Dakota State Historical Society, 2005), South Dakota Historic Resource Survey Manual (Rogers et al., 2006), and the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (National Park Service, 1983).

For cultural resources identified during the surveys, a recommendation of NRHP-eligibility of the resource will be made. Sites determined to be NRHP-eligible will be avoided by the Project. If avoidance is not practicable, the Applicant will work with WAPA and SHPO to develop appropriate minimization or mitigation measures.

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

ARSD 20:10:22:24. Employment estimates. *The application shall contain the estimated number of jobs and a description of job classifications, together with the estimated annual employment expenditures of the applicants, the contractors, and the subcontractors during the construction phase of the proposed facility. In a separate tabulation, the application shall contain the same data with respect to the operating life of the proposed facility, to be made for the first ten years of commercial operation in one-year intervals. The application shall include plans of the applicant for utilization and training of the available labor force in South Dakota by categories of special skills required. There shall also be an assessment of the adequacy of local manpower to meet temporary and permanent labor requirements during construction and operation of the proposed facility and the estimated percentage that will remain within the county and the township in which the facility is located after construction is completed.*

As discussed in Section 20.1.2.1, the Project is expected to employ approximately 245 temporary workers at the peak of construction to support Project construction. It is likely that general skilled labor is available in Bon Homme, Hutchinson, or Charles Mix counties, or the State to serve the basic infrastructure and site development needs of the Project. Specialized labor will be required for certain components of Project construction. It is likely that this labor will be imported from other areas of the State or from other states, as the relatively short duration of construction makes special training of local or regional labor impracticable.

The estimated number of construction jobs by classification and annual employment expenditures during construction are included in Table 21-1; however, the number of jobs during the peak of construction may be higher.

Table 21-1: Anticipated Construction Jobs and Employment Expenditures

Job Classification	Number	Estimated Annual Salary
Crane operators	8	$90,000
Civil workers	50	$85,000
Construction managers	6	$110,000
Collection workers	12	$65,000
Tower erectors	72	$75,000
Transmission workers	12	$75,000
Substation workers	12	$80,000
Foundation workers	24	$70,000
Testing & inspections	12	$85,000
Design engineers	10	$140,000
Total:	**218[a]**	**$17,770,000**

(a) There may be as many as 245 workers during the peak of construction.

The estimated number of jobs by classification and annual employment expenditures during operation are included in Table 21-2. Annual employment expenditures are anticipated to be the same for each of the first 10 years of commercial operation.

Table 21-2: Anticipated Operation Jobs and Employment Expenditures

Job Classification	Number	Estimated Annual Salary
Facility managers	1	$80,000
Wind turbine technicians	6	$70,000
Operators	1	$65,000
Administrative	1	$35,000
Total:	**9**	**$600,000**

22.0 CUMULATIVE EFFECTS

Sections 10.0 through 15.0 and Sections 17.0, 18.0, and 20.0 provide a description of the potential environmental effects of Project construction and operation. Following is a discussion of the environmental effects which may be cumulative or synergistic consequences of siting the proposed facility in combination with any operating energy conversion facilities, existing or under construction.

One existing wind energy facility, the 80-MW Beethoven Wind Project, is located adjacent to the proposed Prevailing Wind Park Project Area. Although Beethoven Wind Project is technically excluded from the cumulative effects analysis because it generates fewer than 100 MW, the Applicant has chosen to include it here due to its proximity to the Prevailing Wind Park Project Area.

The construction and operation of the proposed Project, in combination with operation of the existing Beethoven Wind Project, could contribute to cumulative effects on environmental resources in the area. For purposes of the cumulative effects analysis, the information provided in Table 22-1 is assumed for the Beethoven Wind Project.

