South Dakota Public Utilities Commission

Energy Facility Permit Application

Tatanka Ridge Wind Project

Prepared for:
Tatanka Ridge Wind, LLC
a subsidiary of
Avangrid Renewables, LLC

Prepared by:
Barr Engineering Co.

June 2019

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Acronyms and Abbreviations

AGL	Above-ground Level
ARMS	Archaeological Resources Management System
ARSD	Administrative Rules of South Dakota
AWEA	American Wind Energy Association
ac	acres
BBCS	Bird and Bat Conservation Strategy
BBS	Breeding Bird Survey
BCC	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practice
BOA	Board of Adjustment
dBA	A-weighted decibels
DOI	Department of the Interior
ECPG	Eagle Conservation Plan Guidance
ELF	extremely low frequency
EMF	electromagnetic fields
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
ft	feet
GW	gigawatts
hp	horsepower
Hz	hertz
IBA	Important Bird Areas
In	inches
ISO	International Organization for Standardization
kV	kilovolt
kWh	kilowatt-hour
LBNL	Lawrence Berkeley National Laboratory
LCOE	levelized cost of electricity
m	meters
MBTA	Migratory Bird Treaty Act
mG	milligauss
m/s	meters per second
MET	meteorological
MISO	Midcontinent Independent System Operator, Inc.
MSL	Mean sea level
MW	megawatts

MWhr	megawatt hours
NAAQS	National Ambient Air Quality Standards
NAIP	National Agriculture Imagery Program
NLCD	National Land Cover Dataset
NLEB	Northern Long-Eared Bat
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NRI	National Rivers Inventory
NWI	National Wetlands Inventory
O&M	operation and maintenance
PCS	personal communication service
PPA	power purchase agreement
PTC	Production Tax Credit
ROW	right-of-way
SCA	State Conservation Area
SDAC	South Dakota Aeronautics Commission
SDARC	South Dakota Archaeological Research Center
SDDOT	South Dakota Department of Transportation
SDDENR	South Dakota Department of Environment and Natural Resources
SDGS	South Dakota Geologic Survey
SDGFP	South Dakota Game, Fish, and Parks
SDNHD	South Dakota Natural Heritage Database
SDPUC	South Dakota Public Utilities Commission
SDSU	South Dakota State University
SESC	Soil Erosion and Sediment Control
SEP	Special Exception Permit
SHPO	State Historic Preservation Office
SPCC	Spill Prevention, Control, and Countermeasures Plan
SWPPP	Stormwater Pollution Prevention Plan
US	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USDOE	United States Department of Energy
USEIA	United States Energy Information Administration
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USEIA	United States Energy Information Administration
WEG	Wind Energy Guidelines
WES	Wind Energy System
WEST	Western Ecosystems Technology, Inc.

WHO	World Health Organization
WMA	Wildlife Management Area
WOUS	Waters of the United States
WPA	Waterfowl Production Area

1.0 Introduction

1.1 Project Overview

Tatanka Ridge Wind, LLC (Tatanka Ridge), a wholly owned subsidiary of Avangrid Renewables, LLC, is proposing to construct and operate the Tatanka Ridge Wind Project (Project) in Deuel County, South Dakota. The Project will generate up to 155 megawatts (MW) of electricity; therefore, Tatanka Ridge is requesting an Energy Facility Permit from the South Dakota Public Utilities Commission (SDPUC). The Project is located entirely within Deuel County (County) in the following townships (refer to Figure 1):

- Blom;
- Brandt;
- Grange;
- Hidewood; and
- Scandinavia.

The Project includes approximately 18,700 acres (ac) of leased land and a total area of 27,900 ac within the Project boundary, of which up to approximately 51.4 ac will have permanent facilities. The Project will generate up to 155 MW of electricity at rated capacity and will include construction of up to 56 turbines. Refer to Figure 2 for the layout of the Project. Additional Project Facilities include:

- Access roads;
- Above/underground electrical collection lines;
- Communication systems;
- Operation and maintenance (O&M) building (O&M Facility);
- One permanent meteorological (MET) tower;
- Aircraft detection lighting system (ADLS);
- Electrical substation (Project Substation); and
- Less than 0.5 mile overhead 345 kilovolt (kV) line connecting the Project Substation to the Interconnection Substation (gen-tie line or feeder line).

SDCL Chapter 49-41B-2.1 defines an electric transmission line requiring a permit from the SDPUC as a transmission line and associated facilities with a design of more than 115 kilovolts (kV). However, if such a transmission line is less than 2,640 feet (ft) in length (one-half mile), does not cross any public highways, and eminent domain is not necessary to obtain rights-of-way, the transmission line is not a transmission facility for purposes of SDCL Chapter 49-41B-2.1. Therefore, because the 345 kV gen-tie or feeder line will

be less than 2,640 ft in length, does not cross any public highways, and does not require the use of eminent domain, it does not require a permit from SDPUC.

Tatanka Ridge executed a Generator Interconnection Agreement with Otter Tail Power Company and Midcontinent Independent System Operator, Inc. (MISO). The Project will interconnect to the regional electric grid via the Astoria substation, a new Otter Tail Power Company Interconnection Substation scheduled to be operational in 2020, located in Scandinavia Township.

Avangrid Renewables, LLC, as the parent company, will oversee development of the Project. Avangrid Renewables, LLC, is an international energy company with the largest renewable asset base of any company in the world. Avangrid Renewables, LLC, headquartered in Portland, Oregon, has more than $10 billion of operating assets totaling more than 6,000 MW of owned and controlled wind and solar generation in 22 US states. Avangrid Renewables, LLC owns and operates approximately 310 MW of wind energy in South Dakota including the 50.4 MW Buffalo Ridge I Wind Project, the 210 MW Buffalo Ridge II Wind Project, and the 150 MW MinnDakota Wind Project (50 MW in South Dakota, 100 MW in Minnesota). Additionally, Coyote Ridge is a 96.7 MW project in Brookings County that is currently under construction.

1.2 Names of Participants, Owner, and Manager (ARSD 20:10:22:06 and ARSD 20:10:22:07)

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.*

Tatanka Ridge authorizes the following individuals to receive communications relating to this application:

- Jesse Bermel
  Business Developer
  Tatanka Ridge Wind, LLC
  1125 NW Couch Street, Suite 600
  Portland, Oregon 97209-4129
  jbermel@Avangrid.com
  (319) 626-2512

- Mandy Bohnenblust
  Sr. Permitting Manager
  120 South Sixth Street, Suite 1725
  Minneapolis, Minnesota 55402
  (612) 367-4311

- Brett Koenecke
  May, Adam, Gerdes, and Thompson, LLP
  503 S Pierre Street
  Pierre, South Dakota 57501
  brett@mayadam.net
  (605) 222-0386

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.*

Tatanka Ridge Wind, LLC, is a wholly owned subsidiary of Avangrid Renewables, LLC and is the Applicant. The Applicant will be the sole owner of the Project. Jesse Bermel, Mandy Bohnenblust, and Brett Koenecke, named above, are the primary contacts.

1.3 Facility Permit Application Content and Organization

Tatanka Ridge prepared this application in accordance with SDCL Chapter 49-41B and Administrative Rules of South Dakota (ARSD) Chapter 20:10:22 relating to wind energy sites. Accordingly, this application includes details regarding the existing environment, the potential Project impacts, as well as the proposed avoidance, minimization, and/or mitigation measures for the following resources:

- Physical (geology, economic deposits, and soils);
- Hydrology (ground and surface water) and water quality;
- Terrestrial ecosystems (vegetation, wetlands, wildlife, and, threatened and endangered species);
- Aquatic ecosystems;
- Land use (agriculture, residential, recreation, noise, aesthetics, and telecommunications);
- Air quality; and
- Communities (socioeconomics, cultural resources, and transportation).

Section 1.3.1 includes a Completeness Checklist (Table 1-1) that details the location within this application that addresses each rule requirement.

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

- Complies with applicable laws and rules;
- Will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants in the Project area;
- Will not substantially impair the health, safety, or welfare of the inhabitants; and

- 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.

1.3.1 Completeness Checklist

SDCL 49-41B and ARSD 20:10:22:05 specify the contents required for an application with the SDPUC. Table 1-1 lists the SDPUC's submittal requirements and cross-references this application to each rule requirement.

Table 1-1 Completeness Checklist

SDCL	ARSD	Required Information	*Location within Application*
49-41B-11 (1) thru (12); 49-41B-35 (2)	20:10:22:05	The application for a permit for a facility shall contain a list of each permit that is known to be required from any other governmental entity at the time of the filing. The list of permits shall be updated, if needed, to include any permit the applicant becomes aware of after filing the application. The list shall state when each permit application will be filed. The application shall also list each notification that is required to be made to any other governmental entity.	Section 22.1 Appendix R
49-41B-11(1)	20:10:22:06	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 1.2
49-41B-11(7)	20:10:22:07	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 1.2
49-41B-11(8)	20:10:22:08	The applicant shall describe the purpose of the proposed facility.	Section 2.0
49-41B-11(12)	20:10:22:09	The applicant shall describe the estimated construction cost of the proposed facility.	Section 3.0
49-41B-11(9)	20:10:22:10	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 2.0
49-41B-11(2)	20:10:22:11	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 4.0 Figure 1 Figure 2 Figure 3 Figure 4 Figure 5

SDCL	ARSD	Required Information	*Location within Application*
49-41B-11(6); 49-41B-21; 34A-9-7(4)	20:10:22:12	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 5.0 Figure 2 Figure 6 Figure 6a – d Figure 7a – d
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:13	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.	Section 6.0 Figure 8
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:14	The applicant shall provide information describing the effect of the proposed facility on the physical environment. The information shall include:	Section 7.0 Figure 9 Figure 10 Figure 11 Figure 14 Appendix A
		(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;	

SDCL	ARSD	Required Information	*Location within Application*
		(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	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:	Section 8.0 Figure 4 Figure 7a – d Figure 12 Appendix B Appendix C
		(1) A map drawn to scale of the plant, wind energy, or transmission site showing surface water drainage patterns before and anticipated patterns after construction of the facility;	
		(2) Using plans filed with any local, state, or federal agencies, indication on a map drawn to scale of the current planned water uses by communities, agriculture, recreation, fish, and wildlife which may be affected by the location of the proposed facility and a summary of those effects;	
		(3) A map drawn to scale locating any known surface or groundwater supplies within the siting area to be used as a water source or a direct water discharge site for the proposed facility and all offsite pipelines or channels required for water transmission;	
		(4) If aquifers are to be used as a source of potable water supply or process water, specifications of the aquifers to be used and definition of their characteristics, including the capacity of the aquifer to yield water, the estimated recharge rate, and the quality of ground water;	
		(5) A description of designs for storage, reprocessing, and cooling prior to discharge of heated water entering natural drainage systems; and	
		(6) If deep well injection is to be used for effluent disposal, a description of the reservoir storage capacity, rate of injection, and confinement characteristics and potential negative effects on any aquifers and groundwater users which may be affected.	

SDCL	ARSD	Required Information	*Location within Application*
49-41B- 11(2,11); 49- 41B-21; 49- 41B-22	20:10:22:16	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 9.0 Figure 3 Figure 13 Appendix D Appendix E Appendix F Appendix G Appendix H Appendix I Appendix J
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:17	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 10.0 Figure 4 Appendix E
49-41B-11(2,11); 49-41B-22	20:10:22:18	The applicant shall provide the following information concerning present and anticipated use or condition of the land:	Section 11.0 Figure 3 Figure 6a – d Figure 7a – d Figure 8 Figure 13 Appendix J Appendix K Appendix L Appendix M Appendix N Appendix O
		(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;	

SDCL	ARSD	Required Information	*Location within Application*
		(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	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 12.0 Figure 6a – d
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:20	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 13.0
49-41B-11(2,11); 49-41B-21; 49-41B-22	20:10:22:21	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 14.0
49-41B-11(3)	20:10:22:22	The applicant shall provide estimated time schedules for accomplishment of major events in the commencement and duration of construction of the proposed facility.	Section 15.0

SDCL	ARSD	Required Information	*Location within Application*
49-41B-11(11); 49-41B-22	20:10:22:23	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:	Section 16.0 Figure 3
		(1) A forecast of the impact on commercial and industrial sectors, housing, land values, labor market, health facilities, energy, sewage and water, solid waste management facilities, fire protection, law enforcement, recreational facilities, schools, transportation facilities, and other community and government facilities or services;	
		(2) A forecast of the immediate and long-range impact of property and other taxes of the affected taxing jurisdictions;	
		(3) A forecast of the impact on agricultural production and uses;	
		(4) A forecast of the impact on population, income, occupational distribution, and integration and cohesion of communities;	
		(5) A forecast of the impact on transportation facilities;	
		(6) A forecast of the impact on landmarks and cultural resources of historic, religious, archaeological, scenic, natural, or other cultural significance. The information shall include the applicant's plans to coordinate with the local and state office of disaster services in the event of accidental release of contaminants from the proposed facility; and	
		(7) An indication of means of ameliorating negative social impact of the facility development.	
49-41B-11(4)	20:10:22:24	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	Section 17.0
49-41B-11(5)	20:10:22:25	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 18.0

SDCL	ARSD	Required Information	*Location within Application*
49-41B-35(3)	20:10:22:33.01	The applicant shall provide a plan or policy statement on action to be taken at the end of the energy conversion facility's on-line life. Estimates of monetary costs, site condition after decommissioning, and the amount of land irretrievably committed shall be included in this statement. 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 19.0 Appendix Q
49-41B 11(2,11)	20:10:22:33.02	If a wind energy facility is proposed, the applicant shall provide the following information:	Section 21.0 Figure 5 Figure 6a – d Figure 7a – d Appendix K Appendix L Appendix M Appendix N
		(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;	

SDCL	ARSD	Required Information	*Location within Application*
		(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-7; 49-41B-22	20:10:22:36	The applicant shall also submit as part of the application any additional information necessary for the local review committees to assess the effects of the proposed facility pursuant to SDCL 49-41B-7. The applicant shall also submit as part of its application any additional information necessary to meet the burden of proof specified in SDCL 49-41B- 22.	Section 22.0 Appendix P
49-41-B-35; 49-41B-11	20:10:22:39	Upon the filing of an application pursuant to SDCL 49-41B-11, an applicant shall also file all data, exhibits, and related testimony which the applicant intends to submit in support of its application. The application shall specifically show the witnesses supporting the information contained in the application.	Section 23.0
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	Sections 7.0 – 14.0, 16.0, and 20.0

2.0 Purpose of and Demand for the Facility (ARSD 20:10:22:08, 20:10:22:10)

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

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.*

2.1 Project Purpose

The purpose of the Project is to supply up to 155 MW of renewable energy to the MISO regional electric grid via the Astoria substation, a new Otter Tail Power Company Interconnection Substation, located in Scandinavia Township. The electricity the Project generates will help MISO operators meet electricity demand in both the immediate and surrounding MISO control areas.

In addition, the purpose of the Project is to generate electricity via wind power to supply the needs required for contracts with Tatanka Ridge Wind, LLC. Tatanka Ridge Wind, LLC has entered into two purchase power agreements (PPA), one with Google for 98 MW and one with Dairyland Power Cooperative in Wisconsin for the balance. Tatanka Ridge will deliver the power generated by the Project into the MISO regional electric grid. The additional capacity will help Google reach its goal of purchasing enough renewable energy to match its energy consumption for global operations.

2.2 Project Demand

2.2.1 National Demand

In 2018, the United States Energy Information Administration (USEIA) estimated that the United States (US) consumed 3.979 billion MW hours (MWhr) of electricity. In its 2019 Annual Energy Outlook, the USEIA forecasts an 0.8% growth in electricity demand by 2050 that considers increases in efficiency and declines in energy intensity (the amount of energy consumed per unit of potential demand). The USEIA estimates the electricity generation from renewable sources in the US will increase from 18% in 2018 to 31% by 2050 (U.S. Energy Information Administration, 2019a). US wind power capacity increased 8% in 2018 with the commissioning of 7,588 MW of new wind power capacity (96,433 total MW installed wind capacity in the US). At the end of 2018, there was 35,135 MW of wind power capacity either under construction or in advanced development across 31 states (American Wind Energy Association, n.d.).

The demand for renewable wind energy from traditional utility companies has been increasing due to the renewable energy mandates or goals in 29 states and its cost-competitiveness with traditional fuel

sources such as coal and natural gas. According to the USEIA, wind has lower levelized cost of electricity (LCOE) per MWhr than most traditional and alternative fuel sources (refer to Table 2-1).

Table 2-1 Levelized Cost of Electricity for New Generation Sources Entering Service in 2020

Generation Type	Energy Source	Total System LCOE ($/MWhr)
Conventional	Coal	119.1 – 130.1
	Combined Cycle (Natural Gas)	49.0 – 74.9
	Combustion Turbine	85.1 – 98.7
	Nuclear	92.6
Alternative	Onshore Wind	48.0 – 59.1
	Solar (photovoltaic)	49.9 – 63.2
	Solar (thermal)	126.6 – 165.1
	Hydroelectric	61.7
	Geothermal	41.6 – 44.6
	Biomass	95.3

Source: (U.S. Energy Information Administration, 2019b)

In addition to traditional utility companies, increasing demand for wind energy is also coming from corporate and other non-utility customers, such as Fortune 500 companies and universities. In 2018, corporate and non-utility customers entered into long-term power purchase agreements for 4,203 MW of wind energy (80% increase from 2015) (American Wind Energy Association, n.d.).

2.2.2 Local Demand

South Dakota generates and consumes less electricity than four-fifths of all US states; however, per capita retail electricity sales in South Dakota are in the top one-third of states, and South Dakotans use more electricity than current generation rates in the state. The residential and commercial sectors together account for almost four-fifths of retail electricity sales in South Dakota. Retail sales to the commercial sector are slightly greater than the residential sector, where one-third of households use electricity as the primary energy source for home heating (U.S. Energy Information Administration, 2019c).

The US Department of Energy's (USDOE) WIND Exchange platform indicates that South Dakota has approximately 418 gigawatts (GW) of total potential wind capacity; however, only 977 MW of wind energy generation has been installed as of the third quarter of 2018 (National Renewable Energy Laboratory, 2018), which is less than 1% of the state's total potential capacity

Local demand is found in the interest of landowners wanting to have wind towers on their property. Local demand for electricity will not change as a result of this project; we are not selling electricity to the local market.

2.2.3 Local Benefits

In addition to developing South Dakota's strong wind resource and providing lower energy costs as described in Section 2.2.1, the Project will provide significant economic benefits to the local community and government. Construction of the Project will create approximately 200 jobs. After construction, an expected 12 to 15 permanent employees will be necessary for ongoing maintenance and operation of the Project.

Tatanka Ridge will make payments to landowners before, during, and after construction. The project will act as a natural hedge for landowners to help offset annual instability in crop yields and prices. These payments are not dependent on the amount of energy generated from the turbines, and will increase by 2.5% per year. Tatanka Ridge estimates the Project will pay participating landowners, in aggregate, approximately $2.3 million annually over the entire life of the facility.

Current state law levies taxes on wind farms on a nameplate capacity and an actual production basis. Those payments are made to the state, which then allocates the revenue among itself and the Project area school districts, counties and townships. Tatanka Ridge estimates that the Project will pay approximately $720,000 annually in taxes. Of this, Tatanka Ridge estimates that the local school districts will divide approximately $260,000 between them, based on tower locations. Deuel County will receive approximately $180,000 on an annual basis. The townships will divide approximately $75,000 between them. Finally, the Project will pay sales and use taxes, and the contractors will pay excise taxes based upon construction costs. Each will receive a rebate of a portion of those taxes through the state's current economic development board.

Refer to Sections 16.1 and 17.0 for additional details regarding the local economic benefits of the Project.

2.3 Consequences of Delay or Termination

Delay or termination of the Project will reduce or eliminate completely the benefits detailed in Section 2.2.3.

The referenced PPA's have contractual operational date requirements in them. The Applicant could incur liquidated damages or at worst, the PPA's could be cancelled if the Project cannot meet certain deadlines.

Further, the Production Tax Credit (PTC) is slated to start to decline in future years. If the Project is not operational by the end of 2020, the Project will not be eligible to receive the full PTC. Under the reduced benefits schedule of the PTC, the amount of tax benefit to the Project will decrease until the PTC is fully phased out. Such a delay would significantly alter the project's economic assumptions and likely cause disruption.

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

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

As of the submittal of this Application, Tatanka Ridge estimates the total capital cost to construct the Project will be approximately $216 million (in 2019 dollars), including all infrastructure, construction costs, tax payments, and landowner payments.

4.0 General Site Description (ARSD 20:10:22:11)

20:10:22:11. General site description. *The application shall contain a general site description of the proposed facility including a description of the specific site and its location with respect to state, county, and other political subdivisions; a map showing prominent features such as cities, lakes and rivers; and maps showing cemeteries, places of historical significance, transportation facilities, or other public facilities adjacent to or abutting the plant or transmission site.*

4.1 General Site Description

The Project is located entirely within rural Deuel County near the Towns of Toronto and Brandt (refer to Figure 1). The area is primarily agricultural. Table 4-1 includes townships, sections, and ranges within the Project boundary.

Table 4-1 Township, Sections, and Ranges within the Project Boundary

Sections	Township	Range
1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 15, 22, 31, 32, 34, 35	Blom (113N)	49W
2, 3, 4, 6, 19, 24, 25, 29, 30, 31, 32, 34, 35	Brandt (114N)	49W
1	Grange (113N)	50W
24, 25, 26	Hidewood (114N)	50W
5, 6, 7, 12, 16, 17, 18, 20, 21, 22	Scandinavia (113N)	48W

Figure 2 provides the layout of the Project. Figure 3 illustrates the cities, cemeteries, cultural resources, roads, and other public land adjacent to or near the Project. Figure 4 shows the surface waters adjacent to or near the Project.

The Project area is in (south-central) Deuel County. Topographic relief within the Project area ranges from approximately 1,750 to 2,020 ft above mean sea level that represents a variation of approximately 50 ft (refer to Figure 2).

4.2 Project Components Description

4.2.1 Wind Turbines

Tatanka Ridge will use a combination of two different turbine types to achieve a total installed capacity for the Project of up to 155 MW. Specifications are included in Table 4-2. Figure 5 illustrates the design features of the turbine models detailed in Table 4-2.

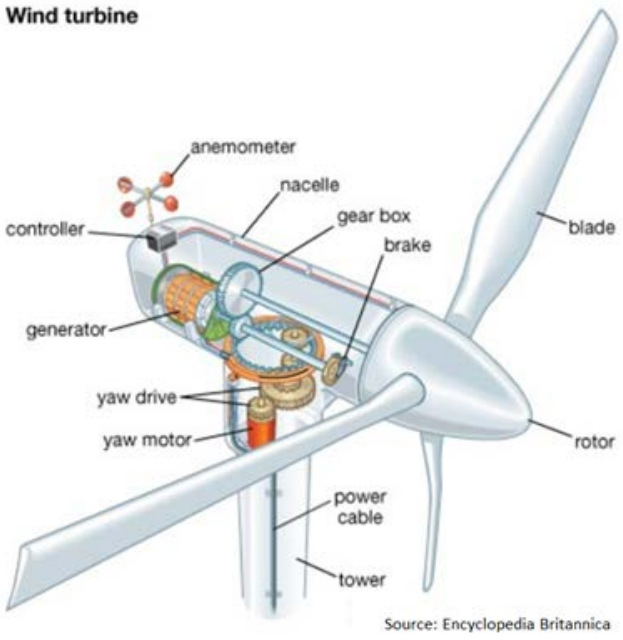
Table 4-2 Wind Turbine Specifications

Manufacturer	Turbine Model	Hub Height (meters [m])	Rotor Diameter (m)	Tip Height (m)	Rating (MW)
GE	GE 2.82-127	89	127	152.1	2.82
GE	GE 2.3 - 116	90	116	148	2.3

The primary components of a wind turbine include the rotor (blades and hub), nacelle, tower, and foundation. The nacelle includes, but is not limited to the:

- Generator;
- Gearbox;
- Controller;
- Mechanical braking system;
- Generator cabling; and
- Generator cooling unit.

Turbine blades convert the wind's kinetic energy into rotational energy. The hub supports the blades and connects the rotor to the mechanical equipment in the nacelle. The nacelle is the housing mounted at the top of the tower that contains the mechanical components of the wind turbine that generate electricity from the rotational energy of the rotor (refer to the illustration provided below). The nacelle, blades, and rotor mount on top of a single tubular steel tower.



A buried octagonal or circular shaped reinforced concrete spread-foot foundation base will support each turbine tower. The final design of the foundation will be responsibility of the construction contractor, which is contingent upon completion of geotechnical investigations. The foundation size depends on the height of the tower size of the turbine, and site geotechnical conditions. For this Project, it is estimated that the foundations will be approximately 60 ft in diameter and approximately 10 ft below the existing grade. The foundation includes a cylindrical pedestal on top of the foundation base that is approximately 4 ft to 6 ft tall and 18 ft to 20 ft in diameter. The pedestal extends above the ground surface by approximately 6 inches (in). The installation of the foundation includes:

- Identifying and rerouting drainage tiles out of the excavation area to the extent possible;
- Completing the excavation;
- Placing a mud mat of lean concrete;
- Placing reinforcing steel;
- Installing the tower mounting system (anchor bolt cage);
- Placing concrete forms; and
- Placing concrete into the forms.

The wind turbine tower attaches to the top of the concrete pedestal. The towers are tapered tubular steel and consist of three sections manufactured from rolled steel plates welded together along with thick flanges for bolting the sections together. All surfaces are multi-layer coated for protection against corrosion. Access to the turbine is through a lockable steel door at the base of the tower. Access to the nacelle is through an internal ladder equipped with a fall-arresting safety system. The wind turbines' exterior will have a white non-glare paint coating and any required red synchronized light to comply with Federal Aviation Administration (FAA) requirements.