Table 22-1: Beethoven Wind Project Information

Location	Bon Homme, Hutchinson, and Charles Mix Counties
Owner	NorthWestern Energy
Total capacity	80 MW
Turbine model and size	GE 1.85-MW
Number of turbines	43
Hub height	80 meters
Rotor diameter	87 meters
Estimated total project area	8,300 acres
Estimated total length of access roads	44,000 feet
Estimated total length of collector lines	91,000 feet
Estimated total operational ground disturbance acreage	25 acres
Commercial operation date	May 2015
Estimated life of project	25 to 30 years

The Prevailing Wind Park Project, in combination with the 80-MW Beethoven Wind Project, would result in the construction and operation of up to 104 wind turbines and associated access roads, collector lines, and other facilities in Bon Homme, Hutchinson, and Charles Mix counties. The projects would

result in an estimated 70 acres of cumulative ground disturbance during the life of the projects. This disturbance acreage represents less than 0.2 percent of the combined acreage of both project areas.

As discussed in this Application, impacts to the physical environment, hydrologic resources, terrestrial and aquatic ecosystems, and socioeconomic and community resources have been avoided or minimized during the siting and design of the Project. Furthermore, implementation of the mitigation measures identified in this Application would minimize potential impacts of the Project on all resources. Therefore, the cumulative effects of siting the proposed Project in combination with the Beethoven Wind Project on resources within Bon Homme, Hutchinson, and Charles Mix counties are not expected to be significant.

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

ARSD 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.*

No future additions and modifications are anticipated. Prevailing Wind Park does request the turbine location flexibility and other facility flexibility specified in Section 8.1.

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

ARSD 20:10:22:33.01. Decommissioning of wind energy facilities -- Funding for removal of facilities. *The applicant shall provide a plan regarding the action to be taken upon the decommissioning and removal of the wind energy facilities. Estimates of monetary costs and the site condition after decommissioning shall be included in the plan. The commission may require a bond, guarantee, insurance, or other requirement to provide funding for the decommissioning and removal of a wind energy facility. The commission shall consider the size of the facility, the location of the facility, and the financial condition of the applicant when determining whether to require some type of funding. The same criteria shall be used to determine the amount of any required funding.*

The Applicant has entered into long-term lease and easement agreements for placement of the wind turbines and associated Project infrastructure with private landowners within the Project Area. The Applicant anticipates that the life of the Project would be approximately 30 years but reserves the right to extend the life of the Project as well as explore alternatives regarding Project decommissioning. One such option may be to retrofit the turbines and power system with upgrades based on new technology, which may allow the wind farm to produce efficiently and successfully for many more years.

The Project will be decommissioned in accordance with applicable State and County regulations. Current decommissioning requirements in Bon Homme County require that all towers, turbine generators, transformers, overhead collector and feeder lines, foundations, buildings, and ancillary equipment be dismantled and removed to a depth of 4 feet. To the extent possible, the site shall be restored and reclaimed to its pre-project topography and topsoil quality. All access roads shall be removed unless written approval is given by the landowner requesting roads be retained.

The Applicant estimates that the costs of decommissioning will be in the magnitude of the estimate provided for the up to 72-turbine Dakota Range Wind Project. The Dakota Range Wind Project developer estimated the cost per turbine (no resale) to be $38,900 per turbine. The Applicant has commissioned DNV-GL to provide a decommissioning plan with a cost estimate, which will be submitted to the SDPUC for review shortly after this application is submitted. The decommissioning plan will address the following activities:

- The Project will be decommissioned in accordance with applicable State and County regulations.
- Removal and salvage of turbines
- Removal of turbine foundations
- Removal and salvage of substation components
- Removal and salvage of aboveground components of 34.5-kV collection system
- Removal and salvage of below grade components of collection system foundations

- Removal and salvage of interconnection facilities
- Removal of access roads
- Removal of crane pad(s)
- Restoration and reclamation of the site

Prevailing Wind Park will restore and reclaim the site to its pre-Project topography and topsoil quality using BMPs consistent with those outlined by the 2012 USFWS Land-Based WEG. The goal of decommissioning will be to restore natural hydrology and plant communities to the extent practicable while minimizing new disturbance and removal of native vegetation. The decommissioning BMPs that will be employed on the Project to the extent practicable with the intent of meeting this goal include:

- Conduct survey, using qualified experts, to detect populations of invasive species, and implement and maintain comprehensive approaches to preventing and controlling invasive species as necessary.
- Remove any unnecessary overhead electrical lines and associated poles.
- After decommissioning, install erosion control measures in all disturbance areas where potential for erosion exists, consistent with storm water management objectives and requirements.
- Remove fencing unless the landowner requests it stay.
- Remediate any petroleum product leaks and chemical releases prior to completion of decommissioning. Decommissioning and restoration activities will be completed within 12 months after the date the Project ceases to operate.

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

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

25.1 Reliability

Reliability (availability) is defined as the ability of the turbine to generate electricity when sufficient wind is available. GE has over 35,000 wind turbines (60 GW) currently installed globally. GE's current turbine availability rate is 98 percent. Vestas has installed over 3,500 of their 3MW Platform wind turbines globally. Their 3MW Platform global turbine availability has increased from just under 84 percent to just under 98 percent from the beginning of 2014 to week 13 of 2017. Turbine availability is now greater than 98 percent for their 3MW Platform. To further provide for reliability and to protect the Project financially, sPower requires availability guarantees from turbine manufacturers and O&M service providers to maintain the turbine at 98 percent availability or higher. If the turbine manufacturers and O&M service providers fail to maintain the required level of availability, then the turbine manufacturers and O&M service providers are required to pay a project liquidated damages for the lost revenue from lost energy production. Typically, the turbine manufacturer maintains the turbine for the first 2 years, then the turbines are maintained under O&M service contracts with terms of 5 or 10 years.

To further improve reliable operation of the region's power grid, wind energy projects are required to provide short-term forecasts of wind speed and energy that would be produced. Accurately anticipating weather conditions lets wind energy project owners and operators get the most out of the facilities. Transmission system operators need to know how much energy wind facilities can deliver and when to dispatch generators on the system to match load to generation. Typically, wind projects provide a next-day, next-hour, and next-15 minutes forecast, updated every 15 minutes to the off-taker, balancing authority, and/or regional transmission operator. These predictions of energy generation through in-depth, site-specific weather forecasting are used to integrate wind energy into the region's power grid and to schedule turbine and transmission maintenance windows, improving overall reliability.

25.2 Safety

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

- The towers would be placed at distances away from existing roadways and residences per the applicable planned setback requirements described in Section 9.2

- Security measures would 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 would sit on solid steel enclosed tubular towers; access to each tower would be only through a solid steel door that would be locked and accessed only by authorized personnel
- Tower exteriors would be designed to be unclimbable
- Turbines would conform to applicable industry standards
- A professional engineer would certify that the foundation and tower design of the turbines is within accepted professional standards, given local soil and climate conditions

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

ARSD 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.

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

- Configuration of wind turbine – Section 8.2 and Appendix A, Figure 3
- Number of wind turbines – Section 8.1
- Warning lighting requirements for wind turbines – Section 20.4.2.2
- Setback distances – Section 9.2
- Sound levels during construction and operation – Section 15.3.4
- Electromagnetic interference – Section 15.6
- Site and major alternatives – Section 9.0 and Appendix A, Figures 2 and 4
- Reliability and safety – Section 25.0
- Right-of-way or condemnation requirements – Sections 8.0 and 9.3
- Clearing activities – Sections 8.0 and 13.1.2
- Configuration of interconnection towers and poles – Section 8.7
- Conductor and structure configurations – Section 8.7
- Underground electric interconnection facilities – Section 8.7

Please refer to the Completeness Checklist (ARSD 20:10:22:33.02, Information concerning wind energy facilities) at the beginning of this application for additional requirement details.