In addition to meeting the required turbine obstruction markings, Tatanka Ridge is electing to use an ADLS at the Project. ADLS is a sensor-based system designed to detect aircraft as they approach an obstruction. The system will automatically activate the appropriate obstruction lights (lights on each turbine) until the aircraft clears the area. ADLS is an all-weather, continuously operating, low voltage, radar-based obstacle avoidance system that does not require additional equipment in an aircraft. Traditional obstruction lighting for turbines continuously flash on a set interval. Tatanka Ridge plans to use the ADLS lighting system in response to landowner requests.

ADLS vendors must receive approval from the FAA to confirm their technology meets the requirements of Advisory Circular (AC) 70/7460-1L, "Obstruction Marking and Lighting." At present, there are a limited number of ADLS vendors that have received FAA approval. Tatanka Ridge will determine the location of ADLS radars based upon the selected ADLS vendor's engineering analysis, and will provide Deuel County with a map of the planned locations upon confirmation. The final locations will be on land leased for the Project and will comply with applicable setbacks, FAA specifications, and other requirements.

The base of the tower includes electrical cables, communication cables, and a control system. The electricity produced by the wind turbine will transmit through insulated cables to a step-up transformer located either within or adjacent to the base of the turbine that increases voltage to the collection system voltage of 34.5 kV.

Tatanka Ridge based the layout on a detailed analysis of the Project area to avoid or minimize potential impacts. However, a limited amount of additional field survey work, construction micrositing, and a geotechnical analysis of the proposed locations is necessary to finalize the locations, which could necessitate minor shifts. To accommodate this final micrositing, Tatanka Ridge requests that the Facility Permit allow for the minor shifting of turbines and other project facilities within 200 ft of their current proposed location. If turbine shifts are greater than 200 ft and do not meet applicable setback requirements. Tatanka Ridge will either not use the turbine location, or will obtain SDPUC approval of a proposed turbine location change. In all cases, the final turbine locations constructed will adhere to all applicable local, state, and federal regulations and requirements.

4.2.2 Access Roads

The Project will include permanent all-weather gravel roads that provide access to the wind turbines and other aboveground facility components. During construction, the roads will temporarily be up to approximately 50 ft wide to accommodate transportation of heavy construction equipment. Upon completion of construction of the Project, Tatanka Ridge will reduce the width of the permanent roads to approximately 16 ft. Total access road length across the entire Project will be up to approximately 17.0 miles.

The permanent aggregate access roads may consist of geotextile fabric and relatively uniformly graded aggregate base or other equivalent material based on the geotechnical investigation and final road design. To the extent practical, based on existing grades and the requirement to facilitate proper drainage, the finished elevation of the access roads will be level with existing grade to minimize impacts to farming activities. While constructing the access roads, Tatanka Ridge will strip and stockpile the topsoil for site restoration in a manner that will allow integration of permanent construction into contours of the existing grade to preserve drainage to what existed prior to construction. Tatanka Ridge will install culverts or field drain tile inlets as necessary to prevent the ponding of water as a result of the construction of the roads. Tatanka Ridge will install culverts as necessary to allow for fish passage for waterbody crossings within the Big Sioux watershed. Tatanka Ridge will maintain access roads throughout the construction and operation of the Wind Farm, including snow removal and erosion control repair.

4.2.3 Collector Lines

The voltage of collector lines for the Project will be 34.5 kV. Depending on final electrical design, the Project will require approximately 46.0 miles of collector lines (above and/or below ground). The collector lines will be primarily on privately owned parcels but may also include some installations in public ROW subject to the permitting requirements of the ROW authority. Tatanka Ridge will install all underground collector lines at a typical depth of 42 in below grade via trenching, plowing, or directional bores, creating a network between turbine locations and the Project Substation. Aboveground junction boxes may be

utilized in the underground collector system design. Tatanka Ridge will segregate topsoil from subsoil when installing the collector lines using the trenching method, then backfill in the reverse order. Tatanka Ridge will bury the collector lines with marking tape per appropriate electrical code and the Project will register the appropriate underground facilities with the South Dakota One-Call system.

4.2.4 Operations and Maintenance Facility

An O&M Facility will provide space for administrative offices, workshop, and storage for Project operations and maintenance. Tatanka Ridge will either utilize an existing O&M facility at the Coyote Ridge Wind Farm in Brookings County, or construct a new facility at the location illustrated on Figure 2.

If Tatanka Ridge constructs a new O&M Facility, the building(s) will house the equipment necessary to operate and maintain the Project. A fenced-in gravel and/or paved area for parking and storage will surround the building. Tatanka Ridge anticipates that rural water will provide water service for the O&M Building, and that on-site septic system will provide for sanitary disposal needs.

4.2.5 Project Substation

The Generator Interconnection Agreement with Otter Tail Power Company and MISO will establish the requirements for the construction of the Project Substation and 345 kV gen-tie or feeder line.

The Project Substation will receive electricity from the wind turbines via the collector lines. The principal function of the Project Substation will be to step up the voltage of the 34.5 kV collector system to 345 kV in order to facilitate interconnection to the electrical grid. The Project Substation will be within a fenced area designed in accordance with industry standards to provide safety and security. The Project Substation equipment will include, but not limited to, the following:

- Transformers;
- Circuit breakers;
- Disconnect switches;
- Bus conductors;
- Auxiliary equipment; and
- A control enclosure containing equipment for proper control, protection, monitoring, and communications.

An overhead 345 kV gen-tie or feeder line will connect the Project Substation to the adjacent Otter Tail Power substation.

4.2.6 Communication Cables

Each wind turbine will communicate directly with Tatanka Ridge operators using the Supervisory Control and Data Acquisition (SCADA) system for the purposes of performance monitoring, energy reporting, and

trouble-shooting. The SCADA system provides the overall control of the wind farm. The SCADA system also allows for remote operation of the wind farm by the Avangrid Renewables National Control Center.

Tatanka Ridge will collocate communication cables with the collector system whenever feasible. Tatanka Ridge will install all communication cables underground at a minimum depth of 38 in below grade via trenching, plowing, or directional bores. Tatanka Ridge will segregate topsoil from subsoil when installing the communication cables using the trenching method, then backfill in the reverse order. Tatanka Ridge will bury the communication cables with marking tape per appropriate electrical code and the Project will register the appropriate underground facilities with the South Dakota One-Call system.

4.2.7 Permanent Metrological Tower

The Project includes installation of a permanent MET tower to acquire wind data to confirm turbine performance during operations. The MET tower will measure the performance of the Project, conform to grid integration requirements, and validate wind turbine power curves. The permanent MET tower is part of the Project's communication system with an underground fiber optic line. The MET tower will be self-supporting and approximately 90 m tall. The permanent MET towers will include the marking and lighting requirements specified by the FAA and be part of the ADLS noted in Section 4.2.1.

4.2.8 Temporary Facilities

The Project construction requires temporary staging and construction laydown yards, and possibly a concrete batch plant. Additional temporary facilities will include road improvements to allow for delivery of large components, and crane paths to move construction cranes across the Project area. All temporary facility locations will meet applicable local requirements. Tatanka Ridge will remove temporary facilities and road improvements at the end of construction and restore the disturbed areas to preconstruction conditions.

4.2.9 Crane Paths

Crane paths are typically up to 50 ft wide. Generally, the large erection cranes use cross-field routes as opposed to the local road system. After construction, Tatanka Ridge will decompact soils along crane paths where necessary. If the cranes are travelling on frozen ground, decompaction may not be necessary.

For dry or frozen conditions, no work may be necessary to prepare crane paths; however, in wet conditions or other such conditions that may pose soft soil conditions, Tatanka Ridge may use timber or steel matting through part or the entire course of the walk.

Tatanka Ridge may also use additional stone to support crane. This may typically occur at ditch crossings or when travelling next to an existing access road where the material adjacent to the road is not suitable. For ditch crossings, Tatanka Ridge may add temporary culverts to allow for through-flow in a rain event. Tatanka Ridge will ensure installation of any culverts within waterbodies in the Big Sioux watershed allow for fish passage.

Restoration of crane paths includes:

- Removing any stone and culverts installed;
- Replacing any stripped topsoil and subsoil in the reverse order; and
- Decompacting using rippers or plows through the affected area.

Tatanka Ridge will determine the final crane paths locations prior to construction.

4.2.10 Summary Land Requirements

Table 4-3 details the temporary construction and long-term operational land requirements for the Project.

Table 4-3 Summary of Land Requirements

Component	Land Requirements
Temporary Land Requirements during Construction	
Turbines	200 ft radius at each wind turbine location that typically includes 60 ft by 80 ft crane pad area at each turbine (the contractor will determine the exact size of crane pads based on equipment needs)
Access Roads	Up to 100 ft wide to accommodate transportation of heavy construction equipment during construction. Total access road length across the entire Project will be up to approximately 17.0 miles.
Collector System	Approximately 46.0 miles, 100 ft wide
Crane Paths	Approximately 24.6 miles, 50 ft wide
Temporary Laydown/Staging Areas	10 ac, two locations
Project Substation	5 ac
MET Tower	100 ft by 100 ft temporary workspace
Operational Land Requirements During the Life of the Project	
Turbines	39 ft radius at each turbine
Access Roads	16 ft wide. Total access road length across the entire Project will be up to approximately 17.0 miles
O&M Facility	5 ac that includes a building and adjacent parking lot
Project Substation	5 ac
MET Tower	52 ft by 52 ft fenced area

4.2.10.1 Right-of-Way or Condemnation Requirements (ARSD 20:10:22:33.02 and 20:10:22:35)

Tatanka Ridge obtained all land rights required for the Project through voluntary easements with property owners and will use private land and public road ROW for all facilities. Tatanka Ridge will coordinate with federal, state, and local agencies to obtain appropriate permits for the Project (refer to Section 22.0 for additional details).

4.3 Operation and Maintenance

Tatanka Ridge anticipates the life span of the Project to be approximately 40 years. As previously discussed, the Project will have SCADA communication technology to control and monitor operations. The SCADA communications system permits automatic, independent operation, and remote supervision, allowing the simultaneous control of the wind turbines at all times. An O&M crew will be on-site during normal working hours to monitor turbine operation from the O&M facility and to conduct maintenance activities.

All major components of wind turbines will undergo routine maintenance according to the schedules established by the component manufacturer. Examples of such activities include replacing lubrication filters, replacing gear oil, adding coolant, greasing components, and applying paints or coatings for corrosion control. Over the life of the turbine, some mechanical components may also need repair or replacement. Other activities include regrading and gravel replacement on access roads, routine electrical inspections, and the application of herbicides to control noxious and invasive weeds.

5.0 Alternative Sites and Siting Criteria (ARSD 20:10:22:12)

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.

5.1 Project Siting Criteria

Tatanka Ridge considered the following criteria when evaluating potential sites for the Project:

- Sufficient wind energy resource;
- Proximity to transmission infrastructure;
- Compatibility with siting requirements, land use, and environmental features; and
- Landowner support.

The proceeding sections provide details regarding each of these criteria. Tatanka Ridge used each of these criteria for refining the Project area and micrositing of individual turbine locations.

5.1.1 Wind Energy Resource

Development of an economically viable wind energy project requires demonstrated strong wind speeds. Tatanka Ridge considers areas with greater than 8.5 meters per second (m/s) on an annual basis at 90 m (hub height) to provide sufficient wind resource for an economically viable project. According to the National Renewable Energy Laboratory (NREL), the annual average wind speeds in the Project area at 80 m (hub height) are 8.0 to 8.5 (AWS Truepower, LLC, 2010). Therefore, there is sufficient wind resource in the Project area for reliable power generation.

5.1.2 Proximity to Transmission Infrastructure

There is an existing 345 kV overhead transmission line within the Project area (refer to Figure 2). This location minimizes the length of the new infrastructure required for the interconnection of the proposed Project to the electrical grid.

5.1.3 Compatibility with Siting Requirements, Land use, and Environmental Features

Tatanka Ridge selected the Project area based on a review of applicable siting requirements that limits the locations available for constructing turbines. Table 5-1 lists the state and local setbacks and turbine siting criteria that are applicable to the Project. Figure 6a-d and Figure 7a-d illustrate the turbine locations relative to the applicable setbacks and siting criteria. The Project area includes areas zoned as the "Agricultural District" in the Deuel County Zoning Ordinance. A wind energy facility is a special exception under the Zoning Ordinance in the Agricultural District because it allows existing uses to continue around the facility. Therefore, the Project is compatible with applicable siting requirements and land use.

Table 5-1 Summary of Distances and Setbacks Required

Category	Requirement
State of South Dakota	
Setback	Turbines shall be set back at least 500 ft or 1.1 times the height of the tower, whichever is greater, from any surrounding property line. However, if the owner of the wind turbine tower has a written agreement with an adjacent land owner allowing the placement of the tower closer to the property line, the tower may be placed closer to the property line shared with that adjacent land owner
Deuel County	
Setback	Distances from existing Non-Participating residences and businesses shall be not less than four times the height of the wind turbine. Distance from existing Participating residences, business and public buildings shall be not less than fifteen hundred ft. Non-Participating property owners shall have the right to waive the respective setback requirements.
Setback	Distance from public right-of-way shall be 110% the height of the wind turbines, measured from the ground surface to the tip of the blade when in a fully vertical position.
Setback	Distance from any property line shall be 110% the height of the wind turbine, measured from the ground surface to the tip of the blade when in a fully vertical position unless wind easement has been obtained from adjoining property owner.
Setback	Distance from the Lake Park District located at Lake Cochrane 3 miles, Lake Alice 2 miles and 1 mile from the Lake Park District at Bullhead Lake
Setback	Distance from the municipalities of Altamont, Astoria, Brandt, and Goodwin of 1 mile from the nearest residence and 1 ½ miles from the city limits of the towns of Gary, Toronto, and Clear Lake, except the area of Clear Lake located in sections 11, 12, and 14.
Sound	Noise level shall not exceed 45 dBA average A-Weighted Sound pressure at the perimeter of existing residences, for non-participating residences.
Shadow Flicker	Limit for allowable shadow flicker at existing residences to no more than 30 hours annually.

As detailed in subsequent sections, Tatanka Ridge conducted surveys of the Project area to identify environmental resources (wetlands, waterbodies, cultural resources, protected species, and avian/bat use) to refine placement of individual turbines. In addition, Tatanka Ridge used this information to assist with the Project turbine siting following the Land Based Wind Energy Guidelines (U.S. Fish and Wildlife Service, 2012) and Eagle Conservation Plan Guidance (U.S. Fish and Wildlife Service, 2013b).

5.1.4 Landowner Support

Tatanka Ridge first began developing the Project in 2005 with initial landowner outreach. Development activities paused between 2012 and 2015. In 2015, landowner outreach resumed in addition to evaluation of the wind resource in the area. Leasing, stakeholder outreach, engineering, and additional Project development activities continued throughout 2018 and into 2019.

These outreach efforts include:

- Meeting with individual landowners and landowner groups, regulatory agencies, local government units, and the general public to discuss the Project;
- Identifying support or constraints for the Project; and
- Gathering comments to address in Project planning, design, permitting, construction, and operation.

Throughout the development of the Project, Tatanka Ridge refined the location of proposed infrastructure based on input from individual landowners and applicable setbacks. Tatanka Ridge does not have eminent domain powers to acquire easements for the Project. Tatanka Ridge obtained all private land rights required for the Project through voluntary leases with property owners.

On June 11, 2019, the Deuel County Board of Adjustment held a public hearing for the Project. Numerous landowners attended to show support for the Project and many spoke in favor of Project approval by the Board. There were no opponents in attendance. The Deuel County Board of Adjustments voted 5 to 0 in favor of the Project.

5.2 Site Configuration Alternatives

Figure 2 illustrates 62 potential turbine locations. However, Tatanka Ridge will only construct up to 56 turbines within the configuration illustrated on Figure 2. The proposed layout of 62 turbines reflects an optimal configuration to maximize the wind energy resource within the Project area, while taking into consideration the siting criteria detailed in Section 5.1 and consultations with landowners.

Final engineering, geotechnical investigations, environmental constraints, and landowner requests could result in minor turbine location adjustments. To accommodate this final micrositing, Tatanka Ridge requests that the Facility Permit allow for the minor shifting of turbines within 200 ft of their current proposed location, provided the location meets the specified setbacks. If turbine shifts are greater than 200 ft and do not meet the applicable setback requirements, Tatanka Ridge will either not use the turbine location or obtain PUC and Deuel County approval of a proposed turbine location change. In all cases, the final turbine locations constructed will adhere to all applicable local, state, and federal regulations and requirements listed in Table 5-1, above. Impacts described in the application conservatively assume that all alternate turbines and infrastructure are built.

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

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.*

The following sections of this document provide specific details regarding the existing environment at the time of Application submittal, potential impacts resulting from the construction and operation of the Project, and irreversible changes that will remain beyond the operational lifetime of the facility:

- Section 7.0 Effects on Physical Environment;
- Section 8.0 Hydrology;
- Section 9.0 Effect on Terrestrial Ecosystems;
- Section 10.0 Effect on Aquatic Ecosystems;
- Section 11.0 Land Use;
- Section 13.0 Water Quality;
- Section 14.0 Air Quality; and
- Section 16.0 Community Impact.

The sections listed above also identify the avoidance, minimization, and mitigation measures Tatanka Ridge will implement to address potential impacts.

Tatanka Ridge used field survey data and publically available data to quantify the impacts of the Project.

6.1 Other Major Industrial Facilities under Regulation

ARSD 20:10:22:13 indicates that a cumulative impacts analysis accounting for the impacts of the proposed Project and other energy conversion facilities that are operating or under construction is necessary. SDCL 49-41b-2(6) defines an "energy conversion facility" as "any new facility, or facility expansion, designed for or capable of generation of one hundred megawatts or more of electricity, but does not include any wind energy facilities." Based on this definition, there is one is energy conversion facility and two other major industrial facilities regulated by the SDPUC within or adjacent to the Project area:

- Otter Tail Power Company is planning to construct an approximately 250 MW simple-cycle natural gas combustion turbine (peaking plant) adjacent to the Interconnection Substation for the Project. Otter Tail Power Company anticipates the facility will be operational in 2021;
- Northern Border Pipeline has an existing compressor station located adjacent to the northwest corner of the Project boundary; and
- The Big Stone South-Brookings County 345-kilovolt transmission line project lies east of the Project. This transmission line extends 70 miles between the Big Stone South Substation near Big Stone City, South Dakota, to the Brookings County Substation near Brookings, South Dakota and became operational in 2017.

Although not included in the definition of "energy conversion facility," there is one wind energy facility adjacent to the Project and one wind energy facility proposed:

- The Buffalo Ridge II wind energy facility is located approximately 1.5 miles south of the Project (refer to Figure 8) in Deuel and Brookings Counties. The Buffalo Ridge II facility began operating in December 2010 and consists of 105 turbines (210 MW total); and
- The proposed Deuel Harvest Wind Energy LLC wind energy facility will be located to the north and east of the Project (refer to Figure 8). As proposed, the Deuel Harvest Wind Energy LLC will consist of up to 110 turbines that will generate up to 300 MW. Construction will commence in late 2019 and be complete in 2020.

Tatanka Ridge, in combination with these facilities, could result in the construction and operation of up to 271 wind turbines and associated infrastructure in the southern portion of Deuel County and northeastern Brookings County.

The proposed Otter Tail Power Company peaking plant, the only energy conversion facility in the vicinity of the Project, indicated in their application to the PUC that "the proposed project is not expected to cause environmental effects that would be hazards to the health and welfare of human, plant, and animal communities, even when the cumulative and synergistic consequences of siting the proposed facility is considered in combination with any operating energy conversion facilities, existing or under construction." Therefore, cumulative impacts, from the Tatanka Ridge Project, are not anticipated (South Dakota Public Utilities Commission, 2017).

In addition, Tatanka Ridge is not aware of any other major industrial facilities under regulation that may have an adverse effect on the environment as a result of their construction or operation in the Project's siting area.

7.0 Effects on Physical Environment (ARSD 20:10:22:14)

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

7.1 Geological Characteristics

7.1.1 Existing Geological Characteristics

7.1.1.1 Regional Landforms

The proposed Project is located within the Coteau des Prairies division of the Central Lowland physiographic region of South Dakota, a highland area between the Minnesota-Red River Lowland and the James River Lowland to the west. This landform is part of a plateau that extends through North Dakota into Canada. It is drained to the south by the Big Sioux River. Glacial drift thickness is approximately 600 to 800 ft in the vicinity of the project site and can generally be considered an approximate depth of materials overlying bedrock.

7.1.1.2 Geological Features

7.1.1.2.1 Surficial Geology

The surficial geology of the Project area consists of Quaternary and Upper Wisconsin glacial deposits. Figure 9 illustrates the surficial geology present within the Project area and the surficial geology present with the Project boundary consists of:

Quaternary (Martin, Sawyer, Fahrenbach, Tomhave, & Schulz, 2004)

- Quaternary Alluvium (Qal): Clay – to boulder-sized clasts with locally abundant organic material. Thickness up to 75 ft (23 m).

Upper Wisconsin

- Till, Ground Moraine (Qltg): Compact, silty, clay-rich matrix with sand- to bounder-sized clasts of glacial origin. A geomorphic feature characterized by smooth, rolling terrain. Composite thickness of all Upper Wisconsin till may be up to 300 ft (91 m);
- Till, End Moraine (Qlte): Compact, silty, clay-rich matrix with sand- to boulder-sized clasts of glacial origin. A geomorphic feather 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); and
- Till, Moraine (Qlt): Compact, silty, clay-rich matrix with sand- to boulder-sized clasts of glacial origin. Exhibits a distinctive weathered, dissected surface. Typically overlain by up to 10 ft (3 m) of loess. Thickness up to 150 ft (46 m).

7.1.1.2.2 Glacial Deposits

Below the surficial deposits, a layer of glacial deposits occurs about 700-800 ft in thickness. The majority of this layer consists of late Wisconsin and pre-Wisconsin glacial tills, while there are also smaller areas of late Wisconsin and pre-Wisconsin glacial outwash of sand and gravel (South Dakota Geological Survey, 1987).

7.1.1.2.3 Bedrock Geology

The bedrock geology of the Project area consists of mostly Upper Cretaceous Kp – Pierre Shale with Kn – Niobrara Formation in the western portion of the Project area. The Niobrara Formation consists of chalks, marls, and chalky shales with some bentonite. The thickness of the Niobrara Formation in Deuel County ranges from about 100 to 150 ft and is likely thinner in the Project area where the overlying Pierre Shale has been removed and the ancient bedrock channel has carved into the Niobrara Formation. The Pierre Shale consists primarily of light-gray to black shale (South Dakota Geological Survey, 1987). The total thickness of the Pierre Shale in Deuel County is less than 100 ft. Figure 10 shows the bedrock geology relative to the Project area.

7.1.1.2.4 Economic Deposits

According to the South Dakota Department of Environment and Natural Resources (SDDENR), there are no active sand, gravel, or construction aggregate sites within the Project area (South Dakota DENR, n.d.). There is one reclaimed sand and gravel site within the Project area in Blom Township, in the southwest corner of the Project area. Two active sand and gravel sites are located approximately 3.1 miles west of the Project area located in the City of Estelline.

There are no oil and gas fields and oil wells located in Deuel County according to the information from the SDDENR Oil and Gas Initiative Program (South Dakota DENR - Geological Survey Program, n.d.). The nearest gas field is approximately 32 miles northwest of the Project area in Codington County (plugged and abandoned). There are no commercially viable deposits of lignite coal.

7.1.1.3 Seismic Risks

According to the USGS 2014 Seismic Hazard Map for the US, a 2% chance exists for an earthquake to occur within the Project area in the next 50 years that could result in a peak ground acceleration of approximately 2% (0.02 grams) and 6% (0.06 grams; (U.S. Geological Survey, 2014)). Therefore, the risk of seismic activity in the Project area is extremely low. According to the South Dakota Geologic Survey (SDGS), no earthquakes have ever been recorded in Deuel County from 1870-2013 (South Dakota Geological Survey). Furthermore, there are no active or inactive faults in the Project area vicinity (U.S. Geological Survey, 2019b).

7.1.1.4 Subsidence Potential

The risk for ground subsidence is minimal in the Project area. Most of the surficial soils are compact, there are no known underground mines in the area, and the natural geology is not a karst landscape; therefore, the potential for ground subsidence is negligible.

7.1.2 Impacts to Geological Resources

7.1.2.1 Regional Landforms

Ground disturbance will include grading, excavation, and trenching; however, this will not result in impacts to regional landforms.

7.1.2.2 Geological Features

7.1.2.2.1 Surficial Geology

Impacts related to surficial geology during construction will include excavation and trenching for the installation of the turbines and collector cables. Operation of the Project will not impact surficial geology.

7.1.2.2.2 Glacial Deposits

The depth to the glacial deposits is approximately 700 ft below the Project area, therefore, the excavation of approximately 10 ft required for the installation and operation of the wind turbines and the associated facilities will have no impact to the glacial deposits.

7.1.2.2.3 Bedrock Geology

The depth to bedrock is approximately 800 ft in the Project area, therefore, the excavation of approximately 10 ft required for the installation of the wind turbines and the associated facilities will have no impact to bedrock. Operation of the Project will not impact bedrock geology.

7.1.2.3 Economic Deposits

Construction and operation of the Project will not impact the reclaimed sand and gravel site within the Project area near the active sand and gravel pit operations, which are located approximately 3.1 miles to the west.