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

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

27.1 Permits and Approvals

The Project must comply with Federal, State, and local laws requiring permits or approvals. Table 27-1 lists the permits and approvals that are anticipated as part of the Project.

Table 27-1: List of Potential Permits or Approvals

Agency	Permit/Approval	Description	Status
WAPA	NEPA compliance	EA required for interconnection to WAPA transmission line	To be completed prior to approval of interconnection agreement
USFWS	Threatened and endangered species – Section 7 compliance	Determination of effect on federally listed species	To be completed in conjunction with WAPA EA
FAA	Form 7460-1, Notice of Proposed Construction or Alteration	Required if construction or alteration is within 6 miles of public aviation facility and for structures higher than 200 feet	Will be completed after final design is complete
USACE	Section 404 permit	Complete an application under the Clean Water Act for impacts to wetlands and waters of the U.S.	Unlikely, but to be determined once layout is finalized
South Dakota SHPO	Section 106 consultation	Determination of effect on archaeological and historical resources	To be completed in conjunction with EA
WAPA	Section 106 consultation with Native American tribes	Determination of effect on Native American cultural resources	To be completed in conjunction with EA
SDPUC	Energy Facility Site Permit	Application required for wind facilities with nameplate capacity greater than 100 megawatts	Submitted May 2018
SDGFP	Coordination	Voluntary coordination regarding wildlife	Ongoing
SDDENR	401 Water Quality Certification	Complete an application under the Clean Water Act, only if Individual Permit is required for Section 404	Not anticipated unless individual Section 404 permit is needed from USACE

Agency	Permit/Approval	Description	Status
	General Permit for Storm Water Discharges Associated with Construction Activities (NPDES)	Storm water permit required for construction activities	SWPPP will be prepared and Notice of Intent will be submitted after final design is complete
	Temporary Water Use Permit	Temporary permits for the use of public water for construction, testing, or drilling purposes; issuance of a temporary permit is not a grant of water right	If necessary, will be obtained prior to construction
	General Permit for Temporary Discharges	Temporary permit for the use of public water for construction dewatering	If necessary, will be obtained prior to construction
	Water Rights Permit for Nonirrigation Use	Needed if water will be appropriated for O&M facility	If necessary, will be obtained prior to construction
SDDOT, Aeronautics Commission	Aeronautical Hazard Permit	Permit lighting plan determined with FAA coordination	Will be completed after final design is complete
SDCL 49-32-3.1	Notice to telecommunications companies	Telecommunication companies review the preliminary electrical layout and may suggest revisions to reduce impact to their systems	Ongoing
SDDOT	Highway Access Permit	Permit required for any access roads abutting State roads	If necessary, will be obtained after final design is complete
	Utility Permit	Permit required for any utility crossing or use within State road right-of-way	If necessary, will be obtained after final design is complete
	Oversize & Overweight Permit	Permit required for heavy equipment transport over State roads during construction	Will be obtained prior to construction
Bon Homme County	Large Wind Energy System Permit	Permit required for construction of the Project	Will be obtained prior to construction
	Individual Building Permits	Permit required for construction of each turbine and building	Will be obtained prior to construction
Charles Mix County	Individual Building Permits	Permit required for construction of each turbine and building	Will be obtained prior to construction
Hutchinson County	Conditional Use Permit	Permit required for construction of the Project	Will be obtained prior to construction
	Individual Building Permits	Permit required for construction of each turbine and building	Will be obtained prior to construction

Agency	Permit/Approval	Description	Status
Counties and Townships	Road use and utility permits	Required for use and crossing of roads	Will be obtained prior to construction

27.2 Agency Coordination

Throughout Project planning and development, the Applicant and its predecessor, Prevailing Winds, LLC, have coordinated with various Federal, State, and local agencies and governmental authorities to identify potential concerns regarding the proposed Project. A summary of agency comments and coordination efforts are provided below.

27.2.1 USFWS and SDGFP

Prevailing Wind Park and its predecessor, Prevailing Winds, LLC, have coordinated closely with the USFWS and SDGFP through meetings, conference calls, electronic communications and site visits. The primary topics of these coordination efforts are summarized below, and Prevailing Wind Park provides a response to each such topic below and elsewhere (where noted) in this Application.

- USFWS easements: As discussed in Section 15.2.1, three wetland easements and two grassland conservation easements managed by USFWS Lake Andes NWR are within the Project Area. Additionally, two WPAs managed by the USFWS Lake Andes Wetland Management District are located within the Project Area. To determine the exact locations of these properties, Prevailing Winds, LLC and Prevailing Wind Park coordinated with the USFWS Lake Andes Complex to obtain grassland and wetland easement and WPA data, coordinate field reviews, and review various iterations of the Project design. The proposed configuration avoids USFWS wetland and grassland easements and WPAs and incorporated USFWS design suggestions to the extent practicable.
- Birds of Conservation Concern, Other Grassland Birds, and Related Native Grassland and Wetland Habitat Concerns: Primary threats to Birds of Conservation Concern in South Dakota include habitat loss and fragmentation. The agencies recommend avoidance, minimization, and if necessary, mitigation to reduce impacts to these species and habitat types. Prevailing Wind Park has adjusted the Project layout to avoid native grasslands, wetlands, and other habitats within the Project Area to the extent practicable. Section 13.4 and the BBCS discuss Birds of Conservation Concern and contain additional details about avoidance and minimization measures.
- Bald Eagles: Bald eagle use and nest monitoring surveys were completed in 2015 and 2016; an aerial nest survey was conducted in 2016. There are no bald eagle nests located within the Project

Area, and bald eagle use monitoring data suggests low use within the Project Area. The nearest active eagle nest is located approximately 0.5 mile from the Project Area. Additional data collected in connection with the nearby Beethoven Wind Project further supports these findings.

- NLEB: Acoustic presence/absence surveys for the NLEB were conducted in 2015 and 2016. During the 2015 surveys, the NLEB was qualitatively verified as occurring at two acoustical survey stations. Based, in part, on the results of the 2015 survey, the Project Area was shifted to the north and away from suitable woodland habitat located primarily along the Missouri River. During the 2016 surveys, no NLEB calls were recorded at the monitoring locations, which included one site in the southwest portion of the Project Area where an NLEB was recorded in 2015. The wind turbine located closest to this monitoring location is approximately 0.25 mile to the southeast. Prevailing Wind Park will comply with applicable avoidance, minimization, and mitigation measures specified in the PEIS.
- Whooping Crane. The Project Area is located within the 95 percent migration corridor when considered specific to South Dakota; however, there have been no confirmed whooping crane sightings within the Project Area. Prevailing Wind Park will comply with applicable avoidance, minimization, and mitigation measures specified in the PEIS.

Following is a list of the primary coordination meetings completed to date. Copies of USFWS and SDGFP correspondence are included in Appendix T.

- April 1, 2015: Prevailing Winds. LLC meeting with USFWS, SDGFP, and Western EcoSystems Technology, Inc. (WEST) to introduce agencies to the Prevailing Winds Project, review Tier 1-2 work to date, and discuss scope of planned Tier 3 field surveys.
- April 6, 2015: Prevailing Winds, LLC email communication from SDGFP with a partial list of breeding birds expected in the Project boundary.
- May 14, 2015: Prevailing Winds, LLC meeting with USFWS Lake Andes NWR/WMD staff to introduce Prevailing Winds Project, review work to date and discuss planned field surveys. Discussed and requested USFWS easements within Project Area.
- June 6, 2016: Prevailing Winds, LLC meeting with USFWS, Burns & McDonnell, and WEST to discuss project description, status of SDPUC permit application, status of wildlife surveys completed, and WAPA NEPA process.
- July 14, 2016: Prevailing Winds, LLC site visit with USFWS and SDGFP to tour points of interest in the Project boundary. Presentations were given on ongoing and completed studies

included bat acoustic surveys. The group also visited an active bald eagles nest and the adjacent Beethoven Wind Project.