7.1.2.4 Seismic Risk

Due to the low risk of seismic activity in the Project area and the absence of large seismically induced ground movements, there will be no earthquake-related impact from the Project.

7.1.2.5 Subsidence Potential

Since there is minimal risk for ground subsidence in the Project area and there are no anticipated large seismically induced ground movements related to the Project, there will be no impacts related to ground subsidence from the Project.

7.1.3 Mitigation Measures for Geological Resources

Because there is limited impact to geological resources from the proposed Project, as outlined in Section 7.1.2, no mitigation is required.

7.2 Soil Resources

7.2.1 Existing Soil Resources

Soils in the Project area consist primarily of deep, fertile glacial till soils. After the last glacial recession, soils were built in depth and fertility for several thousand years by the dominant tall-grass prairie landscape. Today, these soils support a variety of agricultural activities, including commercial crop farming and livestock grazing.

Tatanka Ridge obtained the soil characteristics within the Project area from the Natural Resources Conservation Service (NRCS) Soils Survey Geographic Database (U.S. Department of Agriculture, 2017b). Table 7-1, below, lists the detailed soil types within the Project area and the general soil type locations are shown on Figure 11.

Table 7-1 Summary of the Soil Types in the Project Boundary

Soil Type	% Sand	% Silt	% Clay	Kf[1]	Erosion Hazard	Hydrologic Soil Group[2]	Runoff Potential
Barnes-Buse loams*							
Barnes clay loam, 2 to 6 % slopes	34.4	37.6	28	0.2	Moderately low	C	Moderately high
Barnes-Buse loams, 15 to 25 % slopes	34.4	37.6	28	0.2	Moderately low	C	Moderately high
Barnes-Buse loams, 2 to 6 % slopes	34.4	37.6	28	0.17	Low	C	Moderately high
Barnes-Buse-Svea loams, 2 to 15 % slopes	34.4	37.6	28	0.17	Low	C	Moderately high
Buse loam, 20 to 40 % slopes	39.8	37.7	22.5	0.24	Moderate	C	Moderately high
Buse-Barnes loams, 9 to 40 % slopes, very stony	39.8	37.7	22.5	0.24	Moderate	C	Moderately high
Barnes-Svea loams*							
Barnes-Svea loams, 0 to 2 % slopes	34.4	37.6	28	0.2	Moderately low	C	Moderately high
Barnes-Svea loams, 1 to 6 % slopes	34.4	37.6	28	0.2	Moderately low	C	Moderately high
Barnes-Svea-Buse loams, 2 to 12 % slopes, stony	34.4	37.6	28	0.2	Moderately low	C	Moderately high
Barnes-Svea-Buse loams, 2 to 9 % slopes	34.4	37.6	28	0.17	Low	C	Moderately high
Renshaw loams*							
Renshaw loam, coteau, 0 to 2 % slopes	42	37	21	0.2	Moderately low	B	Moderately low
Renshaw loam, coteau, 2 to 6 % slopes	42	37	21	0.2	Moderately low	B	Moderately low
Renshaw-Fordville loams, coteau, 0 to 2 % slopes	42	37	21	0.2	Moderately low	B	Moderately low
Renshaw-Fordville loams, coteau, 2 to 6 % slopes	42	37	21	0.2	Moderately low	B	Moderately low
Renshaw-Sioux complex, coteau, 2 to 6 % slopes	42	37	21	0.2	Moderately low	B	Moderately low
Sioux-Renshaw complex, coteau, 9 to 15 % slopes	45	40	15	0.28	Moderate	B	Moderately low
Generalized loams*							
Darnen loam, 0 to 2 % slopes	39.8	37.7	22.5	0.2	Moderately low	B	Moderately low
Darnen loam, 2 to 6 % slopes	39.8	37.7	22.5	0.2	Moderately low	B	Moderately low
Divide loam	41.6	37.4	21	0.2	Moderately low	C	Moderately low
Divide loam, 0 to 2 % slopes, occasionally flooded	41.6	37.4	21	0.2	Moderately low	C	Moderately low
Egeland-Embden complex, 2 to 6 % slopes	66.8	19.2	14	0.15	Low	A	Low
Egeland-Embden complex, coteau, 0 to 2 % slopes	66.8	19.2	14	0.15	Low	A	Low

Soil Type	% Sand	% Silt	% Clay	Kf[1]	Erosion Hazard	Hydrologic Soil Group[2]	Runoff Potential
Egeland-Embden complex, coteau, 2 to 6 % slopes	66.8	19.2	14	0.15	Low	A	Low
Fordtown loam, 0 to 2 % slopes, rarely flooded	41.1	36.9	22	0.17	Low	B	Moderately low
Fordville loam, coteau, 0 to 2 % slopes	42	37	21	0.17	Low	B	Moderately low
La Prairie loam	39.8	37.7	22.5	0.2	Moderately low	B	Moderately low
La Prairie loam, coteau, 0 to 2 % slopes, occasionally flooded	39.5	37.5	23	0.2	Moderately low	C	Moderately high
LaDelle silt loam	7	69.5	23.5	0.28	Moderate	B	Moderately low
LaDelle silt loam, 0 to 2 % slopes, occasionally flooded	7	70	23	0.32	Moderately high	C	Moderately high
Lowe loam	38.1	36.4	25.5	0.2	Moderately low	B/D	Moderately low to high
Marysland loam	39.1	36.9	24	0.2	Moderately low	B/D	Moderately low to high
Marysland loam, 0 to 1 % slopes, occasionally flooded	39.1	36.9	24	0.2	Moderately low	B/D	Moderately low to high
Orthents, loamy	41.1	36.9	22	0.24	Moderate	C	Moderately high
Rentill loam	42.1	37.9	20	0.2	Moderately low	C	Moderately high
Renwash loam, 0 to 2 % slopes, rarely flooded	39.5	37.5	23	0.24	Moderate	B	Moderately low
Vallers loam	39.8	37.7	22.5	0.24	Moderate	C/D	Moderately high to high
Poinsett-Waubay silty clay loams							
Poinsett-Waubay silty clay loams, 0 to 2 % slopes	7	64	29	0.32	Moderately high	C	Moderately high
Poinsett-Waubay silty clay loams, 1 to 6 % slopes	7	64	29	0.32	Moderately high	C	Moderately high
Kranzburg-Brookings silty clay loams							
Brookings silty clay loam, 0 to 2 % slopes	7	64	29	0.28	Moderate	C	Moderately high
Kranzburg-Brookings silty clay loams, 0 to 2 % slopes	7	64	29	0.32	Moderately high	C	Moderately high
Kranzburg-Brookings silty clay loams, 1 to 6 % slopes	7	64	29	0.32	Moderately high	C	Moderately high
Kranzburg-Brookings silty clay loams, 2 to 9 % slopes	6.7	62.8	30.5	0.24	Moderate	C	Moderately high
Lamoure silty clay loams*							
Buse-Lamoure, channeled, complex, 0 to 40 % slopes	39.8	37.7	22.5	0.24	Moderate	C	Moderately high
Lamoure silty clay loam, coteau, 0 to 1 % slopes, occasionally flooded	6.7	62.8	30.5	0.24	Moderate	B/D	Moderately low to high
Lamoure-La Prairie complex, channeled	6.7	62.8	30.5	0.2	Moderately low	B/D	Moderately low to high

Soil Type	% Sand	% Silt	% Clay	Kf[1]	Erosion Hazard	Hydrologic Soil Group[2]	Runoff Potential
Lamoure-Rauville silty clay loams, channeled	6.7	62.8	30.5	0.2	Moderately low	B/D	Moderately low to high
Lamoure-Rauville silty clay loams, channeled, 0 to 2 % slopes, frequently flooded	6.7	62.8	30.5	0.24	Moderate	B/D	Moderately low to high
McIntosh-Lamoure silty clay loams	7.1	65.4	27.5	0.28	Moderate	C	Moderately high
Moritz-Lamoure complex	39.2	37.3	23.5	0.2	Moderately low	C	Moderately high
Parnell silty clay loams*							
Parnell silty clay loam	17.5	49	33.5	0.24	Moderate	C/D	Moderately high to high
Parnell-Vallers complex	17.5	49	33.5	0.24	Moderate	C/D	Moderately high to high
Singsaas-Waubay silty clay loams							
Singsaas-Waubay silty clay loams, 0 to 2 % slopes	18.1	50.9	31	0.24	Moderate	C	Moderately high
Singsaas-Waubay silty clay loams, 1 to 6 % slopes	18.1	50.9	31	0.24	Moderate	C	Moderately high
Generalized silty clay loams*							
Brandt silty clay loam, 0 to 2 % slopes	7	64	29	0.32	Moderately high	C	Moderately high
Cubden silty clay loam, 0 to 2 % slopes	7	64	29	0.32	Moderately high	C/D	Moderately high to high
Fulda silty clay loam	16.9	48.1	35	0.24	Moderate	C/D	Moderately high to high
Hamerly-Badger complex	35.4	33.6	31	0.15	Low	C	Moderately high
Hegne-Fulda silty clay loams	18.5	44	37.5	0.2	Moderately low	C/D	Moderately high to high
Mckranz-Badger silty clay loams, 0 to 2 % slopes	7	64	29	0.32	Moderately high	C/D	Moderately high to high
Oldham silty clay loam	18.5	44	37.5	0.15	Low	C/D	Moderately high to high
Playmoor silty clay loam	6.7	62.8	30.5	0.2	Moderately low	B/D	Moderately low to high
Poinsett silty clay loam, 6 to 9 % slopes	7	64.5	28.5	0.28	Moderate	C	Moderately high
Rauville silty clay loam, coteau, 0 to 1 % slopes, frequently flooded	6.7	62.3	31	0.24	Moderate	B/D	Moderately low to high
Southam silty clay loam, 0 to 1 % slopes	7	64	29	0.32	Moderately high	C/D	Moderately high to high

Soil Type	% Sand	% Silt	% Clay	Kf[1]	Erosion Hazard	Hydrologic Soil Group[2]	Runoff Potential
Generalized silty clays*							
Castlewood silty clay	7.2	47.8	45	0.2	Moderately low	C/D	Moderately high to high
Nutley-Sinai silty clays, 6 to 12 % slopes	5.3	44.7	50	0.17	Low	C	Moderately high
Sinai silty clay, 0 to 2 % slopes	5.3	44.7	50	0.17	Low	C	Moderately high
Sinai silty clay, 2 to 6 % slopes	5.3	44.7	50	0.17	Low	C	Moderately high
Estelline silt loams*							
Estelline silt loam, coteau, 0 to 2 % slopes	7	68	25	0.32	Moderately high	B	Moderately low
Estelline silt loam, coteau, 2 to 6 % slopes	7	68	25	0.32	Moderately high	B	Moderately low
Estelline-Kampeska silt loams, 2 to 6 % slopes	7	69	24	0.28	Moderate	B	Moderately low
Vienna Soils Complex*							
Vienna-Brookings complex, 0 to 2 % slopes	7	68	25	0.37	Moderately high	C	Moderately high
Vienna-Brookings complex, 1 to 6 % slopes	7	68	25	0.37	Moderately high	C	Moderately high
Vienna-Buse complex, 6 to 9 % slopes	21.3	54.7	24	0.28	Moderate	C	Moderately high
Generalized sandy/gravelly soils*							
Arvilla sandy loam, 0 to 2 % slopes	68.3	19.7	12	0.15	Low	A	Low
Arvilla sandy loam, 2 to 6 % slopes	68.3	19.7	12	0.15	Low	A	Low
Arvilla sandy loam, 6 to 9 % slopes	68.3	19.7	12	0.15	Low	A	Low
Arvilla-Sandberg sandy loams, coteau, 2 to 6 % slopes	63.5	26.5	10	0.24	Moderate	A	Low
Arvilla-Sandberg sandy loams, coteau, 6 to 9 % slopes	63.5	26.5	10	0.24	Moderate	A	Low
Arvilla-Sioux complex, 6 to 15 % slopes	68.3	19.7	12	0.15	Low	A	Low
Arvilla-Sioux complex, coteau, 6 to 15 % slopes	65.1	18.9	16	0.15	Low	A	Low
Maddock loamy fine sand, 6 to 25 % slopes	83.1	9.4	7.5	0.1	Low	A	Low
Maddock loamy fine sand, 9 to 25 % slopes	83.1	9.4	7.5	0.1	Low	A	Low
Orthents, gravelly	44.3	40.7	15	0.24	Moderate	A	Low
Sioux-Arvilla complex, coteau, 15 to 40 % slopes	44.3	40.7	15	0.24	Moderate	A	Low
Udorthents, coteau (gravel pits)	44.3	40.7	15	0.24	Moderate	A	Low

Soil Type	% Sand	% Silt	% Clay	Kf[1]	Erosion Hazard	Hydrologic Soil Group[2]	Runoff Potential

1 Kf is the K factor for erosion potential of the soil type. The values of the K factor range from 0.02 for the least erodible soils to 0.64 as the most erodible soils.

2 Hydrologic Soil Group Definitions:

Group A: Soils having a high infiltration rate (low runoff potential) when thoroughly wet.

Group B: Soils having a moderate infiltration rate when thoroughly wet.

Group C: Soils having a slow infiltration rate when thoroughly wet.

Group D: Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet.

Certain wet soils are placed in Group D based solely on the presence of a water table within 60 cm of the surface, even though the saturated hydraulic conductivity may be favorable of water transmission. If these soils can be adequately drained, they are assigned to dual hydrologic soil groups (A/D. B/D. and C/D) based on their saturated hydraulic conductivity and the water table depth when drained.

7.2.1.1 Prime Farmland

Prime farmland is land that has the highest optimal physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and minimal rocks (Soil Science Division Staff, 2017).

The majority of the Project area (approximately 73%) includes prime farmland (refer to Figure 14). Approximately 11% is not prime farmland (Table 7-2). Another 11% of the Project includes farmland considered prime if drained, and approximately 0.6% is prime if irrigated. Approximately 5% of the Project area includes farmland of statewide importance as outlined in Table 7-2. The NRCS defines farmland of statewide importance as

> "land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Criteria for defining and delineating this land are to be determined by the appropriate state agency or agencies. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable. In some states, additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by state laws." (U.S. Department of Agriculture, 2011)

Table 7-2 Summary of Farmland Types and Impacts within the Project Boundary

Farmland Class	All Areas are Prime Farmland	Farmland of Statewide Importance	Not Prime Farmland	Prime Farmland if Drained	Prime Farmland if Irrigated
Acres in Project area	20,416.8	1,284.3	3,023.2	3,001.1	178.8
Percent of Project	73.2	4.6	10.8	10.8	0.6
Turbine and Access Road Temporary (ac)	362.4	31.8	15.8	30.4	0.1
Turbine Long-Term (ac)	4.7	0.4	0.2	0.2	0.0
Access Road Long-Term (ac)	28.0	2.4	1.5	3.5	0.0
Laydown Yard Temporary (ac)	18.3	0.0	0.0	1.7	0.0
O&M Building Long-Term (ac)	4.8	0.0	0.0	0.0	0.0
Substation Long-Term (ac)	3.3	0.0	1.4	0.0	0.0
Met Tower Temporary (ac)	0.2	0.0	0.0	0.0	0.0
Met Tower Long-Term (ac)	0.0	0.0	0.0	0.0	0.0
Total Impacts (acres (ac)	389.0[1]	31.8	17.3	32.0	0.1

* Conservatively [1] Approximately 1.9% of the total acres of Prime Farmland in the Project boundary.
* Assumes all alternate turbines and infrastructure are built. Removes most instances of component requirement overlapping to reduce double counting.
*The long-term impact values are included within the temporary impact values.
Data Source: (U.S. Department of Agriculture, 2019b)

7.2.1.2 Drainage Class

The natural drainage class refers to the frequency and duration of wet periods in conditions similar to those under which the soil formed (Soil Survey Division Staff, USDA, 2017). They are used for the assessment of agriculture, forestry, wildlife, and recreational lands development. Approximately 82% of the Project area is classified as well-drained soil (Table 7-3).

Table 7-3 Summary of Soil Drainage Classifications within the Project Boundary

Drainage Class	Acres in Project Boundary	Percent of Project Boundary (%)
Unknown	4.0	0.01
Excessively drained	24.9	0.1
Moderately well drained	257.2	0.9
Poorly drained	1,433.4	5.1
Somewhat excessively drained	295.6	1.1
Somewhat poorly drained	2,850.4	10.2
Very poorly drained	256.1	0.9
Well drained	22,784.3	81.6
Data Source: (U.S. Department of Agriculture, 2019b)		

7.2.1.3 Erosion Potential

The K factor index determines the erosion potential and quantifies the relative susceptibility of the soil to sheet and rill erosion. The values of the K factor index range from 0.002 for the least erodible soils to 0.65 as the most erodible soils (U.S. Department of Agriculture, 2001). The K factors within the Project area range from 0.1 (moderately low erosion hazard) to 0.37 (moderately high erosion hazard) (refer to Table 7-1 in Section 7.2.1).

7.2.1.4 Slope Gradient

The Slope gradient is the angle of inclination of the soil surface from the horizontal. It is represented as a percent, which is the number of ft rise or fall in 100 ft of horizontal distance. The gradient of the soil slope is important for identifying the ability of the soil to retain water and the potential risks related to erosion. The range of slope gradients in the Project area is 1 to 30 (1 being nearly level and 30 being very steep) with the majority having slopes of either 4 (52%) or 1 (35%) (refer to Table 7-4), therefore the slope gradient within the Project are minimal and the erosion potential is low.

Table 7-4 Summary of Soil Slope Gradients within Project Boundary

Slope (%)	Acres in Project Boundary	Percent within Project Boundary (%)
Unknown	4.0	0.0
1	9,838.2	35.3
2	592.0	2.1
3	169.3	0.6
4	14,577.7	52.2
7	135.8	0.5
8	1,281.2	4.6
9	5.9	0.0
11	76.0	0.3
12	163.4	0.6
20	26.5	0.1
25	18.0	0.1
28	890.0	3.2
30	127.7	0.5
Data Source: (U.S. Department of Agriculture, 2019b)		

7.2.2 Impacts to Soil Resources

Construction activities include clearing, grading, trench excavation and backfilling, and the transport of equipment and material within the temporary workspace, which can increase the potential for soil erosion and the transport of sediments to sensitive areas. Grading and equipment traffic will compact the soil, potentially reducing the porosity in the soil and percolation rates, which could lead to increased runoff. However, since the majority of the Project area is located within minor slope gradients, runoff impacts will be minimal. Construction equipment may leak; however, it would be similar to impacts from farming equipment and will be minimal due to the continuation of farming practices during construction and the design of the access roads to match the farming practices.

During construction, Tatanka Ridge's construction contractor will use many Best Management Practices to avoid and minimize impacts to soil resources to the extent practicable. Those BMPs include, but are not limited to the measures outlined in the following subsections. The Decommissioning Plan (refer to Section 19.0) provides a description of the decommissioning and restoration phase of the Project, including a list of the primary wind farm components, dismantling and removal activities, and disposed or recycled materials.

The proposed Project involves the potential for long-term impacts to soil resources that are associated with the development of the wind turbines, Project substation, an operation and maintenance facility, collector lines, a permanent MET tower, and operational access roads. These developments will convert some of the land into less pervious surfaces than pre-existing conditions and may disrupt the surficial soil characteristics within those areas. The total impacts resulting from the construction of Project facilities amounts to approximately 1.9% of all prime farmland within the Project boundary.

No impacts to soil resources from operation activities are anticipated. There may be minor impacts to soil resources from periodic maintenance activities; however, Tatanka Ridge will manage similarly to construction activities with appropriate BMPs.

7.2.2.1 Temporary Stabilization of Soils

During construction in upland areas, Tatanka Ridge will stabilize areas of exposed soil with slopes less than 3:1 (non-steep slopes), with one or more of the following:

- Mulch (such as straw mulch, slash mulch, wood chip, or other appropriate mulch) at approximately 2 tons/ac to achieve approximately 90% ground coverage;
- Hydromulch (must be appropriate for a given slope according to the manufacturer recommendations);
- Erosion control blanket;
- Riprap; and
- Other material that prevents erosion.

Tatanka Ridge will stabilize areas of exposed soil that have slopes greater than or equal to 3:1 (steep slopes) with one or more of the following (within the timeline described below):

- Hydromulch (must be appropriate for a given slope according to the manufacturer recommendations);
- Erosion control blanket;
- Turf reinforcement mat (follow manufacturer recommendations);
- Riprap; and
- Other material that prevents erosion.

7.2.2.2 Perimeter Sediment Controls

Prior to land disturbing activities, Tatanka Ridge, through its construction contractor, will install sediment controls where necessary on downgradient perimeters and upgradient of any buffer zones, a protective zone surrounding impacted areas in order to protect the non-impacted environment. Filtration perimeter sediment controls may include:

- Silt fence;
- Sediment control logs (filled with compost, wood chip, rock, etc.);
- Filter berms (constructed of slash mulch or wood chips);
- Rock berms; and

- Other equivalent measures.

If the contractor adjusts or removes sediment control practices to accommodate short-term activities (such as clearing, grubbing, or passage of vehicles), they will re-install them immediately after the short-term activity is complete. Any short-term activity that requires removal of sediment control practices will occur as quickly as possible.

7.2.2.3 Vehicle Tracking BMPs

Where vehicle traffic leaves the Project (or onto paved roads within the site), Tatanka Ridge will:

- Install vehicle tracking BMPs (such as a rock pads, mud mats, slash mulch, concrete or steel wash racks, or an equivalent system) to minimize the track out of sediment from the construction area; and
- Remove the deposited sediment by the end of the same workday in which the track-out occurs. Removal options include sweeping, shoveling, or vacuuming these surfaces, or using other similarly effective means. Tatanka Ridge will not hose or sweep tracked-out sediment into storm drain inlets, surface waters of the state, or any stormwater conveyance.

7.2.2.4 Erosion and Sediment Control BMP Maintenance

Per the General Stormwater Permit (Permit Number: SDR100000), Tatanka Ridge will ensure that all erosion and sediment controls remain in effective operating condition until final stabilization is complete. At minimum, Tatanka Ridge will:

- Remove sediment from sediment controls before the deposit reaches 50% of the above-ground height of the control;
- Repair vegetative buffers if they become silt-covered, contain rills, or are otherwise rendered ineffective;
- Repair and stabilize eroded areas by the end of the same work day they are identified or implement alternative control measures;
- Clean inlet protection devices when sediment accumulates, when the filter becomes clogged, or when performance is compromised;
- Ensure that all controls remain in effective operating condition and protect from activities that would reduce their effectiveness; and
- Repair, replace, maintain, or supplement all nonfunctional BMPs before the next anticipated runoff event or by no later than seven calendar days from the time the repair or replacement is discovered, whichever comes first.

7.2.2.5 Revegetation

The majority of soil disturbing activities will occur in agricultural areas. In agricultural areas, final stabilization will occur by returning temporarily disturbed land to its pre-construction agricultural use. In non-agricultural areas, Tatanka Ridge will reseed and mulch areas in accordance with the South Dakota Department of Transportation (SDDOT) specifications provided in Appendix A. Tatanka Ridge will work with landowners and the local NRCS office to identify the appropriate seed mixes for non-agricultural areas. All seeding will occur in accordance with South Dakota Seed Law (SDCL 38-12A).

7.2.2.6 Additional BMPS

Impacts to soil quality from potential release of chemicals from construction equipment will be minimized with implementation of a Spill Prevention, Control, and Countermeasures (SPCC) plan.

Tatanka Ridge will decompact crane paths and other areas temporarily impacted during construction using rippers or plows through the affected area, if necessary.

Construction of the Project will require coverage under the SDDENR General Permit Authorizing Stormwater Discharges (Permit Number: SDR100000). Tatanka Ridge will implement best management practices (BMPs) to control erosion and sedimentation to minimize negative impacts caused by stormwater discharges from the Project.

7.2.3 Mitigation Measures for Soil Resources

As a result of the Project design, construction BMPs, and other avoidance and minimization measures discussed above, no permanent impacts to soil resources are expected to occur, and therefore no mitigation is necessary for these resources.

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

20:10:22:15. Hydrology. *The applicant shall provide information concerning the hydrology in the area of the proposed plant, wind energy, or transmission site and the effect of the proposed site on surface and groundwater. The information shall include:*

(1) A map drawn to scale of the plant, wind energy, or transmission site showing surface water drainage patterns before and anticipated patterns after construction of the facility;

(2) Using plans filed with any local, state, or federal agencies, indication on a map drawn to scale of the current planned water uses by communities, agriculture, recreation, fish, and wildlife which may be affected by the location of the proposed facility and a summary of those effects;

(3) A map drawn to scale locating any known surface or groundwater supplies within the siting area to be used as a water source or a direct water discharge site for the proposed facility and all offsite pipelines or channels required for water transmission;

(4) If aquifers are to be used as a source of potable water supply or process water, specifications of the aquifers to be used and definition of their characteristics, including the capacity of the aquifer to yield water, the estimated recharge rate, and the quality of ground water;

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

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

8.1 Groundwater Resources

8.1.1 Existing Groundwater Resources

The Project area is covered by glacial deposits that range from 30 to 300 ft in thickness and contain a substantial amount of the shallow groundwater found in the region. In this area, aquifers are generally encountered at depths greater than 100 ft below the land surface (Jensen, 2001). However, in areas near Hidewood Creek, Bullhead Run, Peg Munky Run, and an area south of the city of Brandt, the aquifers are generally encountered at depths less than or equal to 50 ft below land surface (Jensen, 2001).

The Project area is not within any major aquifer system. The Northern Great Plains aquifer system is located in the western region of South Dakota and the High Plains aquifer is located in the south (U.S. Geological Survey, 2003). However, the Project area is located near Zone A Wellhead Protection Areas and thus the Project area includes Zone B lands (shallow aquifer boundaries and areas contributing to drainage to Zone A) (Figure 7a-d).

8.1.2 Impacts to Groundwater Resources

Since the proposed Project's turbine foundations will be at approximately 10 ft below the land surface, and most aquifers in the area are at least 100 ft below the land surface, no impacts to groundwater resources are expected from either construction activities or operation and maintenance activities.

8.1.3 Mitigation Measures for Groundwater Resources

Because no impacts to groundwater resources are expected, no mitigation is necessary for the proposed Project.

8.2 Surface Water Resources

8.2.1 Existing Surface Water Resources

8.2.1.1 Waterbodies

The Project occurs within two watersheds; the Middle Big Sioux watershed (8-digit HUC 10170202) is located in the western portion of the Project and the Lac Qui Parle watershed (8-digit HUC 0702003) is located in the eastern portion (U.S. Geological Survey, 2018). Waterbodies include streams that are perennial, intermittent, or ephemeral based on their water flow periods. Perennial streams have water flowing throughout the entire year, ephemeral streams have water flowing only occasionally, and intermittent streams have a combination of wet periods and dry periods depending on the seasons and climate variations. Numerous waterbodies are present within the Project boundary, most of which are tributaries to Hidewood Creek, Cobb Creek, Bullhead Run, North Deer Creek, and Peg Munky Run (Figure 4). The majority of the streams in the Project area are intermittent (U.S. Geological Survey, 2019a). A desktop review using the National Hydrology Dataset from the US Geological Survey shows there will be nine stream crossings (six streams total) from temporary crane path construction, six stream crossings (five streams total) from access road development, and 34 stream crossings (29 streams total) from collector line development as summarized in Table 8-1 (U.S. Geological Survey, 2019a). Waterbody delineations will be complete in 2019 to verify the number and type of stream crossings.

Table 8-1 Summary of Project Waterbody Crossings

Type	Number of Crane Path Crossings Impacted by Crane Paths	Number of Access Road Crossings Impacted by Access Roads	Number of Collector Line Crossings Impacted by Collector Lines
Unique Crossings*	9	6	34
Streams Crossed	6	5	29

Data Source: (U.S. Geological Survey, 2019a)

* Unique crossings is each time an activity crosses a stream.

Does not include locations where the crane paths and/or collector lines are co-located with access roads (Impact is included with Access Roads).

Does not include locations where the collector lines are co-located with crane paths (Impact is included with crane paths).

8.2.1.2 Wetlands

A desktop assessment of potential wetlands and a delineation was completed for the eastern portion of the Project using the 2018 Project boundary (Appendix B and Appendix C, respectively). The delineations were completed in accordance with the 1987 US Army Corps of Engineers (USACE) Wetland Delineation Manual and Great Plains Regional Supplement (U.S. Army Corps of Engineers Research and Development Center, 2010). Tatanka Ridge will delineate the remaining portions of the Project in 2019. For areas within the Project boundary where field delineation data was not available at the time of application submittal, Tatanka Ridge used data from a desktop level analysis of potential aquatic resources to identify the potential presences of wetlands (Table 8-2; Figure 12).

Table 8-2 Wetland Types Present within the Project Boundary

Freshwater Emergent wetland (Delineated)		Potential Aquatic Resource (Desktop)		Total Wetlands	
Acres	Percent (%)	Acres	Percent (%)	Acres	Percent (%)
352.0	1.3%	1,221.5	4.4%	1,573.5	5.6%

Data Source: (U.S. Fish and Wildlife Service, 2019d)

8.2.1.3 Floodplains

Floodplains play a pivotal role in the natural environment by providing a catchment for excess water and reduction of flow velocity during times of flood, groundwater recharge; wildlife habitat; and the prevention of sediment, nutrients, and other pollutants from entering the respective river.

The Federal Emergency Management Agency (FEMA) is the regulatory agency in the US for the development of flood hazard maps and floodplain datasets. FEMA has not completed a study of Deuel County to determine the flood hazards and publish a map of designated floodplains in the Project area; however, each waterbody has an associated floodplain.

8.2.1.4 National Park Service Nationwide Rivers Inventory

The National Park Service Nationwide Rivers Inventory (NRI) lists more than 3,200 free-flowing river segments in the US that are believed to possess one or more "outstandingly remarkable" natural or cultural values that are to be at east regionally significant. Under the Wild and Scenic Rivers Act section 5(d)(1) and related guidance, all federal agencies must seek to avoid or mitigate actions that adversely affect NRI rivers. There are no NRI rivers located within the Project area (National Park Service, n.d.). The closest NRI river is the Yellow Bank River, approximately 25 miles north of the Project location. The Big Sioux River is not considered a National Park Service NRI river.

8.2.1.5 Impaired Waters

Table 8-3 and Figure 4 include the waters within one mile of the Project boundary (aerial radius measurement) that are likely to receive stormwater runoff from the construction areas either during or after construction. As summarized in Table 8-3, there are no 303(d)-listed, impaired waterbodies within or near the Project area.

Table 8-3 Receiving Waters within One Mile of and that may Receive Stormwater Runoff from the Construction Areas

Name of Waterbody	Impaired Water?(1)	Beneficial Uses of Stream Segments?(2)	Beneficial Use Classification(3)
Hidewood Creek	☐ Yes ☒ No	☒ Yes ☐ No	6, 8, 9, and 10
Unnamed Tributaries to Hidewood Creek	☐ Yes ☒ No	☐ Yes ☒ No	Not applicable
North Deer Creek	☐ Yes ☒ No	☒ Yes ☐ No	6, 8, 9, and 10
Unnamed Tributaries to North Deer Creek	☐ Yes ☒ No	☐ Yes ☒ No	Not applicable
Bullhead Run	☐ Yes ☒ No	☐ Yes ☒ No	Not applicable
Unnamed Tributaries to Bullhead Run	☐ Yes ☒ No	☐ Yes ☒ No	Not applicable
Peg Munky Run	☐ Yes ☒ No	☐ Yes ☒ No	Not applicable
Unnamed Tributaries to Peg Munky Run	☐ Yes ☒ No	☐ Yes ☒ No	Not applicable
Cobb Creek	☐ Yes ☒ No	☐ Yes ☒ No	Not applicable
Unnamed Tributaries to Cobb Creek	☐ Yes ☒ No	☐ Yes ☒ No	Not applicable

(1) Impaired water for the following pollutant(s) or stressor(s):
(2) ARSD 74:51:03:02 , and ARSD 74:51:03:04 to 74:51:03:27
(3) ARSD 74:51:03:02 classifications: 6. Warmwater marginal fish life propagation waters; 8. Limited-contact recreation waters

8.2.2 Impacts to Surface Water Resources

8.2.2.1 Waterbodies

Table 8-1 in Section 8.2.1.1 summarizes the number of streams the Project may impact according to the data from the USGS NHD. Six streams may have temporary impact due to the crane paths, access roads cross five streams, and the collector system crosses 29 streams (Table 8-1 in Section 8.2.1.1).

All construction activities are expected to have minimal, temporary impacts because Tatanka Ridge will follow its SWPPP and BMPs, outlined in Section 7.2.2, that are covered under the General Permit for Storm Water Discharge Associated with Construction Activities (Permit Number: SDR100000) to protect the water quality of the streams. In addition, permanent and temporary access roads and crane paths will be designed and constructed to maintain existing drainage. Tatanka Ridge will install collector lines across waterbodies within the Big Sioux watershed using trenchless techniques to avoid in-stream impacts. Tatanka Ridge will take additional measures in the Big Sioux watershed to avoid impacts to the Topeka Shiner (refer to Section 10.2.1.1).

Hidewood and North Deer Creeks both possess Class 6, 8, 9, and 10 beneficial uses as defined by the state's Surface Water Quality Standards; however, they are outside of the Project boundary and will not be crossed or impacted directly by Project activities.

No impacts to waterbodies from operational activities are anticipated. There may be minor impacts to surface water resources from periodic maintenance activities, but they will be managed similarly to construction activities with appropriate BMPs.

8.2.2.2 Wetlands

Tatanka Ridge carefully selected the proposed wind turbine, crane path, and access road locations to avoid or minimize direct impacts to wetlands and waterbodies. The proposed wind turbine locations are all within upland areas. The Project area includes five privately owned parcels containing United States Fish and Wildlife Service (USFWS) wetland easements. The USFWS easements do not allow impacts to protected wetlands without specific coordination and permission. Tatanka Ridge is coordinating with the USFWS to cross one of these USFWS wetland easements with a collector line (refer to Section 11.2.2). The Project will avoid impacts to the wetlands within the easement by either spanning the wetlands with overhead collector lines, or by boring beneath the wetlands. Tatanka Ridge will notify the USFWS of its proposed avoidance method when the design has been finalized.

Table 8-4 summarizes the potential wetland impacts of the proposed Project. This analysis uses the wetland delineation data, where available, supplemented with USFWS NWI data and will be revised when wetland delineations are complete. A total of 5.8 ac of wetlands will have temporary impacts due to the proposed Project and a total of 0.8 ac of wetlands will have long-term impacts (Table 8-4).

Table 8-4 Summary of Project Wetland Impacts

Impact	Freshwater Emergent Wetland (Delineated) Acres	Potential Aquatic Resource (Desktop) Acres	Total Wetlands Acres
Turbine and Access Road Temporary	3.3	2.5	5.8
Turbine Long-Term	0.0	0.0	0.0
Access Road Long-Term	0.4	0.4	0.8
Laydown Yard Temporary	0.0	0.0	0.0
O&M Building Long-Term	0.0	0.0	0.0

Tatanka Ridge designed the Project layout to avoid impacts to wetlands. The turbines, O&M building, laydown yards, and access roads avoid wetlands and crane paths were designed to minimize impacts to wetlands to the extent possible. Tatanka Ridge will implement the appropriate BMPs, outlined in Section 7.2.2, according to the SWPPP for the construction activities in the wetlands in order to avoid impacts. Depending on the final temporary and permanent impacts, Tatanka Ridge will obtain a permit from the USACE during construction in order to protect wetlands within the Project boundary, and will comply with all of the conditions within the permit to minimize impacts.

No impacts to wetlands from operational activities are anticipated. There may be minor impacts to wetlands from periodic maintenance activities, but they will be managed similarly to construction activities with appropriate BMPs and in compliance with USACE permit conditions, appropriately.

8.2.2.3 Floodplains

Although FEMA has not assessed the area for flood hazards as discussed in Section 8.2.1.3, each waterbody does have an associated floodplain. Tatanka Ridge will implement BMPs during construction, as discussed throughout this application, to restore likely floodplain areas to their pre-construction conditions.

No impacts to floodplains from operational activities are anticipated. There may be minor impacts to floodplains from periodic maintenance activities, but they will be managed similarly to construction activities with appropriate BMPs.

8.2.2.4 National Park Service Nationwide Rivers Inventory

There are no NRI-designated rivers in the area; therefore, the Project will not impact NRI rivers.

8.2.2.5 Impaired Waters

According to Table 8-3 in Section 8.2.1.5, there are no impaired waters located within the Project area. Therefore, the Project will not result in impacts to impaired waters.

8.2.3 Mitigation Measures for Surface Water Resources

The impacts to wetlands associated with the collector system and crane paths will be temporary in nature, will not result in a conversion from one wetland type to another, such as forested or scrub shrub to emergent, and will not result in a loss of waters of the U.S (WOTUS). Construction of the access roads may result in the placement of fill material and culverts within waters of the U.S.; however, Tatanka Ridge does not anticipate that amount of impact at each crossing will exceed ½ ac. As a result, Tatanka Ridge anticipates that the Project will qualify for the USACE's Nationwide Permits (NWPs) 12 and/or 14. Tatanka Ridge will work with the USACE to determine if compensatory mitigation is necessary based on the final calculated impacts.

As a result of the project design, construction BMPs, and other avoidance and minimization measures discussed above, no permanent impacts to surface waterbodies, floodplains, National Park Service NRI rivers, or impaired waters are expected to occur, and therefore no mitigation is necessary for these resources.

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

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.*

This section describes the existing terrestrial ecosystems, potential Project impacts on these terrestrial ecosystems, and the mitigation measures proposed to avoid or minimize impacts. Tatanka Ridge identified the data in this section through a review of published literature, coordination with federal and state agencies, publicly available agency datasets, aerial photographs, and Project-specific field surveys. The following sections describe terrestrial vegetation and wildlife near the Project, including federally and state-listed species.

9.1 Vegetation

Publicly available data and aerial photographs were reviewed to assess terrestrial vegetation communities and identify environmentally sensitive features within the Project. This assessment included land cover, potentially undisturbed grasslands, public lands and easements, and noxious and invasive weeds in or near the Project area, which are discussed below.

9.1.1 Existing Vegetation

The Project is located within the Northern Glaciated Plains Level III Ecoregion, which covers much of the eastern portion of South Dakota (U.S. Environmental Protection Agency, 2016). The Northern Glaciated Plains are characterized by a flat to gently rolling landscape composed of glacial drift. This ecoregion serves as a transitional zone between tall and shortgrass prairie with high concentrations of temporary and wetlands that are favorable for duck nesting and migration. The highest portion of the Project demarks the transition from the Big Sioux Basin Level IV Ecoregion on the west to the Prairie Coteau Level IV Ecoregion on the east. The Big Sioux Basin is characterized by relatively flat topography and fewer wetlands than the surrounding landscapes; a large portion of this region is currently used for cultivated cropland. The Prairie Coteau Ecoregion is approximately 200 miles in length and 100 miles in width, rising from the prairie flatlands in eastern South Dakota, southwestern Minnesota, and northwestern Iowa; this ecoregion is characterized by rolling rocky terrain that is often utilized for grazing (Bryce, S., J.M. Omernik, D.E. Pater, M. Ulmer, J. Schaar, J. Freeouf, R. Johnson, P. Kuck, and S.H. Azevedo, 1998).

Based on USGS NLCD, (U.S. Geological Survey, 2011); (Multi-Resolution Land Characteristics Consortium (MRLC), n.d.); (Homer, C., J. Dewitz, L. Yang, S. Jin, P. Danielson, G. Xian, J. Coulston, N. Herold, J. Wickham, K. Megown, 2015), the majority (91.9%) of land within the Project boundary consists of cultivated crops

(70.8%) and herbaceous land (21.1%; Table 9-1 and Figure 13). Consistent with the overall Project boundary, the Project construction footprint consists primarily of cultivated crops (80.8%) and herbaceous lands (12.7%). Herbaceous wetlands and forested communities each occupy less than 1% of the Project construction footprint.

Table 9-1 Land Cover Types within the Project Boundary

Land Cover Type	Project Boundary		Project Construction Footprint	
	Area (ac)	Percent (%) of Total	Area (ac)	Percent (%) of Total
Cultivated Crops	19,748	70.8	380.1	80.8
Herbaceous	5,899	21.1	59.7	12.7
Developed	1,133	4.1	28.9	6.2
Hay/Pasture	791	2.8	0.05	0.0
Emergent Herbaceous Wetlands	161	0.6	1.1	0.2
Deciduous Forest	131	0.5	0.5	0.1
Open Water	41	0.1	0	0.0
Total	27,905	100	470.4	100

Source: (U.S. Geological Survey, 2011); (Homer, C., J. Dewitz, L. Yang, S. Jin, P. Danielson, G. Xian, J. Coulston, N. Herold, J. Wickham, K. Megown, 2015)
Note: Total values may not equal the sum of the addends due to rounding.

9.1.1.1 Grasslands and Native Prairie Communities

Based on classification by the USGS NLCD, herbaceous lands are dominated by grammanoid (grass-like) or herbaceous (plants without woody stems) vegetation communities; although they are not subject to tilling, herbaceous lands can be utilized for grazing (U.S. Geological Survey, 2011); (Multi-Resolution Land Characteristics Consortium (MRLC), n.d.). Herbaceous lands within and near the Project construction footprint were assessed for their potential to support undisturbed native prairies, which could in turn contain prairie obligate and sensitive species (including the federally listed Dakota skipper [*Hesperia dacotae*] and Poweshiek skipperling [*Oarisma poweshiek*], refer to Section 9.2.1.4). Potential grasslands and native prairies within the Project were assessed using a two-step process, which included desktop assessment and subsequent field surveys.

The desktop assessment for the Project was conducted in two phases due to a change in the Project boundary in early 2019. The desktop assessment for the eastern portion of the Project was completed in June 2018 (using the 2018 Project boundary), and is included as Appendix B. The assessment for the western portion of the Project (2019 Project boundary) was conducted in March 2019 and will be provided in a subsequent filing.

The desktop assessment was conducted to identify potential undisturbed grasslands in the Project boundary. Undisturbed grasslands consist of intact grassland areas that have either never been

tilled/broken, or that may have been tilled in the late nineteenth and early twentieth century using equipment that did not disturb the soils to a depth where the soil profile, topography, and/or grassland potential of the landscape was destroyed.

The desktop assessment was completed by grassland biologists experienced in aerial imagery interpretation, remote sensing techniques, and Northern Great Plains ecology. The biologists used aerial imagery and geospatial datasets to conduct a qualitative desktop assessment of the Project boundary and identify undisturbed grassland areas that the Project could impact. The biologists conducted the assessment using public datasets, including:

- Color-infrared imagery (Esri, 2018);
- National Agriculture Imagery Program imagery (U.S. Department of Agriculture, 2016);
- Current and historical aerial imagery (Esri, 2018);
- Cropland data layer (U.S. Department of Agriculture, 2017a);
- National GAP landcover data (U.S. Geological Survey, 2011);
- National Land Cover Database (Homer, C., J. Dewitz, L. Yang, S. Jin, P. Danielson, G. Xian, J. Coulston, N. Herold, J. Wickham, K. Megown, 2015);
- USFWS NWI dataset (U.S. Fish and Wildlife Service, 2019d);
- Protected Areas Database of the United States (U.S. Geological Survey, 2016a);
- South Dakota Conservation Easement layer (Esri, 2019);
- Plowprint layer (Gage, A.M., S.K. Olimb, and J. Nelson, 2016); and
- South Dakota State University Quantifying Undisturbed (Native) Land in Eastern South Dakota: 2013 layer (Bauman, P., B. Carlson, and T. Butler, 2016).

As described in Table 9-1, a total of 5,899 ac of herbaceous lands are mapped within the Project boundary. Field surveys verify 1,920 ac of undisturbed grasslands (depicted on Figure 13), which are equivalent to approximately 7% of the total Project boundary. The remaining 3,979 ac of herbaceous lands from NLCD are currently cultivated areas, planted tree rows, or heavily disturbed livestock corral areas (referred to as Disturbed Grasslands).

Field surveys were completed within the Project boundary in 2018 and 2019, that involved identifying the lack of cultivation or other soil profile-disturbing activities, and determining whether the grassland area was dominated by native plant communities or non-native plant communities. Field surveys classified grasslands into the following categories:

- Non-native Undisturbed Grasslands – Grasslands that do not show evidence of prior disturbance, but are dominated by non-native species, invasive species, or monocultures; and

- Native Undisturbed Grasslands – Grasslands that do not show evidence of prior disturbance and that contain native herbaceous or grammanoid species.

Based on the results of the desktop assessment and field surveys in 2018 and 2019, over 99% of the grasslands within the Project are composed of Disturbed Grasslands (3,979 ac) and Non-native Undisturbed Grasslands (1,920 ac). Native Undisturbed Grasslands are limited to 14 ac in the southeastern corner of the Project.

9.1.1.2 Conservation Easements

Based on correspondence with the USFWS and a review of the USGS PADUS (U.S. Fish and Wildlife Service, 2018a); (U.S. Geological Survey, 2016a), six conservation easements are located within the Project boundary, all of which are managed by the USFWS (depicted on Figure 3). Of these, five are wetland easements, which are discussed in detail in Sections 8.2.2.2 and 11.2. The remaining conservation easement is located in the northwestern corner of the Project, and is part of the USFWS Dakota Tallgrass Prairie Wildlife Management area (WMA). This parcel, Dakota Tallgrass Prairie WMA 142, occupies 142 ac and is managed to provide a combination of grasslands and wetlands that attract a wide variety of birds, mammals, reptiles, amphibians, fish, insects, and other invertebrates (U.S. Fish and Wildlife Service, 2013a). As discussed in additional detail in Section 11.2, Tatanka Ridge coordinated with the USFWS throughout the Project planning process. In order to avoid impacts to the Dakota Tallgrass Prairie WMA, Project layout has been designed so that the closest turbine is over 1,500 ft southeast of the Dakota Tallgrass Prairie WMA.

9.1.1.3 Special Status Species

Based on the species list generated by the USFWS Information for Planning and Conservation (IPaC) online system and the South Dakota Natural Heritage Database review, no state- or federally listed plants are expected to occur in the vicinity of the Project. These Project-specific reviews are each included in Appendix E.

9.1.1.4 Noxious and Invasive Weeds

The state of South Dakota (SDCL 38-22) and the federal government (7 CFR 360) regulate noxious and invasive weeds to stop the spread of plants that are harmful to the environment, crops, livestock, and/or public health. According to the South Dakota Department of Agriculture (SDDOA), a total of 10 noxious weeds are present in Deuel County (South Dakota Department of Agriculture, 2017); (South Dakota Department of Agriculture, 2018a); (South Dakota Department of Agriculture, 2018b); (Table 9-2). Of these, four are designated as State Noxious Weeds and six are designated as Local Noxious Weeds in Deuel County (SDDOA, 2018a, 2018b). Noxious weed surveys have not been completed for the Project; however, some species (e.g., musk thistle [*Carduus nutans*], Canada thistle [*Cirsium arvense*]) have been observed in the Project boundary during other surveys.

Table 9-2 Noxious Weeds with Potential to Occur in the Project Area

Common Name	Scientific Name	Designation
Absinth wormwood	*Artemisia absinthium*	Local Noxious Weed [a]
Bull thistle	*Cirsium vulgare*	Local Noxious Weed [a]
Canada thistle	*Cirsium arvense*	State Noxious Weed [b]
Leafy spurge	*Euphorbia esula*	State Noxious Weed [b]
Musk thistle	*Carduus nutans*	Local Noxious Weed [a]
Perennial sowthistle	*Sonchus arvensis*	State Noxious Weed [b]
Plumeless thistle	*Carduus acanthoides*	Local Noxious Weed [a]
Poison hemlock	*Conium maculatum*	Local Noxious Weed [a]
Purple loosestrife	*Lythrum salicaria*	State Noxious Weed [b]
Yellow toadflax	*Linaria vulgaris Mill*	Local Noxious Weed [a]

[a] (South Dakota Department of Agriculture, 2018a).
[b] (South Dakota Department of Agriculture, 2018b).

9.1.2 Impacts to Vegetation

Construction of the Project will result in both temporary and permanent impacts to existing vegetation within the Project boundary. Direct impacts will include approximately 470.4 ac of vegetation that will be impacted during construction of the Project. The majority (409.0 ac; 87.0%) of the vegetation within the Project construction footprint has been previously disturbed, and includes actively cultivated croplands and developed land. The remaining 61.3 ac (13%) of habitat within the Project construction footprint includes Disturbed Grasslands (59.7 ac), as well as small areas of emergent wetland (1.1 ac) and deciduous forest (less than 1 ac). Direct impacts to Native Undisturbed Grasslands will be limited to one area where collector lines will cross approximately 100 feet of Native Undisturbed Grasslands along the southern boundary of the Project. 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.

Herbaceous communities within the Project Construction Footprint are almost entirely composed of Disturbed Grasslands (44.5 ac) and Non-native Undisturbed Grasslands (15.2 ac). Impacts to these degraded vegetation communities will be both short-term (i.e., collector lines and crane paths) and long term (i.e., turbine access roads). However, given that these grasslands are highly fragmented and relatively small in size, impacts to Disturbed Grasslands and Non-native Undisturbed Grasslands associated with the Project are expected to be minimal.

As described above, impacts to Native Undisturbed Grasslands will be limited to one area where collector lines cross a 100-ft grassland area. Tatanka Ridge will continue to coordinate with the SDGFP to develop measures to minimize impacts to this Native Undisturbed Grassland.

Tatanka Ridge designed the Project to avoid impacts to the Dakota Tallgrass Prairie WMA. Potential impacts to USFWS wetland easements are discussed in Section 8.2.2.2. Because no state- or federally listed plants are known to occur in the vicinity of the Project, no impacts to listed plant species are expected to occur as a result of construction and operation of the Project.

9.1.3 Mitigation Measures for Vegetation

Terrestrial vegetation communities most sensitive to disturbance include grasslands with native plant communities and forested communities. The Project has been sited to avoid impacts to these sensitive habitats where feasible. To minimize impacts on vegetation, erosion control devices will be installed and maintained throughout construction, and temporary disturbed will be revegetated with weed-free seed, if available, mixes, or in accordance with landowner request, after construction activities are complete. The spread of noxious weeds will be avoided or minimized by delivering clean, washed vehicles to the site; using weed-free straw or waddles for erosion control, if readily available; and through the use of weed-free seed mixes following construction.

Tatanka Ridge designed the Project layout to minimize impacts to grasslands and native plant communities. Tatanka Ridge modified the Project layout to place turbines and other aboveground facilities within croplands and other disturbed communities, minimizing both impacts to sensitive communities and habitat fragmentation. Tatanka Ridge avoid impacts to the Native Undisturbed Grasslands within the Project construction footprint. If engineering constraints preclude complete avoidance, Tatanka Ridge will implement the following measures during construction activities within Native Undisturbed Grasslands:

- Ground disturbance and construction vehicle traffic will be limited wherever possible during construction in Native Undisturbed Grasslands;
- Soil will generally be replaced to follow the original soil profiles, and exposed subgrade will be regraded to the original ground contour in areas where the native soil has been removed; and
- Disturbed areas will be reseeded with a weed-free native plant seed mixture at an appropriate application rate.