- March 16–17, 2017: Prevailing Winds, LLC telephone and email communication between WEST and USFWS regarding proposed eagle nest status checks and merits of conducting further avian use surveys.
- May 17, 2017: Prevailing Winds, LLC biology meeting with USFWS, SDGFP, WAPA, Burns & McDonnell, and WEST to discuss wildlife surveys conducted to date.
- June 23, 2017: Email communication between WEST and USFWS regarding bat acoustic study plan.
- December 13, 2017: Prevailing Wind Park meeting with USFWS, SDGFP, WEST and sPower to introduce sPower, and restart permitting and coordination. Issues raised included protection of native grasslands; requirements for compliance with the PEIS regarding northern long-eared bat and whooping crane; and avian use of the Project Area, including bald eagles. No requests were made for additional surveys.
- January 2018: Prevailing Wind Park email communication between USFWS Lake Andes National Wildlife Refuge and sPower regarding USFWS wetland and grassland easements.
- March 16, 2018: Prevailing Wind Park telephone communication between USFWS, SDGFP, and sPower regarding definitions of grasslands.
- March 30, 2018: Prevailing Wind Park email communication between USFWS and sPower regarding pre-construction surveys for rare plants.

27.2.2 WAPA and SHPO

In connection with WAPA's EA and pursuant to Section 106 of the National Historic Preservation Act of 1966, SHPO's April 20, 2018, comments addressed the area of potential effects and identification of historic properties. SHPO also noted that it does not have the expertise to recommend an area of potential effects or assess the effects of the proposed Project to places of religious and cultural significance to American Indian tribes and encouraged WAPA to provide opportunities for other consulting parties to provide meaningful input on such matters. WAPA is the lead agency for tribal consultation under Section 106 and is coordinating with tribes regarding their participation in the tribal consultation process. As noted in Section 20.5.2 of this Application, the Applicant is consulting with WAPA to develop the most appropriate cultural resources inventory strategy for the Project and will conduct a Level III Archaeological Survey for all areas that will be physically impacted by the Project and a Historic Architectural Resources Reconnaissance Survey within a 2-mile area of potential effect. For cultural resources identified during the surveys, a recommendation of NRHP-eligibility of the resource will be

made. Sites determined to be NRHP-eligible will be avoided by the Project. If avoidance is not practicable, the Applicant will work with WAPA and SHPO to develop appropriate minimization or mitigation measures.

Following is a list of the primary coordination meetings completed to date. Copies of WAPA and SHPO correspondence are included in Appendix T.

- April 27, 2017: Prevailing Winds, LLC EA Kickoff Meeting with WAPA, Prevailing Winds, LLC, Burns & McDonnell, HDR, and WEST to discuss the proposed project, wildlife surveys conducted to date, and status of PUC permit process.
- May 18, 2017: Prevailing Winds, LLC cultural resources meeting with SHPO, Burns & McDonnell, and HDR to discuss Section 106 coordination and survey protocols.
- November 3, 2017: Prevailing Wind Park call with WAPA and Burns & McDonnell to discuss NEPA process.
- February 16, 2018: Prevailing Wind Park call with WAPA, Burns & McDonnell to discuss Section 106 status and survey planning.
- February 28, 2018: Prevailing Wind Park call with WAPA and Burns & McDonnell to discuss status of NEPA process.

27.2.3 Counties

To date, Prevailing Wind Park's correspondence with Bon Homme, Charles Mix, and Hutchinson counties has centered on local permitting requirements and road use agreements – none of the counties have raised significant concerns regarding the Project. Prevailing Wind Park has also met with local officials in each county to discuss the Project. Prevailing Wind Park will apply for local permits beginning in the second quarter of 2018. Discussions regarding road use agreements are ongoing.

Following is a list of the primary coordination meetings completed to date.