Forested communities within the Project are primarily limited to small woodlots associated with farms and windbreak tree rows. As described above, turbines have been primarily sited in croplands and other disturbed communities. During Project development, Tatanka Ridge sited access roads and crane paths to avoid crossing both woodlots and tree rows wherever feasible.

9.2 Wildlife

The USFWS has developed the *Land-Based Wind Energy Guidelines* (WEG; (U.S. Fish and Wildlife Service, 2012)) to assist developers in identifying species of concern that may potentially be affected by a proposed wind project, including migratory birds; bats; eagles and other birds of prey; greater prairie-chicken (*Tympanuchus cupido*) and sharp-tailed grouse (*Tympanuchus phasianellus*); and listed, proposed, or candidate endangered and threatened species. In addition, the USFWS *Eagle Conservation Plan*

Guidance (ECPG; (U.S. Fish and Wildlife Service, 2013b)) provides recommendations for conserving eagles in the course of siting, constructing, and operating wind energy facilities. Tatanka Ridge implemented the recommendations in these documents during development of the Project, as described in the remaining sections of 9.2 below.

9.2.1 Existing Wildlife

Numerous wildlife studies have been completed for the Project between 2009 and 2019, as described in Table 9-3. As often occurs during development of a wind energy project, Tatanka Ridge modified the Project boundary since wildlife studies began; therefore, studies prior to 2018 were completed using a previous iteration of the Project boundary. The sections below provide a summary of the recent (2018–2019) assessments and surveys conducted at the Project relating to migratory birds, bats, and special status species. To provide a robust analysis of wildlife use within the Project, wildlife studies are ongoing, and will continue through March 2020.

Table 9-3 Summary of Wildlife Surveys Conducted at the Project

Survey Type	Dates	Survey Area	Appendix
Birds			
Avian Use Surveys	August 2009 – June 2010	Previous Iteration of the Project	NA
Avian Use Surveys	May 2015 – May 2016	Previous Iteration of the Project	NA
Avian Use Surveys	April 2018 – March 2019	2018 Project boundary (April 2018 – January 2019) 2019 Project boundary (February – March 2019)	F
Avian Use Surveys	April 2019 – March 2020 (ongoing)	2019 Project boundary	Surveys Ongoing
Eagle and Raptor Nest Survey	April 2015	Previous Iteration of the Project	NA
Eagle and Raptor Nest Survey	April 2018	2018 Project boundary and 1-mile buffer (all raptor nests) 10-mile buffer (eagle nests)	G
Eagle and Raptor Nest Survey	April 2019	2019 Project boundary and 1-mile Buffer (all raptor nests) 10-mile Buffer (eagle nests)	G
Bats			
General Acoustic Bat Surveys	August – October 2009	Previous Iteration of the Project	NA
NLEB Habitat Assessment	2018 - Desktop	2018 Project area and 2.5-mile buffer	H
NLEB Habitat Assessment	2019 - Desktop	2019 Project area and 2.5-mile buffer	H
NLEB Acoustic Presence/Probable Absence Surveys	July 2018	2018 Project boundary	I
NLEB Acoustic Presence/Probable Absence Surveys	May – June 2019	2019 Project boundary	To Be Provided in Subsequent Filing
Skippers			
Dakota Skipper and Poweshiek Skipperling Habitat Assessment	2009 - Desktop	Previous Iteration of the Project	NA
Dakota Skipper and Poweshiek Skipperling Habitat Assessment	2010 - Desktop	Previous Iteration of the Project	NA
Dakota Skipper and Poweshiek Skipperling Habitat Assessment	2015 - Desktop	Previous Iteration of the Project	NA
Dakota Skipper and Poweshiek Skipperling Adult Occupancy Surveys	July 2009	Previous Iteration of the Project	NA
Dakota Skipper and Poweshiek Skipperling Adult Occupancy Surveys	June 2015	Previous Iteration of the Project	NA
Dakota Skipper and Poweshiek Skipperling Adult Occupancy Surveys	June – July 2018	2018 Project boundary	D
Dakota Skipper and Poweshiek Skipperling Grassland Habitat Surveys	May 2019	2019 Project boundary	To Be Provided in Subsequent Filing

9.2.1.1 Migratory Birds

The Migratory Bird Treaty Act (MBTA) implements four treaties that provide for international protection of migratory birds. Historically, the MBTA has been interpreted to be a strict liability statute, meaning that proof of intent, knowledge, or negligence is not an element of an MBTA violation. Actions resulting in a "taking" or possession (permanent or temporary) of a protected species, in the absence of authorization from the USFWS or other regulatory authority (e.g., authorization under the Bald and Golden Eagle Protection Act (BGEPA) or Migratory Bird Harvest Information Program) were considered violations of the MBTA. The word "take" is defined by regulation as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect…" (50 CFR § 10.12).

On December 22, 2017, the Office of Solicitor of the US Department of the Interior (DOI) released a legal opinion, M-37050, addressing the issue of incidental take under the MBTA. The new M-Opinion concludes that, "consistent with the text, history, and purpose of the MBTA, the statute's prohibitions on pursuing, hunting, taking, capturing, killing, or attempting to do the same apply only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs." (U.S. Department of the Interior, 2017). The USFWS released a memorandum on April 11, 2018 clarifying that, "the MBTA's prohibitions on take apply when the purpose of an action is to take migratory birds, their eggs, or their nests." (U.S. Fish and Wildlife Service, 2018b). Accordingly, the current policy of the DOI is that incidental take of migratory birds resulting from the operation of a wind project is not regulated by the MBTA.

9.2.1.1.1 Desktop Review (WEG Tier 1 and 2)

The Project is within the Central Flyway that migrating waterfowl, waterbirds, shorebirds, songbirds, and raptors use. Of these species groups, waterfowl have the greatest potential to migrate through the Project area. The Waterfowl Production Areas (WPAs) and WMAs in the area provide feeding and resting areas for waterfowl, waterbirds, and shorebirds migrating through this region.

The National Audubon Society (Audubon) identifies Important Bird Areas as places that provide essential habitat for a variety of bird species and are important for the conservation of bird populations; IBAs include sites for breeding, wintering, and/or migrating birds, and can range from a few ac to thousands of ac in size (Audubon, 2018a). There are three recognized IBAs within approximately 15 miles of the Project, including Oakwood Lakes IBA and two portions of the Prairie Coteau Complex IBA. The Oakwood Lakes IBA is approximately 13 miles southwest of the Project in Deuel County, and includes bur oak and cottonwood forests, planted pines, grassland, and open water habitats; islands in the northeastern part of the IBA support a large wading/waterbird colony (Audubon, 2018b). The Prairie Coteau Complex IBA is located east of the Project in Yellow Medicine and Lincoln counties, Minnesota; the closest portion of the IBA is approximately seven miles northeast of the Project. The Prairie Coteau Complex IBA focuses on prairie, grassland, and marsh birds, including consistent sightings of the upland sandpiper (*Bartramia longicauda*), dickcissel (*Spiza americana)*, and bobolink (*Dolichonyx oryzivorus*) (Audubon, 2018c).

In an effort to characterize potential avian use of the Project, data from the nearest United States Geological Survey's Breeding Bird Survey (BBS) route (Tyler) was reviewed. The Tyler BBS route has been monitored a total of 18 years between 1993 and 2017. A total of 85 bird species have been observed

along this route, with annual species numbers ranging from 21 in 2004 to 47 in 1994 (Pardieck, K.L., D.J. Ziolkowski, Jr., M. Lutmerding, and M.A.R. Hudson, 2018). The most common species were red-winged blackbird (*Agelaius phoeniceus*) and common grackle (*Quiscalus quiscula*).

The USFWS lists 27 species as Birds of Conservation Concern (BCC) within the Prairie Potholes Bird Conservation Region 11 (BCR 11); although BCC do not receive greater legal protection than other birds listed under the Migratory Bird Treaty Act, these species have been identified as vulnerable to population declines by the USFWS (U.S. Fish and Wildlife Service, 2008). In the IPaC resource list generated for the Project (included in Appendix E), the USFWS identified seven species of particular concern at the Project (Table 9-4). The six BCC species that occur in the area during the breeding season have been documented along the Tyler BBS route. Of these, the bobolink (*Dolichonyx oryzivorus*) has been documented most frequently (a total of 60 times between 1993 and 2016; (Pardieck, K.L., D.J. Ziolkowski, Jr., M. Lutmerding, and M.A.R. Hudson, 2018). A review of eBird data (eBird, 2018) indicated that these species have been observed near the Project in recent years, but that sightings are infrequent and primarily occur east of the Project near Oak Lake.

Table 9-4 Migratory Birds of Particular Concern near the Project

Species	Season
Bald eagle (*Haliaeetus leucocephalus*)	Breeding
Black tern (*Chlidonias niger*)	Breeding
Black-billed cuckoo (*Coccyzus erythropthalmus*)	Breeding
Bobolink (*Dolichonyx oryzivorus*)	Breeding
Franklin's gull (*Leucophaeus pipixcan*)	Breeding, Migration
Red-headed woodpecker (*Melanerpes erythrocephalus*)	Breeding
Ruddy turnstone (*Arenaria interpres*)	Migration

Source: USFWS IPaC Report in Appendix E

9.2.1.1.2 Field Surveys (WEG Tier 3)

One year of avian use point-count surveys have been completed for the Project that occurred from April 2018 to March 2019 (Appendix F). A second year of avian use point-count surveys began in April 2019, which will continue through March 2020. Fixed-point bird surveys estimated the seasonal, spatial, and temporal use patterns of birds within the Project area.

Fixed-point bird use surveys (variable circular plots) were conducted using methods described by Reynolds et al. (Reynolds, R.T., J.M. Scott, and R.A. Nussbaum, 1980). Survey points were selected to survey representative habitats and topography of the Project, while achieving relatively even coverage of the Project area; the survey areas covered approximately 30% of the Project boundary per the ECPG (U.S. Fish and Wildlife Service, 2013b). At the initiation of the avian surveys in April 2018, 14 points were selected;

one of the points was relocated in January 2019 as a result of inaccessibility during the winter. Due to expansion of the Project boundary, eight survey points were added in February 2019.

Surveys were conducted once per month, with seasons defined as spring (March 1 – May 31), summer (June 1 – August 31), fall (September 1 – November 30), and winter (December 1 – February 28). The survey plot for large bird surveys was a 2,625-ft (800-m) radius circle centered on the point; the survey radius for small bird surveys was a 328-ft (100-m) radius centered on the same points used for large bird surveys. In accordance with the 2016 Eagle Rule, each survey was 70 minutes in duration. All birds observed were recorded during the first 10 minutes of the survey, which was followed by a 60-minute eagle and large bird observation period.

The results of the 2018 - 2019 avian use surveys are provided in Appendix F. A total of 71 bird species were observed during fixed count surveys at the Project between April 2018 and March 2019, the majority of which were not special status species or BCC species. Waterfowl was the most abundant group recorded, followed by passerines. Overall, avian use was higher during migration periods than other seasons, likely due to the Project's location in the Central Flyway. Forty-four unique large bird species (including unidentified birds) were observed during the surveys. A total of 11 waterfowl species accounted for 97% of large bird observations in spring, of which 91% were snow goose (*Anser caerulescen*]). Passerines were the most abundant small bird group observed at the Project, with 31 identified species (and four unidentified species) accounting for nearly 99% of small bird use during all seasons. Small bird mean use was highest in the spring and summer, and three species (red-winged blackbird [*Agelaius phoeniceus*], lapland longspur [*Calcarius lapponicus*], and horned lark [*Eremophila alpestris*] accounted for approximately 50% of all small bird observations with no other species representing more than 5% of the small bird observations.

Five BCC species (i.e., dickcissel, grasshopper sparrow [*Ammodramus savannarum*], red-headed woodpecker [*Melanerpes erythrocephalus*], Swainson's hawk [*Buteo swainsoni*], and upland sandpiper) were observed in low numbers during 2018–2019 avian use surveys (Appendix F). Swainson's hawk is discussed below (Section 9.2.1.2); the remaining BCC were observed within the Project in the spring in summer. Use was highest by dickcissel (46 observations), and ranged between 1 and 10 observations for the other three BCC species.

Four of the seven migratory birds of particular concern identified by the IPaC resource list generated for the Project (i.e., bald eagle, bobolink, Franklin's gull [*Leucophaeus pipixcan*], and red-headed woodpecker) were observed in low numbers during avian use surveys. Of these, Franklin's gull was observed in the highest numbers; nine groups containing a total of 542 individuals were observed during avian surveys, all of which occurred in the fall (Appendix F).

9.2.1.2 Raptors

9.2.1.2.1 Desktop Review (WEG Tier 1 and 2)

A total of 26 raptors may occur near the Project during nesting, migration, or winter; of these, 20 have the potential to breed in the Project boundary (Table 9-5). Breeding raptors could nest in a variety of habitats in and near the Project. Tree and cavity nesters could occupy small woodlots and shelterbelts surrounding

area farm buildings and residences. Raptor nesting also could occur (predominantly in trees) along riparian corridors and woody wetlands in the Project. However, forested habitat for breeding raptors is limited, accounting for less than 1% of the Project, and generally confined to small woodlots and windbreak tree rows. Nesting in the agricultural and developed areas is limited to manmade structures, such as power poles.

Table 9-5 Raptor Species with Potential to Occur within or near the Project

Common Name	Scientific Name	Seasonal Occurrence			
		Year-round	Summer	Winter	Migration
Diurnal Raptors					
American kestrel	*Falco sparverius*	X	X	X	X
Bald eagle	*Haliaeetus leucocephalus*	X	X	X	X
Broad-winged hawk	*Buteo platypterus*		X		X
Cooper's hawk	*Accipiter cooperii*		X		X
Ferruginous hawk	*Buteo regalis*	X	X	X	X
Golden eagle	*Aquila chrysaetos*			X	X
Gyrfalcon	*Falco rusticolus*			X	
Merlin	*Falco columbarius*	X	X	X	X
Northern goshawk	*Accipiter gentilis*			X	X
Northern harrier	*Circus hudsonius*	X	X	X	X
Osprey	*Pandion haliaetus*		X		X
Peregrine falcon	*Falco peregrinus*				X
Red-tailed hawk	*Buteo jamaicensis*	X	X	X	X
Rough-legged hawk	*Buteo lagopus*			X	X
Sharp-shinned hawk	*Accipiter striatus*	X	X	X	X
Swainson's hawk	*Buteo swainsoni*		X		X
Owls					
Barred owl	*Strix varia*	X	X	X	X
Burrowing owl	*Athene cunicularia*		X		
Common barn owl	*Tyto alba*		X		
Eastern screech-owl	*Megascops asio*	X	X	X	X
Great horned owl	*Bubo virginianus*	X	X	X	X
Northern long-eared owl	*Asio otus*	X	X	X	X
Northern saw-whet owl	*Aegolius acadicus*	X	X	X	X
Short-eared owl	*Asio flammeus*	X	X	X	X
Snowy owl	*Bubo scandiacus*			X	
Vultures					
Turkey vulture	*Cathartes aura*		X		X

Source: (South Dakota Game, Fish and Parks (SDGFP), 2006); (NatureServe, 2019); Appendix F

During migration, raptors could rest and forage in the Project, depending on habitats preferred by individual raptor species, weather, and prey availability. Raptors use ridgelines and shorelines of large bodies of water during migration (Liguori, J., 2005). Updrafts formed as wind hits ridges and thermals created over land, not water, make for energy-efficient travel for raptors over long distances (Liguori, J., 2005). It is for this reason that raptors tend to follow prominent ridges with defined edges during migration. The Project is in a flat to gently rolling landscape with no distinct ridges or other prominent topographical features. Therefore, raptor migration likely occurs in a broad front fashion with no areas of concentration or funneling in the Project.

Habitat within the Project that could attract both migrating and breeding raptors is expected to be somewhat limited because a majority of the Project (75%) is composed of cultivated croplands and developed land. However, grassland habitats are utilized by small mammals, which could provide foraging opportunities for raptors.

9.2.1.2.2 Field Surveys (WEG Tier 3)

Avian Use Surveys (Appendix F)

One year of avian use point-count surveys have been completed for the Project, which occurred from April 2018 to March 2019. A second year of avian use point-count surveys began in April 2019, which will continue through March 2020.

The objective of the fixed-point avian use surveys was to estimate the seasonal and spatial use of the Project area by birds, particularly diurnal raptors (defined here as kites, accipiters, buteos, harriers, eagles, falcons, and osprey). As described above (refer to Section 9.2.1.1), 60-minute large bird surveys were conducted once per month. The survey plot for large bird surveys was a 2,625-ft (800-m) radius circle centered on the point.

A total of 78 diurnal raptor observations were recorded within the Project during the 2018–2019 surveys, representing 12 species (including unidentified diurnal raptors). Red-tailed hawk (*Buteo jamaicensis*) and northern harrier (*Circus hudsonius*) accounted for the majority of diurnal raptor observations. Diurnal raptor mean use was highest during the fall and occurred during all seasons, although winter use was limited to one bald eagle observation (refer to Section 9.2.1.4). No federally or state-listed raptor species were observed during the 2018–2019 surveys; Swainson's hawk, a BCC species, was observed six times during surveys and once incidentally.

Eagle and Raptor Nest Surveys (Appendix G)

Aerial raptor nest surveys were conducted in 2018 and 2019 to record the location and status of bald eagle (*Haliaeetus leucocephalus*) and other raptor nests in and near the Project. The aerial surveys were conducted in accordance with the guidance provided in the ECPG (U.S. Fish and Wildlife Service, 2013b) and the USFWS *Interim Golden Eagle Technical Guidance* (Pagel, J.E., D.M. Whittington, and G.T. Allen, 2010). During both years, the survey area for all raptor stick-nests consisted of a 1-mile (1.6-km) buffer of the Project boundary, and the survey area for bald eagle nests consisted of a 10-mile (16-km) buffer of

the Project boundary. The 2019 nest survey also confirmed the status of bald eagle nests identified in 2018 that were greater than 10 miles from the current Project boundary.

The 2018 nest surveys identified 24 raptor nests within 1-mile of the 2018 Project boundary. Ten nests were considered occupied and active, and 14 nests were considered unoccupied. Of the occupied nests, six were active red-tailed hawk nests and four were active great horned owl nests. The aerial nest survey also documented seven bald eagle nests within 10 miles of the 2018 Project boundary, which are federally protected under the Bald and Golden Eagle Protection Act and are discussed in additional detail in Section 9.2.1.4 (Special Status Species).

The 2019 nest surveys identified 27 raptor nests within 1-mile of the 2019 Project boundary. One unidentified raptor nest observed in 2018 was unable to be located during the 2019 survey. Five nests were considered occupied and active, and 22 nests were considered unoccupied. Of the occupied and active nests, three were red-tailed hawk nests, one was a great horned owl nest, and one was an unidentified raptor nest. Additionally, one great horned owl nest was identified as occupied and active approximately 7.8 miles northeast of the Project boundary; although beyond the 1-mile raptor nest survey boundary, this nest was documented due to its size (giant) and because it was an occupied bald eagle nest in 2018. The aerial nest survey also documented eight bald eagle nests, seven of which are within 10 miles of the 2019 Project boundary. The bald eagle nests are discussed in additional detail in Section 9.2.1.4.

9.2.1.3 Bats

9.2.1.3.1 Desktop Assessment (WEG Tier 1 and 2)

Six bat species occur in eastern South Dakota (Harvey, M.J., J.S. Altenbach, and T.L. Best, 2011); (Bat Conservation International, 2019), and have potential to occur within the Project area (Table 9-6). One of the six bats, the northern long-eared bat (NLEB; *Myotis septentrionalis*), is both state- and federally listed as threatened; the NLEB is discussed in additional detail in Sections 9.2.1.4 and 9.2.2.4.

These species could potentially occur in the Project during all seasons except winter when they are hibernating or have migrated to warmer areas. As described in additional detail in Section 9.2.1.4, a desktop habitat assessment was conducted for the Project that used a machine learning classification algorithm to delineate forest patches within and near the Project. The assessment resulted in the identification of slightly more forested habitat (195 ac) for tree-roosting bats than was identified using the USGS NLCD (Appendix H). Because the machine-learning algorithm used more recent aerial imagery than the USGS NLCD to determine where forested stands are present within the Project, it was used in this analysis. Forested habitat is scattered throughout the Project boundary in small woodlots and tree rows. It is not anticipated that bats utilize the Project area during winter due to the lack of known hibernaculum or cave habitats.

Table 9-6 Bat Species with Potential to Occur in or near the Project

Common Name	Scientific Name	Habitat
Big brown bat	*Eptesicus fuscus*	Found in a wide variety of habitats in North America ranging from mountain meadows to lowland deserts; most abundant in deciduous forests. Can also be found in suburban environments and agricultural areas. Roosts colonially in buildings, bridges, barns, and beneath loose bark and cavities of various tree species. Will hibernate in caves, mines, attics, or other buildings.
Eastern red bat	*Lasiurus borealis*	Found in any forested habitat east of the Rocky Mountains. Roosts singly in the foliage of both deciduous and coniferous trees. Travel long north-south distances during spring and fall migration.
Hoary bat	*Lasiurus cinereus*	Prefer forest edge habitat but have also been found in dense forests and shade trees along urban streets. Roosts in the foliage of trees during the day before foraging after dark. Travel long north-south distances during spring and fall migration, possibly to tropical areas for the winter.
Little brown bat	*Myotis lucifugus*	Found in forested habitats across North America, from riparian corridors to xeric scrub habitat and aspen meadows. Found roosting and hibernating in colonies of hundreds, even thousands of individuals in various man-made structures in addition to tree cavities and crevices.
Northern long-eared bat [1]	*Myotis septentrionalis*	Found in dense forest stands and prefers maternity roosts beneath exfoliating bark and in tree cavities. Hibernates in caves and mines, and is often found singly or in small groups.
Silver-haired bat	*Lasionycteris noctivagans*	Associated with coniferous or mixed coniferous and deciduous forest types. Maternity roosts are formed in tree cavities or small hollows in old growth forest areas. Typically hibernate in tree hollows, wood piles, cliff faces, and occasionally in cave entrances.

[1] Federally listed as a threatened species

Sources: (Bat Conservation International, 2019); (International Union for Conservation of Nature, 2019).

9.2.1.3.2 Field Surveys (WEG Tier 3)

Acoustic surveys were conducted at the Project in July 2018 (Appendix I) and May 2019 (survey report will be provided in a subsequent filing). Bat calls were quantitatively identified using the USFWS-approved automated identification software program Kaleidoscope Pro (version 4.2.0, Wildlife Acoustics, Inc.), which detected five of the six species of bats with potential to occur in the Project area; only the NLEB was not detected during acoustic surveys. Although the intent of the acoustic surveys was not to estimate overall bat activity at the site (rather to confirm presence or probable absence of the NLEB; refer to Section 9.2.1.4), the results of these surveys confirm that the big brown, eastern, hoary, little brown, and silver-haired bat occur within the Project area during the summer.

9.2.1.4 Special Status Species

9.2.1.4.1 Federally Listed Species

Tatanka Ridge Wind generated an IPaC resource list (Appendix E) to identify species listed as federally endangered or threatened under the ESA that are known or expected to occur near the Project. These Project-specific reviews are each included in Appendix E. Based on this agency coordination, four federally listed terrestrial wildlife species occur in Deuel County, and have the potential to utilize habitat within the Project area. The SDNHD does not contain records of federally listed terrestrial wildlife species within 2 miles of the Project. These species are described in Table 9-7 and discussed in additional detail in the sections below.

Table 9-7 Federally Threatened and Endangered Species with Potential to Occur within or near the Project

Species	Status	Habitat	Potential for Occurrence
Mammals			
Northern long-eared bat *Myotis septentrionalis*	T	Typically occurs within forest interiors, requiring adequate canopy closure for both roosting and foraging habitat (Lausen, 2009). In summer, roosts singly or in colonies underneath tree bark or in tree cavities (USFWS, 2014a). Caves, mines, and sometimes buildings are used as hibernacula.	**Summer – Likely absent.** Acoustic surveys in 2018 (Appendix I) and 2019 (to be provided in a subsequent filing) determined that the species is likely absent from the Project during the summer. **Migration – Minimal.** Potential for this species to occur within the Project during migration is minimal due to the limited amount of forested habitat present. **Winter – Minimal.** Hibernacula are not known to occur within Deuel County.
Birds			
Red knot *Calidris canutus rufa*	T	Migratory stopover habitat includes shorelines with an abundance of easily digested foods (invertebrates with thin or no shell) (USFWS, 2013d).	**Migration – Minimal.** The lack of confirmed sightings in the area and absence of large waterbodies that provide sufficient foraging opportunities make the likelihood of the red knot occurring within the Project area minimal.
Insects			
Dakota skipper *Hesperia dacotae*	T	Occurs within two types of native prairie habitat, including moist bluestem prairie and dry upland prairies along ridges and hillsides (USFWS, 2018b).	**Eastern portion of the Project – Not occupied.** Adult occupancy surveys conducted in 2018 (Appendix D) determined that suitable habitat within the Project would be considered not occupied. **Western Portion of the Project – Not occupied.** Grassland surveys conducted in May 2019 did not identify suitable habitat within the western portion of the Project (report to be provided in a subsequent filing).
Poweshiek skipperling *Oarisma poweshiek*	E	Occurs within high quality tallgrass prairie in both upland, dry areas as well as low, moist areas (USFWS, 2014c). Species was last documented within South Dakota in 2008 (79 Federal Register 63672–63748).	**Eastern portion of the Project – Not occupied.** Adult occupancy surveys conducted in 2018 (Appendix D) determined that suitable habitat within the Project would be considered not occupied. **Western Portion of the Project – Not occupied.** Grassland surveys conducted in May 2019 did not identify suitable habitat within the western portion of the Project (report to be provided in a subsequent filing).

Source: IPaC resource list and SDNHD review are included in Appendix E
E = Federally listed as endangered, T = Federally listed as threatened

Northern Long-Eared Bat

The NLEB is federally listed as threatened; however, incidental take of the species due to operation of wind projects is exempt under a 4(d) rule (Federal Register, 2016). Recognizing that the primary threat to NLEBs comes from white-nose syndrome, the 4(d) rule only prohibits the incidental taking of NLEBs in

areas impacted by white-nose syndrome if it occurs within a hibernaculum or results from tree removal activities and:

- The activity occurs within 0.25 mi of a known hibernaculum; or
- The activity cuts or destroys a known, occupied maternity roost tree or other trees within a 150-ft radius from the maternity roost tree during the pup season from June 1 through July 31.

White-nose syndrome has not been documented within Deuel County (U.S. Fish and Wildlife Service, 2018d). However, the USFWS considers the area impacted by white-nose syndrome to include counties within 150 miles of counties where white-nose syndrome has been documented; because white-nose syndrome has been confirmed in two counties in western South Dakota, one county is northwestern Minnesota, and one county in northeastern Nebraska, the entire state of South Dakota is considered to be within the white-nose syndrome area (U.S. Fish and Wildlife Service, 2018d).

The NLEB is a forest-dependent species, generally relying on forest features for both foraging and roosting during the summer months (U.S. Fish and Wildlife Service, 2013c). In particular, the NLEB appears to be a forest interior species that requires adequate canopy closure for both roosting and foraging habitat (Lausen, C., 2009). The wing morphology of the NLEB makes it ideally suited for the high maneuverability required for gleaning-type foraging within a cluttered forest interior (Henderson, L.E. and H.G. Broders, 2008).

NLEBs roost singly, or in colonies, underneath bark, in cavities, or in crevices of both live and dead trees (U.S. Fish and Wildlife Service, 2014a). Cooler roost locations such as caves and mines may be used by non-reproductive females and males. In general, NLEB are opportunistic in selecting roosts and using tree species that retain bark, provide cavities, or crevices. Rarely, NLEB have been found roosting in structures such as barns and sheds; however, structures that may be used for roosting are likely located close to wooded habitat that would be used for foraging. Additionally, riparian areas are considered critical resource areas for many species of bats because they support higher concentrations of prey, provide drinking areas, and act as unobstructed commuting corridors (Grindal, S.D., J.L. Morissette, and R.M. Brigham, 1999).

While NLEB are typically associated with forest habitats, they also have been documented in agricultural settings where forest habitats are highly fragmented. Studies in landscapes dominated by agricultural activities have also found that NLEB may use woodlots and riparian zones with very few ac of actual forest cover as traveling and commuting habitat (Henderson, L.E. and H.G. Broders, 2008); (Foster, R.W. and A. Kurta, 1999). During recent coordination, USFWS staff suggested that they will be using 10 ac as the minimum forested patch size for suitable summer habitat moving forward (Western Ecosystems Technology, Inc., 2018).

The NLEB hibernates in caves, abandoned mines, and sometimes buildings during the winter. Because no NLEB hibernacula are known to occur in Deuel County, and potentially suitable forest habitat is limited within the Project, there is minimal likelihood that this species would occur within the Project during migration or the winter.

Desktop Assessment (WEG Tier 1 and 2)

In order to estimate the amount of potential summer habitat for the NLEB within the Project, desktop habitat assessments were conducted for the Project in 2018 and 2019 (Appendix H). Because recent coordination with the USFWS resulted in a different minimum forested patch size being used for the NLEB habitat assessment (Western Ecosystems Technology, Inc., 2018), only the results of the 2019 habitat assessment are discussed in this section.

The potential suitability of forested habitat within the Project was based on the USFWS's *Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects* (2011), the *2019 Range-Wide Indiana Bat Summer Survey Guidelines* (U.S. Fish and Wildlife Service, 2019e),[1] and the recent USFWS recommendation to use 10 ac as the minimum forested patch size for suitable summer habitat (WEST, 2018a). The habitat assessments used a machine learning classification algorithm to delineate forest patches within and near the Project. The classifier was built using imagery from the Landsat 8 and Sentinel-2 satellites (U.S. Geological Survey, 2016b); (European Space Agency, 2017) as well as aerial imagery from the National Agriculture Imagery Program (U.S. Geological Survey, 2019c) and used in a Random Forests model (Breiman, L., 2001). The results from the model were filtered and visually assessed for accuracy, whereby false positives (areas mistakenly identified as forest) were removed, and forest boundaries were adjusted, as necessary.

The 2019 desktop habitat assessment identified approximately 195 ac of potentially suitable NLEB habitat within the Project boundary (Appendix H). As described in Section 9.1.1, forested habitat within the Project is largely limited to small woodlots and windbreak tree rows, with the majority of forested consisting of small, scattered patches; a total of 12 forested patches within or overlapping with the Project were identified that are large enough to provide suitable summer habitat for the NLEB.

Field Survey (WEG Tier 3)

The *2019 Range-Wide Indiana Bat Summer Survey Guidelines* (U.S. Fish and Wildlife Service, 2019e) describe the minimum survey effort for acoustic surveys associated with non-linear projects to be a minimum of eight detector nights per 123 ac of suitable summer habitat. As stated above, the 2019 desktop habitat assessment identified 195 ac of suitable NLEB summer habitat within the Project boundary; therefore, presence/probable absence surveys were conducted at two sites. One of the sites was located in the southeastern portion of the Project, and was surveyed in July 2018 (Appendix I); the

[1] The *2019 Range-Wide Indiana Bat Summer Survey Guidelines* can also be used for the NLEB (U.S. Fish and Wildlife Service, 2019e).

second site was located in the northcentral portion of the Project and was surveyed from May 30 to June 6, 2019 (survey report to be provided in a subsequent filing).

Acoustic detectors were placed within or near suitable habitat for the NLEB (i.e., small clearings and forest-canopy openings, parallel to woodland edges, and road and/or stream corridors). In accordance with USFWS protocols, detectors were placed in areas with open tree canopies or canopy heights greater than 33 ft, were spaced at least 656 ft apart, and microphones were positioned at least 9.8 ft off the ground. Acoustic data was collected at each survey site for a total of eight detector nights, in accordance with the USFWS guidance (U.S. Fish and Wildlife Service, 2019e).

Bat calls were identified using the Bats of North America classifier in program Kaleidoscope (Wildlife Acoustics, Concord, Massachusetts). Kaleidoscope identified no probable NLEB calls at either of the survey sites. Therefore, surveys have determined the probable absence of the NLEB from the Project area during the summer.

Red Knot

The red knot is federally listed as a threatened species that has one of the longest migration distances known, travelling between its breeding grounds in the central Canadian arctic to wintering areas that are primarily in South America (U.S. Fish and Wildlife Service, 2019f). Due to the very long migration, red knots require stopover habitats rich in easily digested foods (e.g., juvenile clams and mussels, horseshoe crab eggs; (U.S. Fish and Wildlife Service, 2013d)). Red knots typically rely on key stopover areas in coastal areas, but may use stopover areas along the Northern Plains of the Midwest during migration (Baker, A.J., P. Gonzalez, R.I.G. Morrison, and B.A. Harrington, 2013). Although the IPaC report generated for the Project area indicates that there is potential for this species to occur within Deuel County, the red knot has not been reported in the county and has rarely been observed in the surrounding region (eBird, 2019). Because suitable stopover habitat is not present within the Project area and the species is a rare migrant in the spring and fall along the Missouri River corridor, the potential for the red knot to occur within the Project area is minimal.

Dakota Skipper and Poweshiek Skipperling

The Dakota skipper (federally threatened) and Poweshiek skipperling (federally endangered) are small butterflies in the skipper family (Hesperiidae) that occur within specialized native prairie habitat. Critical habitat was designated for the Dakota skipper and Poweshiek skipperling in 2015 (Federal Register, 2015). Although critical habitat has been designated for both species in Deuel County, the closest designated critical habitat to the Project (South Dakota Unit 2) is approximately 3.0 miles south-southeast of the Project in Brookings County.

The Dakota skipper is endemic to North American tallgrass and mixed-grass prairie and does not inhabit non-native grasslands, weedy roadsides, tame hayland, or other habitats that are not remnant native prairie. In addition, Dakota skippers have not been recorded in reconstructed prairie—e.g., former cropland that has been replanted to native prairie (U.S. Fish and Wildlife Service, 2019b).

The Poweshiek skipperling also occurs within high quality tallgrass prairie in upland, dry areas as well as prairie fens, grassy lake and stream margins, moist meadows, sedge meadow, and wet-to-dry prairie. Although South Dakota historically contained approximately 24% of all known records of the Poweshiek skipperling, the species may be extirpated from the state (U.S. Fish and Wildlife Service, 2014b). The species was last observed in South Dakota in 2008 (79 Federal Register 63672–63748).

Desktop Assessment (WEG Tier 1 and 2)

The desktop assessment for the Project was conducted in two phases due to a change in the Project boundary in early 2019. The assessment, which is described in additional detail in Section 9.1.1.1 and included in Appendix D, is summarized below.

The desktop assessment was completed by grassland biologists experienced in aerial imagery interpretation, remote sensing techniques, and Northern Great Plains ecology. The biologists used aerial imagery and geospatial datasets to conduct a qualitative desktop assessment of the Project area and identify potentially undisturbed grassland areas that could be impacted by the Project. A total of 1,920ac of undisturbed grasslands (depicted on Figure 13), were identified within the Project boundary that could support federally listed skippers. The majority of these areas were associated with streams and adjacent hillsides in the Project. In addition, several larger areas of potentially undisturbed lands are present within an area that extends from the upper northcentral portion of the Project to the southeastern portion of the Project.

Field Survey (WEG Tier 3)

Habitat surveys were conducted within the eastern portion of the Project in June 2018 (Appendix D) and within the western portion of the Project between May 28 and June 2, 2019, (report will be provided in a subsequent filing). The surveys documented a total of approximately 41.5 ac of Dakota Skipper/Poweshiek Skipperling Habitat, based on habitat characteristics outlined in the published literature (Rigney, C.L., 2013); (Royer, R. and G.M. Marrone, 1992a); (Royer, R. and G.M. Marrone, 1992b); (Selby, G., 2013); (Skadsen, D.R., 2003); (U.S. Fish and Wildlife Service, 2014c), (U.S. Fish and Wildlife Service, 2016), (U.S. Fish and Wildlife Service, 2018c). Of this, approximately 39.0 ac are within the southeastern portion of the current Project boundary; the remaining 1.5 ac were within the previous Project boundary and are no longer within the current Project boundary[2]. The sites were primarily dominated by smooth brome (*Bromus inermis*), and contained populations of the noxious weed musk thistle (refer to Section 9.1.1.4);

[2] As described in Table 9-3, grassland surveys were conducted within the Project in both June 2018 and May 2019. Surveys conducted in 2018 identified 41.5 ac of Dakota Skipper/Poweshiek Skipperling Habitat within the Project, of which 39.0 ac are within the current Project boundary. Surveys conducted in 2019 did not identify Dakota Skipper/Poweshiek Skipperling Habitat within the Project boundary.

however, they were verified as suitable habitat due to the presence of some native grassland species, including:

- Big bluestem (Andropogon gerardii);
- Black-eyed Susan (Rudbeckia hirta);
- Canada goldenrod (Solidago canadensis);
- Candle anemone (Anemone cylindrica);
- Native thistle (Cirsium spp.),;
- Pale-spike lobelia (Lobelia spicata);
- Prairie coneflower (Ratibid columnifera);
- Prairie lily (Lilium philadelphicum);
- Purple coneflower (Echinacea angustifolia);
- Purple prairie clover (Dalea purpurea);
- Sideoats grama (Bouteloua curtipendula); and
- Smooth deathcamas (Zigadenus elegans).

Although a few areas classified as Dakota Skipper/Poweshiek Skipperling Habitat during surveys were fairly representative skipper habitat (as described in (U.S. Fish and Wildlife Service, 2016); (U.S. Fish and Wildlife Service, 2018c), the majority of the suitable habitat verified in the Project area was marginal with a lowered potential for maintaining a viable population of the Dakota skipper or Poweshiek skipperling. These areas had few, scattered nectar species, were small in size, had poor juxtaposition in relation other suitable habitat polygons, or had a lack of requisite species diversity (Appendix D).

Adult occupancy surveys were conducted between June 29 and July 12, 2018 within areas of suitable habitat in the eastern portion of the Project (Appendix D). In accordance with the *2018 Dakota Skipper Survey Protocols* (U.S. Fish and Wildlife Service, 2018c), three rounds of adult protocol surveys were conducted during the adult flight period of these two species. No Dakota skippers or Poweshiek skipperlings were observed during any of the three rounds of adult protocol surveys. Therefore, based on the USFWS (2018) guidelines, the 41.5 ac of suitable habitat where adult protocol surveys were conducted are considered not occupied by either the Dakota skipper or Poweshiek skipperling. Because the 2018 surveys included all suitable habitat out to a distance of 820 ft (250 m) from the Dakota Skipper/Poweshiek Skipperling Habitat identified during grassland surveys, the surveys are considered valid for two additional years (until 2020; (U.S. Fish and Wildlife Service, 2018c)).

9.2.1.4.2 State-Listed Species

The state of South Dakota maintains a list of endangered and threatened species, for which take is a violation of state law (South Dakota Codified Law 34A-8-9). Although the state of South Dakota has a process by which take of endangered and threatened species can be authorized (South Dakota Codified Law 34A-8-8), it is designed to authorize take associated with scientific, zoological, or educational purposes and does not include take associated with otherwise lawful activity (typically referred to as incidental take).

One state-listed terrestrial wildlife species, the northern river otter (*Lontra canadensis*; threatened) has been documented within Deuel County; however, the SDNHD does not have documentation of the river otter occurring within 2 miles of the Project (Appendix E). The northern river otter occurs within large, slow-moving waterbodies where large fish are present (Kiesow, A.M. and C.D. Dieter, 2005), which are not present within the Project. Therefore, the potential for the Project to impact the northern river otter is considered minimal.

9.2.1.4.3 Bald and Golden Eagles

Bald and golden eagles (*Aquila chrysaetos*) are afforded legal protection under authority of the BGEPA (16 United States Code [USC] §§ 668–668d) and the MBTA (16 USC §§ 703-712). The BGEPA prohibits the take, sale, purchase, barter, offer of sale, purchase or barter, transport, export, or import, at any time or in any manner of any bald or golden eagle, alive or dead or any part, nest, or egg thereof (16 USC § 668).

Bald Eagle

Preferred nesting, foraging, and roosting bald eagle habitats include large, mature trees near water with abundant fish and waterfowl prey, particularly in areas with limited disturbance. Although the species will eat mammals, birds, and reptiles, its preferred food is fish. Wintering bald eagles are often associated with lakes, rivers, and reservoirs. Bald eagles may also be found during migration and winter periods in areas away from large waterbodies if sufficient foraging opportunities are available.

Bald eagles have been observed in low numbers within and near the Project. A Site Characterization Study was conducted for the Project in 2018 in accordance with Tiers 1 and 2 of the WEG and Stage 1 of the ECPG (Appendix J), which reviewed publicly available information on bald eagle use of the Project area. Two bald eagle were observed adjacent to and north of the Project in 2017 (eBird, 2018). Several bald eagles have been observed within five miles of the Project, including near Oak Lake during the period of 2014–2017. These eagles were typically observed during the winter months and migration periods (eBird, 2018).

During the 2018–2019 avian use surveys, which were conducted in accordance with Tier 3 of the WEG and Stage 2 of the ECPG, two bald eagles were observed within the Project (Appendix F). One bald eagle was observed in May 2018 in the northcentral portion of the Project area, and the second observation occurred in December 2018 in the southcentral portion of the Project.

As described above (refer to Table 9-4 and Section 9.2.1.2), aerial surveys for eagle and raptor nests were conducted in 2018 and 2019 (Appendix G). During both years, the survey area for bald eagle nests

consisted of a 10-mile buffer of the Project boundary, although bald eagle nests documented in 2018 were checked during 2019 nest surveys even if they were farther than 10 miles from the current Project boundary. The 2018 nest survey documented seven bald eagle nests within 10 miles of the Project, including four occupied and active bald eagle nests, two occupied inactive nests, and one inactive historic nest. The closest nest to the Project was 3.5 miles southeast of the 2018 Project boundary (5.4 miles southeast of the current Project boundary). The 2019 nest survey documented a total of eight bald eagle nests, including seven bald eagle nests within 10 miles of the Project and one bald eagle nest 11.4 miles east of the Project. Of these, seven bald eagle nests were considered occupied and active and one occupied inactive nest. The closest nest to the current Project boundary is the same nest that was closest in 2018, now 5.4 miles southeast of the Project. In addition, one of the occupied inactive bald eagle nests documented in 2018 was documented as being occupied by a great horned owl and active in 2019 (refer to Section 9.2.1.2).

Based on the desktop review, the first year of avian use surveys, and the raptor nest surveys conducted in 2018 and 2019, although bald eagles may use the Project for foraging activities, it is likely that most bald eagle nesting and foraging activities concentrate at the nearby lakes and rivers to the south and east of the Project.

Golden Eagle

Golden eagles commonly breed in the western US (Kochert, M.N., K. Steenhof, C.L. McIntyre, and E.H. Craig, 2002); however, the Project is outside of their breeding range. Although scarce, golden eagles are occasionally observed in eastern South Dakota during the winter and individual birds may migrate through the region (Birds of North America, 2018; eBird, 2018).

The review of publicly available information for the Project conducted for the Site Characterization Study identified one reported sighting of a golden eagle in or near the Project, which occurred in March 2017 adjacent to and north of the Project (Appendix J). Two golden eagles were observed within the Project during the first year of avian use surveys (Appendix F). One golden eagle was observed in October 2018 in the northcentral portion of the Project area, and the second observation occurred in March 2019 in the southcentral portion of the Project. Based on the desktop review and results of the first year of avian use surveys, golden eagle use within the Project is likely limited to rare occurrences during migration or the winter.

9.2.2 Wildlife Impacts/Mitigation

As described above (refer to Section 9.1.2), construction of the Project will result in impacts to approximately 470.4 ac of land (refer to Table 9-1). The majority (409.0 ac; 87.0%) of these impacts will occur in previously disturbed areas, including actively cultivated croplands and developed land. The remaining 61.3 ac (13.0%) of habitat within the Project Construction Footprint includes Non-native Undisturbed Grasslands (59.7 ac; 12.7%), as well as small areas of emergent wetland and deciduous forest (1.6 ac and less than 1 ac, respectively). The primary impact to terrestrial wildlife that utilize habitat within the Project construction footprint is expected to be short-term displacement to nearby similar habitat due to habitat modification, increased noise levels, and human activity. Construction of the Project may also

result in the direct mortality of some individuals of less mobile wildlife species (e.g., reptiles and amphibians). Mortality associated with construction is expected to be limited, and will not result in population-level effects.

Tatanka Ridge designed the Project layout to minimize impacts to high quality habitat, including forest, grasslands, native plant communities, and wetlands. Further, Tatanka Ridge modified the Project layout so that turbines and other aboveground facilities are located within croplands and other disturbed communities to the maximum extent feasible, which will minimize impacts to high-quality vegetation communities (refer to Section 9.1.3), the terrestrial wildlife that resides within these habitats, and overall habitat fragmentation. Tatanka ridge will instruct construction crews to avoid disturbing or harassing wildlife when observed. Crews will also remove trash from the Project area to avoid inadvertently attracting scavenger species, which could in turn increase potential impacts to prey species (e.g., nesting birds).

Impacts to wildlife from Project operations are expected to be primarily associated with the permanent conversion of small areas of habitat for operation of turbines and the permanent MET tower (35-ft radius around each), the O&M facility and substation (5 ac each),and access roads (16-ft width). As with construction impacts, the primary impact to wildlife will likely be displacement to nearby areas of suitable habitat. Because Tatanka Ridge placed permanent facilities within cultivated croplands and other previously disturbed habitats, many wildlife species occurring in these areas are likely adapted to human disturbance and are expected to habituate to long-term, intermittent activity in the Project area.

Potential impacts and mitigation measures that are specific to migratory birds, raptors, bats, and special status species are described below.

9.2.2.1 Migratory Birds

Construction and operation of the Project may result in direct mortality of migratory birds from collisions with turbines, overhead transmission lines, and MET towers. Additionally, indirect impacts from displacement due to habitat modification, increased noise and activity, and avoidance are likely.

Fatality rates of birds at wind energy facilities depend on a number of factors (e.g., the amount of bird use, vegetation communities present, proximity to bird concentration areas). Post-construction fatality monitoring reports from the Midwest region of North America show a wide variation in levels of bird fatality rates, ranging from 0.27 to 8.25 birds/MW/year (Appendix F). This same wide variation was noted for studies specific to South Dakota wind farms, as bird fatality rates at the Wessington Springs facility ranged between 8.25 and 0.89 birds/MW/year in 2009 (Derby, C., A. Dahl, A. Merrill, and K. Bay, 2010) and (Derby, C., A. Dahl, K. Bay, and L. McManus, 2011), respectively. Other studies in South Dakota, as shown in the 2018–2019 Avian Use Survey Report (Appendix F) report fatality rates between 1.41 and 5.06 birds/MW/year.

The majority of bird species observed during the 2018–2019 avian surveys were not special status species or BCC species (Appendix F). Rather, waterfowl was the most abundant group recorded, followed by passerines. Avian use was higher during migration periods than other seasons, likely due to the Project's

location in the Central Flyway. Waterfowl accounted 97% of large bird observations in spring, approximately 90% of which was associated with large groups of snow goose (*Anser caerulescens*). Overall risk to waterfowl would be highest during the spring, when use is highest and large groups of birds are flying through the Project to areas of higher quality breeding habitat present less than 5 mi east and 10 mi west of the Project.

A study was conducted between 2008 and 2010 by Loesch et al. (2013) at two wind facilities (and two reference sites) in North and South Dakota that monitored changes in the breeding pair density of five species of waterfowl over three years. The study presented the differences in estimated breeding waterfowl pair densities in a wind site and a reference site for each of the site pairs (2), years (3), and species (5; a total of 30 differences in density estimates were presented). The results indicated that duck breeding densities were either indistinguishable (14 of 30 density estimates) between wind farm and reference sites, or lower (16 of 30 density estimates) on wind farms (Loesch et al., 2013). The overall pattern observed was consistent with behavioral avoidance, where breeding pairs continued to use wetland habitats but at reduced densities. The authors noted that Identifying the ultimate cause of the reduced breeding density is difficult to discern and that the limited temporal and geographic scope of the study, and confounding effects between land use and duration of development prevented the formulation of strong conclusions about the cumulative effects of wind energy development on breeding ducks (Loesch et al., 2013).

As described in Section 8.2.1.2 and Table 8-2, NWI data indicates that the Project boundary includes emergent wetlands that could be used by breeding waterfowl. However, the majority of the wetlands present within the Project boundary appear to be isolated wetlands that may be cultivated during dryer periods of the year, and freshwater ponds are typically small and are scattered throughout the central portion of the Project area. During Project design, impacts to wetlands have been avoided to the extent feasible; no turbines will be sited within wetlands. Although it is possible that operation of the Project could result in reduced use of the area by breeding waterfowl, this impact is expected to be minor based on observed waterfowl use of the Project during summer (Appendix F), the limited amount of breeding habitat present within the Project, and the presence of high quality nesting habitat for waterfowl to both the east and west of the Project.

Passerines were the most abundant small bird group observed at the Project during the first year of avian use surveys (Appendix F), accounting for nearly 99% of small bird use during all seasons. Three species (red-winged blackbird [*Agelaius phoeniceus*], Lapland longspur [*Calcarius lapponicus*], and horned lark [*Eremophila alpestris*]) accounted for approximately 50% of all small bird observations. Erickson et al. (2014) conducted a review of fatalities documented during 166 fatality studies at wind farms in North America, and found that passerines accounted for the majority (62.5%) of documented avian fatalities. The review documented a total of 3,110 fatalities representing 156 species of passerines. It was estimated that between 134,000 and 230,000 passerine fatalities occurred each year in the United States and Canada combined, a rate of 2.10 to 3.35 small birds/MW of installed capacity. Operation of the Project will likely have similar effects to passerines; however, given that the passerine species most frequently observed during avian use surveys are both common and numerous, population-level impacts on any one species are not anticipated.

A study was conducted between 2003 and 2012 (Shaffer, J.A. and D.A. Buhl, 2015) at three wind facilities in North and South Dakota that monitored changes in the density of nine grassland bird species during the five years following construction of the wind projects. The study detected statistically significant displacement for three species (savannah sparrow [*Passerculus sandwichensis*], upland sandpiper, and western meadowlark [*Sturnella neglecta*]), and attraction for two species (bobolink and killdeer [*Charadrius vociferus*]) during the first year of project operation. Over a five-year period, the study documented long-term displacement for seven of the nine species studied (bobolink, chestnut-collared longspur [*Calcarius ornatus*], clay-colored sparrow [*Spizella pallida*], grasshopper sparrow, savanna sparrow, upland sandpiper, and vesper sparrow [*Pooecetes gramineus*]). Displacement and attraction detected during the study generally occurred within 328 ft (100 m) of wind turbines, but extended up to and occasionally beyond a distance of 984 ft (300 m). However, the results of the study varied substantially, potentially due to differences in the type and quality of habitat within and near each wind farm, amount of inter- or intra-specific competition, level of anthropogenic disturbance and development, and seasonal weather differences.