- 2015 to October 2017: Prevailing Winds, LLC meetings with Bon Homme County officials numerous times each year to update the county officials on the progress of the Project. Prevailing Winds, LLC met with Charles Mix County officials as the project achieved development milestones to provide updates on the progress of the Project.
- June 1, 2015: Prevailing Winds, LLC conducted a tour of the Crow Lake Wind Farm for local residents and Bon Homme County and Charles Mix County staff and officials.

- December 13, 2017: Prevailing Wind Park meeting with Bon Homme County to introduce sPower and restart the Project permitting.
- March 2018: Prevailing Wind Park email communications between Bon Homme County Zoning Administrator and sPower regarding County permitting requirements for wind energy projects.
- February, March, and April 2018: Prevailing Wind Park email and telephone communications between Hutchinson County and sPower regarding county permitting requirements for wind energy projects.
- March 7, 2018: Prevailing Wind Park telephone and email communications between Charles Mix County Building Permit Administrator and sPower regarding county permitting requirements for wind energy projects.
- April 17, 2018: Prevailing Wind Park attended Bon Homme County Commissioners Meeting to introduce project manager, describe project schedule, and road use agreements.
- April 17, 2018: Prevailing Wind Park telephone communications between Bon Homme County Road Engineer and sPower regarding road use agreements.
- April 17, 2018: Prevailing Wind Park attended Hutchinson County Commissioners Meeting to introduce project manager, describe project schedule, and road use agreements.
- April 17, 2018: Prevailing Wind Park met with Hutchinson County Road Engineer to discuss road use agreements.
- April 19, 2018: Prevailing Wind Park attended Charles Mix County Commissioners Meeting to introduce project manager, describe project schedule, and road use agreements.
- April 19, 2018: Prevailing Wind Park left voice message for Charles Mix County Road Engineer regarding road use agreements.

27.3 Public and Agency Comments

As discussed in Section 9.0, several potential Project sites in South Dakota were considered before the existing site was selected. Prevailing Winds, LLC and the Applicant considered input from agencies and the public in siting the Project Area and in identifying potential turbine locations. Some of the adjustments made during Project siting and design, in response to comments, included:

- Moving the Project away from the Missouri River, where more woodland habitat and higher populations of many plant and animal species, including northern long-eared bats, are present.
- Avoidance of impacts to State and Federal lands within or near Project Area.
- Avoidance of native grasslands, wetlands, and other habitats within or near Project Area to the extent practicable.

- Avoidance of an existing eagle nest located near the Project Area.

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

As described in Sections 1.0 through 3.0, the Applicant has addressed the matters set forth in SDCL Chapter 49-41B and in ARSD Chapter 20:10:22 (Energy Facility Siting Rules), related to wind energy facilities.

The Applicant's burden of proof is set forth in SDCL 49-41B-22. The information presented in this Application establishes that:

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

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

The Applicant is submitting testimony and exhibits in support of this Application. The individuals identified in Table 28-1 are providing testimony in support of the Application. Prevailing Wind Park reserves the right to provide supplemental and/or rebuttal testimony, as needed, to further support this Application.

Table 28-1: List of Individuals Providing Testimony

Individual	Title	Company	Subject Matter
James Damon	Senior Project Manager	sPower	Project development
Bridget Canty	Permitting Project Manager	sPower	Environmental
Keith Thorstad	President	Thorstad Companies	Construction
Aaron Anderson	Senior Mechanical Engineer	Burns & McDonnell	Shadow flicker
Chris Howell	Senior Noise Specialist	Burns & McDonnell	Noise

28.1 Applicant Verification

Sean McBride, being duly sworn, deposes and states that he is the Authorized Representative of the Applicant and is authorized to sign this Application on behalf of the Project Owner/Applicant, Prevailing Wind Park, LLC.

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

Dated this 30th day of May 2018.

Mr. Sean McBride

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APPENDIX T – AGENCY CORRESPONDENCE

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