Grassland habitat makes up approximately 21% of the Project boundary, and is primarily associated with streams and adjacent hillsides. However, as described in Section 9.1.1.1., over 99% of the grasslands within the Project boundary are composed of Disturbed Grasslands (3,979 ac) and Non-native Undisturbed Grasslands (1,920 ac). Native Undisturbed Grasslands are limited to 14 ac in the southeastern corner of the Project. The Project layout has been designed to minimize impacts to grasslands to the extent feasible. As a result, no turbines will be placed within grasslands and the closest Native Undisturbed Grassland is approximately 1,800 ft from a turbine (Turbine B1) and over 90% of the turbines are at least 300 ft from Non-native Undisturbed Grasslands. A total of 20 grassland-associated bird species were observed during 2018 – 2019 avian use surveys, of which 12 are considered prairie-obligate species. Lapland longspur and ring-necked pheasant (*Phasianus colchicus*) and were the grassland-associated species observed in the highest numbers (170 and 113, respectively); of the prairie-obligate species, the western meadowlark and dickcissel were observed in the highest numbers (53 and 46, respectively; Appendix F). Although it is possible that operation of the Project could result in reduced bird use within grassland areas immediately adjacent to turbines, Tatanka Ridge expects this impact to be minor based on:

- The existing low levels of grassland bird use within the Project;
- The small size, high fragmentation, and low to moderate quality of grasslands within the Project area; and
- Because the Project has been designed to avoid grassland impacts to the extent feasible.

Tatanka Ridge developed and will implement several measures during design, construction, and operation of the Project that will minimize impacts to migratory birds, including the following:

- To the extent feasible, project components have been sited outside of sensitive habitats, including wetlands, waterbodies, Dakota Skipper/Poweshiek Skipperling Habitat, Native Undisturbed Grasslands, forested areas, and publicly owned or managed lands;

- Construction and operations staff will be instructed to avoid disturbing or harassing wildlife;
- Tatanka Ridge will implement a Bird and Bat Conservation Strategy (BBCS) that will include standards for minimizing impacts to avian and bat species during operation of the Project and be consistent with the WEG (U.S. Fish and Wildlife Service, 2012);
- Transmission lines and facilities will be designed in accordance with Avian Power Line Interaction Committee (2006, 2012) guidance to minimize the risk of electrocution and collision to avian species; and
- Post-construction fatality monitoring will be conducted for 2 years to assess impacts.

9.2.2.2 Raptors

Impacts to raptors from the construction and operation of the Project will likely be similar to those described above for migratory birds (Section 9.2.2.1). However, although the reason is not fully understood (National Wind Coordinating Committee, 2004), raptors appear to be at higher risk of collisions with wind turbines. For this reason, with the exception of eagles (discussed in Section 9.2.2.6), these species are discussed in additional detail below.

Although raptors may be at a higher risk of collision than other avian groups, some studies have shown that raptors may habituate to the presence of wind turbines on the landscape and many studies have found no reduction in raptor nesting and use at wind farms (Howell, J.A. and J. Noone, 1992); Erickson et al., 2004). Raptors that nest within the Project are likely at a higher risk of collision than individuals who are passing through during migration. Results of the raptor nest surveys for the Project identified red-tailed hawk and great horned owl nests within the Project, indicating that these species may be more susceptible to collision. However, any Project-related fatalities are unlikely to have population-level effects on red-tailed hawks and great horned owls due to their large population sizes within the state of South Dakota (populations estimated at 61,000 and 89,000 individuals, respectively; (Partners in Flight, 2019).

Post-construction fatality monitoring reports from the region show a range in raptor mortality of 0–0.47 fatalities/MW/year; within South Dakota, raptor mortality rates range from 0 – 0.20 fatalities/MW/year (Appendix F). It is expected that impacts to raptors associated with the Project will be similar to those observed at other wind facilities in South Dakota.

While collision mortality is well documented at most wind energy facilities, population level effects have not been detected or reported in the studies/reviews that have evaluated the issue. As described above, Tatanka Ridge will conduct 2 years of post-construction monitoring for the Project. The results will be evaluated to see if impacts to raptors are as expected, or if implementation of the adaptive management measures described in the BBCS are warranted.

9.2.2.3 Bats

Impacts to bats during construction and operation of the Project could be direct (e.g., collision with turbine blades) or indirect (e.g., habitat loss or modification). An estimated 54,000 to 109,000 bats per year were killed in the United States and Canada over a 12-year period as a result of interaction with wind

turbines (Arnett and Baerwald, 2013). The underlying reasons for why bats come near turbines are still largely unknown (Cryan and Barclay, 2009). Migratory tree-roosting bat species (e.g., hoary bat, eastern red bat, and silver-haired bat) appear to be most susceptible to collision with wind turbines (Tierney, R., 2009). Among bats, these species have experienced the highest fatality rates at wind energy facilities in North America, with fatalities peaking during the spring (March – May) and fall (August – October) migrations (Cryan, P.M., 2003); (Johnson, G.D., 2005); (Kunz, T.H., E.B. Arnett, B.M. Cooper, W.P. Erickson, G.D. Johnson, R.P. Larkin, M.D. Strickland, R.W. Thresher, and M.D. Tuttle, 2007); (Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, B.L. Hamilton, T.H. Henry, A. Jain, G.D. Johnson, J. Kerns, R.R. Koford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley, Jr., 2008). Migratory tree-roosting species have composed approximately 75% of reported bats killed in the Midwest and nationally (Arnett et al., 2008; (Gruver, J., M. Sonnenberg, K. Bay, and W. Erickson, 2009); (Gruver, J., K. Bay, M. Kesterke, W. Erickson, K. Murray, and M. Ritzert, 2011).

Several of the measures developed by Tatanka Ridge to minimize impacts to migratory birds are also expected to reduce or avoid impacts to bats. The BBCS will include standards for minimizing impacts to bat species during the construction and operation of the project and will be consistent with the WEG (USFWS, 2012). In addition, Tatanka Ridge will conduct 2 years of post-construction monitoring for the Project. The results will be evaluated to see if impacts to bats are as expected, or if implementation of the adaptive management measures described in the BBCS are warranted.

As described above (refer to Section 9.1.2), Tatanka Ridge avoided impacts to forested areas to the extent feasible, resulting in less than one acre of forest being impacted by construction of the Project. Impacts to suitable forested habitat for roosting bats will be minimal. Tatanka Ridge also avoided impacts to open water habitat, and will implement the erosion and sediment control measures described in Section 8.2.3, thereby minimizing impacts to potential foraging habitat for bats. Because both roosting and foraging habitats are being largely avoided, indirect impacts to bats due to habitat loss or modification are expected to be minimal.

9.2.2.4 Federally Listed Species

9.2.2.4.1 Northern Long-Eared Bat

As described in Section 9.2.1.3, approximately 195 ac of suitable forested habitat for the NLEB is present within the Project, which is largely limited to small, scattered woodlots and windbreak tree rows. Acoustic presence/probable absence surveys were conducted for the NLEB at the Project in accordance with the *2018 Range-Wide Indiana Bat Summer Survey Guidelines* and *2019 Range-Wide Indiana Bat Summer Survey Guidelines* (USFWS, 2018; 2019). Because the NLEB was not detected during acoustic surveys, it was determined that the species is likely absent from the Project during the summer. Although possible, given the limited amount of suitable habitat within the Project, the likelihood of the NLEB utilizing forested habitat within the Project during migration is considered to be minimal and no impacts to the NLEB are anticipated.

It is not anticipated that the NLEB utilizes the Project area during winter due to the lack of known hibernaculum or cave habitats. Therefore, no impacts are anticipated during the winter.

Measures developed by Tatanka Ridge to minimize impacts to migratory birds are also expected to reduce or avoid impacts to the NLEB, if present. The BBCS will include standards for minimizing impacts to bat species during the construction and operation of the project and will be consistent with the WEG (USFWS, 2012). Further, post-construction fatality monitoring will be conducted for 2 years to assess project-related impacts to birds and bats. Although not expected, if a NLEB fatality is documented during monitoring, the USFWS and SDGFP will be notified.

9.2.2.4.2 Red Knot

Potential for the red knot to occur within the Project is limited to the migration season, when it has been known to utilize stop-over habitat along the Missouri River corridor. However, the red knot has not been reported in the county and has rarely been observed in the surrounding region (Appendix E). Further, suitable stopover habitat for the red knot is not present within the Project. Therefore, no impacts to this species are anticipated as a result of construction or operation of the Project.

9.2.2.4.3 Dakota Skipper and Poweshiek Skipperling

Neither the Dakota skipper nor Poweshiek skipperling were documented during adult occupancy surveys in 2018, which were conducted in areas of potentially suitable habitat (specialized native prairie) within the eastern portion of the Project (Appendix D). Grassland surveys conducted in May 2019 within the western portion of the Project did not identify Dakota Skipper/Poweshiek Skipperling Habitat. Therefore, based on the USFWS (2018) guidelines, the Project is considered not occupied by either the Dakota skipper or Poweshiek skipperling and no impacts to federally listed skippers are anticipated as a result of construction or operation of the Project.

Because the nearest designated critical habitat unit for these species is approximately 3 miles to the south, construction and operation of the Project are not expected to impact designated critical habitat for these species.

9.2.2.5 State-listed Species

One state-listed terrestrial wildlife species, the northern river otter has been documented within Deuel County; however, the SDNHD does not have documentation of the river otter occurring within 2 miles (Appendix E). Further, suitable habitat for this species (large, slow-moving waterbodies) is not present within the Project. Therefore, no impacts to this species are anticipated as a result of construction or operation of the Project.

9.2.2.6 Eagles

9.2.2.6.1 Bald Eagle

Two bald eagle observations occurred over the course of 178 observation hours during the 2018–2019 avian use surveys (Appendix F). Observations included one bald eagle at the Project in May 2018 for six minutes, and one bald eagle at the Project in December 2018 for three minutes. Based on the results of raptor nest surveys (Appendix G), the closest bald eagle nest to the Project is 5.4 miles southeast of the Project. Surveys documented six additional bald eagle nests within 10 miles of the Project. These surveys, combined with the absence of large waterbodies, suggest low overall use of the Project by bald eagles.

Eagle mortalities at wind energy facilities in the contiguous United States (excluding the Altamont Pass Wind Resource Area in California) have been summarized by Pagel et al. (2013) and (Kritz, K., M. Rheude, B. Millsap, M. Sadlowski, J. Pagel, M. Stuber, C. Borgman, T. Wittig, U. Kirkpatrick, J. Muir, and H. Beeler, 2018). In total, 55 bald eagles have been killed or injured at wind energy facilities, the majority of which occurred in the Upper Midwest (Pagel et al., 2013, Kritz et al., 2018). Given the low use of the Project by bald eagles and the relatively few bald eagle fatalities documented at wind energy facilities, impacts to eagles at the Project are estimated to be low; however, risk of collision cannot be entirely ruled out. Post-construction fatality monitoring will be conducted for 2 years to assess Project-related impacts to birds and bats. Although not expected, if an injured or deceased bald eagle is documented during monitoring, the USFWS will be notified.

9.2.2.6.2 Golden Eagle

A review of publicly available information indicated very low use of the Project by golden eagles, with only one recent observation in 2017 (Appendix J). Two golden eagle observations occurred over the course of 178 observation hours during the 2018–2019 avian use surveys (Appendix F), including one golden eagle at the Project in October 2018 for three minutes, and one golden eagle at the Project in March 2018 for 40 minutes. Given the low use of the Project by golden eagles during migration and winter, as well as the overall rarity of golden eagle sightings in the vicinity of the Project, the likelihood of impacts to golden eagles at the Project is considered low; however, risk of collision cannot be entirely ruled out. Post-construction fatality monitoring will be conducted for 2 years to assess Project-related impacts to birds and bats. Although not expected, if an injured or deceased golden eagle is documented during monitoring, the USFWS will be notified.

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

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

10.1 Existing Aquatic Ecosystems

10.1.1 Surface Water and Wetland Resources

Aquatic resources present in the Project area are described in detail in Section 8 and are illustrated in Figure 4. The Project occurs within two watersheds; the western portion of the Project is within the Middle Big Sioux watershed (8-digit HUC 10170202) and the eastern portion of the Project is within the Lac Qui Parle watershed (8-digit HUC 0702003; (U.S. Geological Survey, 2018)). With the exception of two ponds in the northeastern corner of the Project, waterbodies within the Project area are largely intermittent streams associated with Cobb Creek, Bullhead Run, North Deer Creek, and Peg Munky Run. Based on delineated and desktop review wetland data, wetlands occupy 5.6% of the Project boundary (1573.5 ac), are primarily located within the eastern portion of the Project area, and are composed almost exclusively of small, freshwater emergent wetlands (352 ac). Given the Project's location in eastern South Dakota, many of the wetlands within the Project are digressional wetlands known as prairie potholes. Based on a review of recent aerial imagery, many of these wetlands may be cultivated during dryer periods of the year.

10.1.2 Special Status Aquatic Species

As described in Section 9.2.1.4, Tatanka Ridge generated an IPaC resource list and requested a South Dakota Natural Heritage Database (SDNHD) review of the Project to identify federally and state-listed species that are known or expected to occur near the Project. These Project-specific reviews are each included in Appendix E. Based on this agency coordination, one federally listed aquatic species (Topeka shiner [*Notropis topeka*]) and two state-listed aquatic species (Banded killifish [*Fundulus diaphanous*] and Northern redbelly dace [*Chrosomus eos*]) have been documented in Deuel County. Of these, the northern redbelly dace was documented within an intermittent waterbody in the southeastern corner of the Project area in 2002, and both the Topeka shiner and northern redbelly dace have been documented in waterbodies near the western portion of the Project (within the Middle Big Sioux watershed). These species are described in Table 10-1 and discussed in additional detail in the sections below.

Table 10-1 Federally and State-listed Threatened and Endangered Species with Potential to Occur within or near the Project

Species	Status	Habitat	Potential for Occurrence
Fishes			
Topeka shiner *Notropis topeka*	FE	Occurs within slow-moving and naturally winding waterbodies, with sand, gravel, or rubble substrates that are often covered by a deep layer of silt (U.S. Fish and Wildlife Service, 2019c).	Moderate potential to occur in waterbodies within the western portion of the Project (within the Middle Big Sioux watershed). Species has been documented approximately 1,200 ft west and south of the Project within Peg Munky Run and North Deer Creek, respectively (Appendix E).
Banded killifish *Fundulus diaphanus*	SE	Occurs in slow-moving waterbodies with abundant rooted aquatic vegetation, clear water, and substrates free of silt (Ohio Department of Natural Resources, 2018).	Very low potential to occur within waterbodies within the Project.
Northern redbelly dace *Chrosomus eos*	ST	Occurs within rivers with slow to moderate flow, as well as ponds with dense aquatic vegetation within the Big Sioux River drainage (Pasbrig, C., 2014).	Moderate potential to occur within waterbodies within the southeastern portion of the Project.

Source: IPaC resource list and SDNHD response are included in Appendix E.
FE = Federally listed as endangered, SE = State-listed as endangered, ST = State-listed as threatened.

10.1.2.1 Topeka Shiner

The Topeka shiner, a federally endangered species, is a small minnow that lives in small to mid-size prairie streams in the central United States where it is usually found in pool and run areas (South Dakota Game, Fish and Parks (SDGFP), 2003). Within South Dakota, the Topeka shiner occupies tributaries of the James, Vermillion, and Big Sioux rivers. In the vicinity of the Project, the Topeka shiner has been documented near the Project in the Middle Big Sioux watershed, which flows into the Missouri River, but not within the Laq Qui Parle watershed, which flows into the Minnesota River (SDGFP 2003). Suitable streams tend to have good water quality and cool to moderate temperatures. Prairie rivers and streams where Topeka shiners are found are also generally slow-moving and naturally winding, with bottoms made of sand, gravel, or rubble often covered by a deep layer of silt (U.S. Fish and Wildlife Service, 2019c). The SDNHD review for the Project included records of the Topeka shiner within 2 miles of the Project in Peg Munky Run, North Deer Creek, and Hidewood Creek. The closest documented occurrences were approximately 1,200 ft west and south of the Project within Peg Munky Run and North Deer Creek, respectively (Appendix E). Although this species has not been documented within the Project area, it has been documented nearby within three streams. Therefore, there is a moderate potential for the Topeka shiner to occur within the Big Sioux watershed portion of the Project area.

Critical habitat was designated for the Topeka shiner in 2004 (69 Federal Register 44736). Critical habitat has not been designated within the Project area; the closest designated critical habitat is in Lincoln County, Minnesota, approximately 18 miles southeast of the Project.

10.1.2.2 Banded Killifish

The banded killifish, a state-endangered species, is a small fish that prefers quiet, shallow lakes and ponds with abundant aquatic vegetation and sandy-gravel substrates). In addition, banded killifish have been detected in streams with muddy bottoms without aquatic vegetation (South Dakota Game, Fish and Parks (SDGFP), 2006). Although the banded killifish has historically occurred within Deuel County, it has not been observed since 2000 (South Dakota Game, Fish and Parks (SDGFP), 2018); therefore, the potential for this species to occur within the Project area is very low.

10.1.2.3 Northern Redbelly Dace

The northern redbelly dace, a state-threatened species, is a small minnow that prefers spring-fed streams with slow to moderate current, and silt or sand substrates; however, this species also occurs within lakes and ponds (Lee, D.S., C.R. Gilbert, C.H. Hocutt, R.E. Jenkins, D.E. McAllister, and J.R. Stauffer, Jr., 1980); (South Dakota Game, Fish and Parks (SDGFP), 2006); (Nebraska Game and Parks Commission (NGPC), 2010). Northern redbelly dace have been reported in tributaries of the Missouri, Big Sioux, Minnesota, White, Niobrara, and Keya Paha river drainages (SDGFP 2018). The northern redbelly dace was documented within an unnamed intermittent stream in the southeastern corner of the Project in 2002; in addition, this species has been documented in portions of Peg Munky Run west of the Project as recently as 2012 (SDNHD 2019). Although the northern redbelly dace has been documented within the Project area, because records are over 15 years old, we consider the potential for this species to occur within the Project area to be moderate.

10.2 Aquatic Ecosystem Impacts/Mitigation

As described in Section 8.2.2, Tatanka Ridge avoided siting turbines in wetlands and waterbodies. To the maximum extent practicable, and in accordance with USACE NWP General Condition No. 23, the Project will avoid and minimize adverse impacts to waters of the United States; Project design has avoided the placement of access roads, collection lines, and other Project facilities in wetlands and waterbodies. Where construction will intersect wetlands and waterbodies, Tatanka Ridge will either use a trenchless technique, or minimize impacts to NWP thresholds to the extent practical (discussed in additional detail in Section 8.2.2).

The primary potential for impacts to aquatic ecosystems would be from a temporary increase in sedimentation or total suspended solids due to soil erosion during construction activities. Project construction will require coverage under the SDDENR General Permit Authorizing Stormwater Discharges (Permit Number: SDR100000), which will include development and implementation of a Project-specific SWPPP. The SWPPP, that will be developed prior to construction, will describe BMPs for erosion and sedimentation control. Such BMPs may include installation and maintenance of silt fences, straw wattles, water bars, vegetative buffers, and other measures to control stormwater run-on and runoff to mitigate erosion and sedimentation. Further, Tatanka Ridge designed the Project to avoid waterbodies where

federally or state-listed species have been documented near the Project (e.g., Peg Munky Run, North Deer Creek, Hidewood Creek, and an unnamed intermittent tributary; refer to additional discussion in Section 10.2.1). With the implementation of these measures, impacts to aquatic ecosystems associated with sedimentation or total suspended solids are expected to be minimal.

10.2.1 Special Status Aquatic Species

10.2.1.1 Topeka Shiner

The Topeka shiner occurs within the Middle Big Sioux watershed and has been documented near the Project in Peg Munky Run, North Deer Creek, and Hidewood Creek (Appendix E).

Due to the potential presence of the Topeka shiner, no in-stream activities will occur within the Middle Big Sioux watershed. Further, Tatanka Ridge will implement a 50-foot buffer along each side of waterbodies where federally or state-listed species have been documented near the Project. If intermittent streams are completely dry at the time of construction activities, crane paths may cross these features. If this occurs, Tatanka Ridge will implement the measures described in the USFWS 2014 Programmatic Biological Opinion for the Issuance of Selected Nationwide Permits Impacting the Topeka shiner in South Dakota, as follows:

- Erosion and sediment control measures will be installed, monitored, and maintained;
- Impacts to both the dry waterbody as well as riparian and grassland habitat must; be minimized to the extent feasible;
- The site must be restored to pre-disturbance condition;
- Manual revegetation of all disturbed areas must be initiated immediately following construction, or at the first opportunity if outside of the growing season. If outside of the growing season, erosion and sediment control measures must be monitored and maintained until the site is permanently stabilized;
- Revegetated areas must be monitored, and any failures addressed, until the site is permanently stabilized; and
- Livestock and machinery must both be excluded from the site following disturbance until the site is permanently stabilized.

With the implementation of the measures described above, impacts to the Topeka shiner due to the Project are not anticipated. Because the closest designated critical habitat for the Topeka shiner is approximately 18 miles southeast of the Project area in Lincoln County, Minnesota, no impacts to critical habitat are expected.

10.2.1.2 Banded Killifish

The banded killifish, has not been observed in Deuel County since 2000 (South Dakota Game, Fish and Parks (SDGFP), 2018). Based on the species overall rarity in eastern South Dakota, lack of recent

documentation within Deuel County, and implementation of the minimization measures described above, impacts to the banded killifish are not anticipated and mitigation is not necessary.

10.2.1.3 Northern Redbelly Dace

The northern redbelly dace has been documented in the Project area within an unnamed intermittent stream, and west of the Project in Peg Munky Run (Appendix E). However, because Tatanka Ridge will avoid in-stream activities within the Middle Big Sioux watershed (including Peg Munky Run) and will maintain 50-foot buffers along both sides of Peg Munky Run and the unnamed intermittent stream, impacts to the northern redbelly dace are not anticipated and mitigation is not necessary.

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

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.

11.1 Land Use and Ownership

11.1.1 Existing Land Use and Ownership

Based on the NLCD database, the primary land use within the Project area is agricultural, which includes cultivated crop lands (approximately 70.8%) and pasture and hay (2.8%) (refer to Table 11-1). Cattle grazing occurs primarily on pasture lands in the southeastern portion of the Project area. Other land uses include developed lands (4.1%), which include mainly roads and highways).

In addition to these human-induced land uses, the Project area also includes natural areas such as herbaceous lands, open water,, deciduous forests, and emergent herbaceous wetlands. Figure 13 for site-specific information. The Project boundary includes approximately 14.1 ac (0.05%) native grasslands and approximately1905.9 ac (6.8%) of non-native grasslands. Wooded areas within the Project boundary are limited to small woodlots and windbreaks, which are primarily associated with farmsteads.

Table 11-1 Land Cover Types within the Project Area

Land Cover Type (NLCD)*	Project area	
	Acres	Percent (%)
Cultivated Cropland	19,748	70.8
Herbaceous	5,899	21.1
Developed	1,133	4.1
Hay/Pasture	791	2.8
Emergent Herbaceous Wetlands	161	0.6
Deciduous Forest	131	0.5
Open Water	41	0.1

Source: (U.S. Geological Survey, 2011).

*For the purposes of this section and this table, Land Use and Land Cover categories and acreages are derived entirely from one publicly-available dataset (USGS National Land Cover Database) and not from field surveys or other sources used for other sections in this application (e.g. Section 9, Effect on Terrestrial Ecosystems). For this reason, any comparisons and inherent differences between sections and tables in this application should be understood accordingly.

The Project area does not contain any commercial or institutional use facilities or areas. The majority of the land is privately owned with small areas of public land (refer to Section 11.2.1 for the description of public lands). Two residence surveys, conducted on June 10 and 11, 2018, and on February 15, 2019, identified 129 residential structures within 1 mile of the Project area. The surveys excluded all residences within Toronto. The city limits of Toronto are entirely within the one-mile buffer of the Project boundary; therefore, and including this town would have greatly increased the number of residences in the survey. The number of structures in each category from the residence survey is shown in Table 11-2.

Table 11-2 Summary of Existing Residences within the Project Area and 1-Mile Buffer

Residence Status	Project Area	Project Area plus 1-Mile Buffer
Occupied	38	87
Presumed Occupied	11	25
Presumed Unoccupied	3	6
Unoccupied	6	11
Total	58	129

The majority of the Project area is within areas zoned as "Agricultural District" in the Deuel County Zoning Ordinance. Wind energy facilities may be allowed as a special exception in the Agricultural District

because such a use allows existing uses, such as row crop farming and grazing, to continue around the facility.

11.1.2 Land Use Impacts

The Project will inevitably involve some amount of land conversion, primarily from agricultural use to renewable energy production. However, the Deuel County BOA voted on June 11, 2019 to grant the Project a Wind Energy System Permit and a Special Exception; therefore is compatible with applicable siting requirements and land use regulations as summarized in Section 5.1.3. In construction areas that are not permanently converted to use as a wind energy facility, temporary impacts to land use and land cover will be fully returned to preconstruction conditions.

In consideration of the 163129 residential structures located within the Project area (Refer to Section 11.1.1), Tatanka Ridge refined the layout and location of proposed Project infrastructure based on input from individual landowners (refer to the setback analysis in Section 5.1.3 and Figure 6a-d) as well as on state and county siting guidelines. Tatanka Ridge obtained all private land rights through voluntary leases with property owners.

During the construction phase of the Project, Tatanka Ridge will restore all temporary workspaces back to the original use. Appropriate fencing may be necessary where construction activities are within or near pasture lands in order to prevent livestock from being injured or interfering with the construction area. Tatanka Ridge will work with landowners on installing the appropriate measures in order to keep livestock contained and away from construction activities.

Furthermore, Tatanka Ridge will implement the following BMPs during construction to avoid adverse impacts to the existing land uses:

- Remove all excess concrete from site;
- Strip and segregate topsoil from the agricultural fields in the temporary workspaces during construction activities and replace the soil during restoration;
- Install erosion and sediment control devices to prevent impacts to agricultural fields; and
- Decompact the subsoil during post-construction restoration, if necessary,

No impacts to land uses from operation activities are anticipated. There may be minor impacts to land uses from periodic maintenance activities, but they will be managed similarly to construction activities with appropriate BMPs.

11.1.3 Mitigation Measures for Land Use

Based on the measures noted in Section 11.1.2, impacts to land uses are not anticipated beyond permitted activities. Therefore, mitigation measures are not necessary.

11.2 Recreation, Public Facilities, and Conservation Easements

11.2.1 Existing Recreation, Public Facilities, and Conservation Easements

The Project area contains one public facility (Brookings/Deuel Water System facility), a SDDOT maintenance facility, and one cemetery (Toronto Cemetery).

There are a total of five federally owned or managed areas within the Project boundary, including one parcel that contains a USFWS grassland easement, and four parcels that contain wetland basins protected by USFWS wetland easements (Figure 3; Figure 6a-d). The Project area does not contain any USFWS Waterfowl Protection Areas. These areas are summarized in Table 11-3.

Table 11-3 Summary of Federal Lands in Project Area

Federal Land Type	Acres in Project Area
Waterfowl Protection Area (WPA)	0.0
USFWS Grassland Easements (1)	144.0
USFWS Wetland Easements (4)	648.5
Total	792.5

(U.S. Fish and Wildlife Service, 2019a); (U.S. Fish and Wildlife Service, 2019g)

The USFWS administers a wetland and grassland conservation easement management program for participating private lands in the Prairie Pothole Region of the US. These are managed by regional Wetland Management Districts. The easements are perpetual, and private landowners receive payment to participate in the program and follow the associated conservation measures. On parcels with grassland easements, there are restrictions on converting grassland to crops or otherwise removing the protected grassland habitat. Some agricultural practices such as cattle grazing or haying may be allowed. On parcels with wetland easements, there are restrictions on the ability to fill, burn, or drain protected wetland basins. Within a parcel that has protected wetland basins, restrictions apply only to the specific protected wetland basins. Therefore, a subset of the 648.5 ac covered by the parcels with wetland easements are the protected wetland basins, and the remainder of those parcels would not have restrictions and could be cultivated or otherwise developed by the private landowner.

In addition to the federal easement lands within the Project area, and typical of this portion of the state, several WPAs, South Dakota State Conservation Areas (SCA), WMAs, federal conservation easements, and a state recreation area are located outside of and within 5.0 miles of the Project (Figure 5; Table 3 in Appendix J). These managed lands are primarily associated with wetlands and waterbodies, which support waterfowl production and have the potential to provide suitable habitat for birds and other wildlife.

11.2.2 Impacts to Recreation, Public Facilities, and Conservation Easements

Tatanka Ridge carefully selected the proposed wind turbine, crane path, and access road locations to avoid or minimize direct impacts to protected wetlands and grassland easements. The proposed wind turbine locations are all within upland areas and not located within wetlands. No Project-related activities

will occur within the parcel that includes the grassland easement, and only one of the four USFWS wetland easements will be crossed by proposed Project infrastructure. As discussed in Section 11.2.1, Project activities within USFWS grassland or wetland easements are not allowed without prior approval from the USFWS. At one location, collector lines will be installed along the boundary of one USFWS wetland easement. The Project will avoid impacts to the wetlands within the easement by either spanning the wetlands with overhead collector lines, or by boring beneath the wetlands. Tatanka Ridge will notify the USFWS of its proposed avoidance method when the design has been finalized.

WPAs and SCAs located outside of the Project area are located away from all proposed Project construction and operation activities and will not be impacted by the Project.

Similarly, the Project layout avoids all impacts to the SDDOT maintenance facility and Toronto cemetery. If necessary during construction, Tatanka will coordinate with SDDOT to avoid conflicts with use of the maintenance facility.

11.2.3 Mitigation Measures for Recreation, Public Facilities, and Conservation Easements

The Project will not result in impacts to recreation, public facilities, or conservation easements, and therefore, mitigation is not required for these areas.

11.3 Visual Resources

11.3.1 Existing Visual Resources

As discussed above, the dominant land uses in and near the Project area include agricultural lands including row crops, grazing, and farmsteads; public roads; and some recreational uses in the form of federal conservation easements (refer to Sections 11.1.1 and 11.1.2 for further information). Users of these lands are most likely to be aware of the visual presence of the Project's facilities on the landscape.

There is currently one wind energy facility operating in the Project area, and one proposed:

- The Buffalo Ridge II wind energy facility is located approximately 1.5 miles south of the Project (refer to Figure 8) in Deuel and Brookings Counties. The Buffalo Ridge II facility began operating in December 2010 and consists of 105 turbines (210 MW total); and
- The proposed Deuel Harvest Wind Energy LLC wind energy facility, as proposed, would be located to the north and east of the Project (refer to Figure 8). The Deuel Harvest Wind Energy LLC project would consist of up to 110 turbines that will generate up to 300 MW. Construction could start in late 2019 and be complete in 2020.

11.3.2 Impacts to Visual Resources

The Tatanka Project would add up to 56 additional wind turbines to the region that would add distinct vertical lines to the landscape. Based on the wind turbine specifications summarized in Section 4.2.1, the total hub height of the turbines would be approximately 89-90 m. The total tip height would be

approximately 148 to 152.1 m. The presence of these structures will be visibly noticeable within and near the Project area, but will not be a new impact based on the presence of Buffalo Ridge II to the south. The other components of the Project (substation, facility buildings, overhead collector lines), will also introduce new visual components to the Project vicinity, although such structures are not uncommon in the landscape.

To minimize the visual impacts of the Project, Tatanka Ridge incorporated state and county setback requirements into the design of the Project (Figure 6a-d; Figure 7a-d). The turbines will be painted with non-glare white paint to minimize visual impacts and implement ADLS in accordance to the FAA regulations (refer to Section 4.2.1).

11.3.3 Mitigation Measures for Visual Resources

Based on the impact minimization measures noted in Section 11.3.2, and consistent with county, state, and FAA permits, unregulated impacts to visual resources are not anticipated. Therefore, mitigation measures are not necessary for the Project.

11.4 Electromagnetic Interference

11.4.1 Existing Communication Towers and Antennas

Comsearch conducted an analysis in May 2019 to identify all communications towers and FCC-licensed communication antennas that exist in the Project vicinity (Appendix K). Comsearch used the following sources to perform its search:

- FCC's Antenna Structure Registration (ASR) database;
- Universal Licensing System (ULS);
- National and regional tower owner databases; and
- Local planning and zoning boards.

Comsearch identified four tower structures registered with the FCC near the Project. With exception to one tower, each tower structure includes multiple communication antennas (Table 11-4).

Table 11-4 Communication Towers near the Project

Tower ASR Number	Tower Owner	Tower Structure Height (m)	Antenna Service Type	Antenna Call Sign	Antenna Licensee	Antenna Height AGL (m)	Tower Distance to Closest Turbine (km)
1213429	CCATT LLC	92.4	Cellular	KNKN384	AT&T Mobility Spectrum LLC	47.7	0.69
1041435	South Dakota, State of	91.4	None	None	None	None	1.40
1306309	Alpha 3E Corporation	129.2	Land Mobile	WNFB441	Brookings Deuel Rural Water System Inc.	30	1.4
			FM	KDBX	Alpha 3E Licensee, LLC	120.0	1.78
			Land Mobile	WPWA690	BIT/State Radio Communications Engineering	82.3	1.40
			Land Mobile	WPWF366	BIT/State Radio Communications Engineering	82.3	1.40
			Land Mobile	KBI853	BIT/State Radio Communications Engineering	91.0	1.41
1042181	Otter Tail Power Company	128.0	Land Mobile	WQCY464	Otter Tail Power Company	76.0	2.54
			Land Mobile	WNPZ939	Otter Tail Power Company	128.0	
			Microwave	WHI615	Otter Tail Power Company	103.6	

Comsearch also identified six additional antennas that may be located on a variety of structure types such as guyed towers, monopoles, silos, rooftops or portable structures (Table 11-5).

Table 11-5 Communication Antennas near the Project

Call Sign	Service Type	Licensee	Antenna Height (m)	Distance to Closest Turbine (km)
WPCR283	Land Mobile	Brookings Deuel Rural Water System Inc.	24.0	0.32
WPEC289	Land Mobile	Sioux Falls Two Way Radio Service Inc.	61.0	0.69
WPEU910	Land Mobile	Clear Lake Vet Clinic	61.0	0.69
WQEQ405	Land Mobile	Eide, Stacy	55.0	0.69
KDBX	FM	Alpha 3E Licensee, LLC	113.0	0.33
RXONLY	Microwave	Alpha 3E Licensee, LLC	30.5	0.33

11.4.2 Microwave Paths

Point-to-point microwave transmission is a critical component of the national communications infrastructure. Microwave paths enable broadband data transmission that supports telephone, cellular, and personal communication service (PCS) networks, wireless internet providers, audio and video transmission from television studios to transmitter sites, as well as many other industry and utility applications. In order to ensure signal reliability, these paths are located to avoid any line-of-sight obstructions. Proposed structures that create a line-of-sight obstruction can degrade signal reliability and could require revisions to the microwave system (Appendix L).

Capitol Airspace Group conducted a microwave path analysis on April 2, 2019, to identify licensed and applied coordinated non-federal microwave paths that could limit the placement of the Project wind turbines (Appendix L). The study used industry standard procedures and Federal Communications Commission (FCC) databases to identify existing microwave paths crossing the Project, land mobile and other radio frequency facilities within or adjacent to the identified area and broadcast signals receivable in the area. Six paths associated with four unique microwave links overlie the Project (Table 11-6).

Table 11-6 Summary of Microwave Path Analysis

License	Call Sign	Path	Status	Transmitter	Receiver	Frequency (MHz)[1]
Alpha 3E Licensee LLC	WPUI339	1	Licensed	TEC studio	KDBX site	945.50
Northern Border Pipeline Company	WQDT287	2	Licensed	CS11	Lake Shokatan	6226.89
	WQDT289	1	Licensed	Lake Shokatan	CS11	5974.85
NorthWestern Corporation	WPTA307	4	Licensed	BANCROFT	TORONTO M/W STATION	958.75
Otter Tail Power Company	WHI614	5	Licensed	STATION[2]	Toronto	6675.63
	WHI615	2	Licensed	TORONTO	GARY[2]	6835.63

[1] Microwave paths may be licensed to operate using more than one frequency. For the purposes of calculating Fresnel zone radii, the lowest frequency was used to create the largest Fresnel zone.

[2] This microwave link antenna location could not be associated with a single antenna structure due to the multiple antenna structures in close proximity. As a result, Capitol Airspace increased the Fresnel zone radius at this antenna location in order to encompass all of the potential antenna structure candidates.

Based on the study, none of the proposed wind turbines (including the rotor swept areas) will obstruct licensed or applied non-federal microwave link Fresnel zones.

11.4.3 AM/FM

Comsearch conducted an analysis in May 2019 of AM and FM radio broadcast stations within 30 kilometers (km, 18.6 miles) of the Project (Appendix M). Comsearch did not identify any AM broadcast stations within 30 km of the Project. Therefore, the Project will not affect AM broadcast coverage.

Comsearch identified seven database records for FM stations within 30 km of the Project (Appendix M). Only three of these stations are currently licensed and operating, two of which are translators that broadcast with limited range. The coverage of FM stations is generally not susceptible to interference caused by large objects, such as wind turbines, especially when they are in the far field region of the radiating FM antenna, which mitigates the risk of distorting the antenna's radiation pattern.

Based on the report, the closest station to the Project, KDBX, is approximately 332.5 m from the nearest turbine; however, based on recent field observations and discussions with the landowner, this tower has been removed. The Project will not affect FM broadcast coverage.

11.5 Sound

As discussed in Section 11.1, the Project is within Deuel County and located primarily on agricultural land (cropland, pasturelands/rangelands, and haylands). Farming activities and vehicular traffic are likely to be the largest anthropogenic contributors to sound levels within most of the Project area. A natural gas pipeline compressor station is located outside the northwestern corner of the Project boundary, northeast of the Brandt exit on Interstate 29. The proposed Astoria Generating Station will be located east of the Project's southeastern boundary. The State of South Dakota does not have regulatory sound limits for wind turbines. Deuel County's Zoning Ordinance Section 1215.03(13)(a) states that "Noise level shall not

exceed 45 dBA average A-Weighted Sound pressure at the perimeter of existing residences, for non-participating residences."

A study was completed to predict sound levels from the Project. Appendix N contains the detailed sound level analysis. The following is a summary of the analysis. The sound propagation factors used in the acoustical model have been adopted from International Organization for Standardization 9613-2 (ISO 9613-2), *Acoustics—Sound Attenuation During Propagation Outdoors Part 2: General Method of Calculation* (1996). The ISO 9613-2 parameters used in the acoustical analysis to evaluate compliance with the Deuel County regulatory limit are a receptor height of 4 meters (13 ft) and mixed ground (G = 0.5, where G may vary between 0 for hard and 1 for acoustically absorptive ground), with all turbines operating at their maximum rated sound power level plus 2 A-weighted decibels (dBA). Modeling was also conducted using alternative ISO 9613-2 modeling parameters, all of which yield predicted sound levels less than those required by Deuel County. Table 11-7 presents a summary of the predicted results, while complete results and sound contours are included in Appendix J.

Table 11-7 Summary of Predicted Sound Levels

Receiver Status	Receiver ID	Predicted Sound Level (dBA)	
Participating	H89	49	46
Participating	H76	49	46
Participating	H155	49	47
Participating	H81	49	46
Participating	H75	48	45
Participating	H72	48	45
Participating	H156	48	45
Participating	H74	48	45
Participating	H86	47	44
Participating	H158	47	45
Participating	H77	47	44
Participating	H145	46	43
Participating	H163	46	43
Participating	H147	46	43
Participating	H160	46	43
Participating	H43	46	44
Participating	H146	45	42
Participating	H58	45	42
Participating	H71	45	42
Participating	H117	45	42
Participating	H63	45	42
Participating	H80	45	42
Participating	H161	45	42
Participating	H159	45	42
Participating	H53	44	41
Nonparticipating	H83	44	41
Participating	H85	44	41
Nonparticipating	H137	44	41
Participating	H50	44	41

[a] Table sequence is determined by predicted sound level shown in Mixed Ground + 2-dBA Methodology column.

[b] ISO 9613-2 modeling parameters of mixed ground, G=0.5, + 2-dBA sound power adjustment and receiver height of 4 meters (13 ft).

[c] ISO 9613-2 modeling parameters of mixed ground, G=0.5, no sound power adjustment and receiver height of 1.5 meters as identified by National Association of Regulatory Utility Commissioners (NARUC) in *Assessing Sound Emissions from Proposed Wind Farms & Measuring the Performance of Completed Projects (*2011).

Note:
ID= identifier

As shown in Table 11-7, the highest predicted sound level at nonparticipating residence is 44 dBA when using the more conservative modeling parameters of G = 0.5, height of 4 meters, and a positive 2-dBA

adjustment to the turbine sound power levels. When less conservative parameters are utilized, the highest predicted sound level at a nonparticipant is 41 dBA.

The Federal Highway Administration (FHWA) *Roadway Construction Noise Model User's Guide* (FHWA, 2006) identifies the range in typical construction equipment sound levels and these sound levels are summarized in Appendix J. The sound level from construction activities will vary throughout the construction period, but the duration at any individual location will be more limited as construction progresses from one area to another.

In summary, the sound levels from the Project are predicted to comply with applicable requirements.

11.6 Shadow Flicker

Shadow flicker is a term used to refer to the alternating changes in light intensity that can occur at times when the rotating blades of wind turbines cast moving shadows on the ground or on structures. Shadow flicker occurs only when the wind turbines are operating during sunny conditions and is most likely to occur early and late in the day when the sun is at a low angle in the sky. There are no applicable federal or state laws regarding shadow flicker. Deuel County's Zoning Ordinance Section 1215.03(13)(b) states that the "Limit for allowable shadow flicker at existing residences to no more than 30 hours annually."

To evaluate the potential levels of shadow flicker, an analysis was conducted for the proposed Project using the SHADOW calculation module of the WindPRO 3.2 software. A summary of the analysis results is presented in Table 11-8 while the complete analysis and results are presented in Appendix O.

Table 11-8 Summary of Predicted Duration of Shadow Flicker

Receiver Status[a]	Receiver ID	Expected Shadow Hours per Year
Participating	H86	28:29
Participating	H89	27:24
Participating	H75	27:03
Participating	H146	25:10
Participating	H76	22:32
Participating	H155	21:45
Participating	H81	20:59
Participating	H72	20:19
Participating	H156	20:16
Participating	H74	17:51
Participating	H145	17:44
Participating	H158	16:57
Nonparticipating	H45	14:51
Participating	H58	14:27
Participating	H71	14:17
Participating	H163	13:45
Participating	H117	13:05
Participating	H147	12:11
Nonparticipating	H87	11:37
Participating	H53	11:18
Nonparticipating	H144	11:16
Participating	H77	10:51
Participating	H60	10:05

[a] Table sequence is determined by Expected Shadow Hours per Year column.

As indicated in Table 11-8, the highest predicted hours of expected shadow flicker per year are approximately 15 hours at a nonparticipating dwelling and approximately 28 hours at a participating dwelling. Therefore, the predicted duration of shadow flicker associated with the Project complies with the Deuel County Zoning Ordinance requirement that shadow flicker should not exceed 30 hours annually.

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

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.*

Deuel County regulates the siting of wind energy facilities in Section 1215 of its zoning ordinance (Zoning Ordinance, Appendix P). The Zoning Ordinance includes specific setbacks for turbines and siting criteria for sound and shadow flicker. The Project conforms to the applicable setbacks and siting criteria detailed in Table 12-1 and illustrated on Figure 6a-d.

Table 12-1 Applicable Setbacks and Siting Criteria

Category	Requirement
State of South Dakota	
Setback	Turbines shall be set back at least 500 ft or 1.1 times the height of the tower, whichever is greater, from any surrounding property line. However, if the owner of the wind turbine tower has a written agreement with an adjacent land owner allowing the placement of the tower closer to the property line, the tower may be placed closer to the property line shared with that adjacent land owner.
Deuel County	
Setback	Distances from existing Non-Participating residences and businesses shall be not less than four times the height of the wind turbine. Distance from existing Participating residences, business and public buildings shall be not less than fifteen hundred ft. Non-Participating property owners shall have the right to waive the respective setback requirements.
Setback	Distance from public right-of-way shall be 110% the height of the wind turbines, measured from the ground surface to the tip of the blade when in a fully vertical position.
Setback	Distance from any property line shall be 110% the height of the wind turbine, measured from the ground surface to the tip of the blade when in a fully vertical position unless wind easement has been obtained from adjoining property owner.
Setback	Distance from the Lake Park District located at Lake Cochrane 3 miles, Lake Alice 2 miles and 1 mile from the Lake Park District at Bullhead Lake
Setback	Distance from the municipalities of Altamont, Astoria, Brandt, and Goodwin of 1 mile from the nearest residence and 1 ½ miles from the city limits of the towns of Gary, Toronto and Clear Lake, except the area of Clear Lake located in sections 11, 12, and 14.
Sound	Noise level shall not exceed 45 dBA average A-Weighted Sound pressure at the perimeter of existing residences, for non-participating residences.
Shadow Flicker	Limit for allowable shadow flicker at existing residences to no more than 30 hours annually.

Furthermore, the Project is within areas zoned “Agricultural District.” A wind energy facility may be allowed as a special exception in the Agricultural District. Accordingly, Tatanka Ridge submitted Special Exception Permit (SEP) and Wind Energy System (WES) applications to the Deuel County Board of Commissioners (BOC) on April 29, 2019 for review and approval. The Deuel County BOA held a hearing on June 11, 2019, for the SEP and WES applications and approved granting the permit to Tatanka Ridge in a 5 to 0 vote.

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

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.*

13.1 Existing Water Quality

Section 8.2.1 outlines the receiving waters within one mile of the Project area that may receive stormwater runoff from the Project construction. None of the waterbodies within the Project area and within one mile of the Project boundary are considered 303(d)-listed, impaired waterbodies. There are two waterbodies that are located within one mile of the Project boundary that possess beneficial use classes (Hidewood Creek, northwest of the Project boundary, and North Deer Creek to the south of the Project area). Both waterbodies have use classification 6 and 8 as defined by the state's Surface Water Quality standards. Use classification 6 refers to warmwater marginal fish life propagation waters and use classification 8 refers to limited-contact recreation waters. Use classification 9 refers to fish and wildlife propagation, recreation, and stock watering waters. Use classification 10 refers to irrigation waters.

13.2 Water Quality Impacts

There is potential for sediments from disturbed soil and other contaminants to reach the waterbodies within and near the Project area during construction activities. If adequate measures are not taken to protect the land from soil erosion or other ground disturbances, there is potential for water quality impacts and sedimentation from Project construction activities.

The Project will cross intermittent streams for collector line installation, access road development, and temporarily for crane path development (refer to Section 8.2.2.1). Due to construction in and near the intermittent streams in the Project area, water quality impacts could occur due to chemical contamination from construction activities, or increased sediment transport from exposed soils. Tatanka Ridge will implement a SPCC plan to prevent impacts.

The Project will require a General Permit for Storm Water Discharges Associated with Construction Activities from the SDDENR (as discussed in Sections 8.2.3). Tatanka Ridge will implement a Soil Erosion and Sediment Control Plan in accordance with Deuel County requirements to avoid potential transport of sediment. Additionally, Tatanka Ridge as a Soil Erosion and Sedimentation Plan and will develop a SWPPP in order to describe the appropriate BMPs for the Project area during construction. These BMPs may include silt fencing, erosion control blankets, temporary stormwater sedimentation ponds, and revegetation measures. Tatanka Ridge will implement BMPs during all phases of the Project (construction, operation, decommissioning). Therefore, Tatanka Ridge does not anticipate impacts to water quality resulting from the Project.

13.3 Mitigation Measures for Water Quality

Based on the measures noted in Section 13.2, impacts to water quality are not anticipated. Therefore, mitigation measures are not necessary for the Project.

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

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.*

14.1 Existing Air Quality

The U.S. Environmental Protection Agency sets primary and secondary National Ambient Air Quality Standards (NAAQS) for pollutants, referred to as criteria pollutants, that are common in outdoor air, considered harmful to public health and the environment, and that come from numerous and diverse sources (U.S. Environmental Protection Agency, 2019b). The criteria pollutants that are regulated under NAAQS are: carbon monoxide, lead, particulate matter, ozone, nitrogen dioxide, and sulfur dioxide. The concentrations of criteria pollutants, for all counties in South Dakota, are less than the National Ambient Air Quality Standards (NAAQS) (U.S. Environmental Protection Agency, 2019a); each county is in an attainment zone.

Since the main industry within the Project area is agriculture, emission sources within the Project area may occur from agricultural equipment use and vehicle dust emissions. Additionally, there is one reclaimed sand and gravel site within the Project area, two active sand and gravel mines located approximately 3.1 miles west of the Project area, and the Northern Border natural gas pipeline compressor station located adjacent to the Project. These sources may produce particulates from fugitive dust emissions and other criteria pollutants from vehicle exhaust and combustion-related activities.

14.2 Air Quality Impacts

During construction of the Project, fugitive dust emissions, resulting from vehicle and construction traffic could temporarily impact local air quality. Air quality impacts related to fugitive dust will be temporary and limited to the time of construction. Tatanka Ridge may implement the following BMPs during the construction activities to reduce air emissions from fugitive dust:

- Using designated access roads, onsite roads, and parking lots with maintained surfaces;
- Designating appropriate staging areas for construction activities; and
- Applying water to dirt roads and disturbed areas with exposed, loose soil during the construction activities.

The construction of Tatanka Ridge will likely require a temporary concrete batch plant and general air quality permit from the SDDENR may be necessary for operation of the batch plant. The Project's construction contractor will manage this approval as required and the compliance with all specified conditions.

During Project operation, negligible amounts of dust, vehicle exhaust, and combustion-related emissions from onsite emergency generators may occur during maintenance activities. Small amounts of ozone and

nitrogen oxide emissions may result from the energized conductors at the operation and maintenance facilities. Furthermore, minimal amounts of sulfur hexafluoride may result from leaks generated from sulfur hexafluoride-filled circuit breakers within in the Project substation. The emissions from these Project components will be minor and will not cause exceedances to air quality standards.

14.3 Mitigation Measures for Air Quality

Based on the avoidance and minimization measures noted in Section 14.2; impacts to air quality are not anticipated. Therefore, mitigation measures are not necessary for the Project.

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

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 table below describes the anticipated schedule for land acquisition, permits/approvals, equipment procurement, construction, testing operations, and commercial operation of the Project. This schedule is subject to modification based on factors beyond Tatanka Ridge's control such as receipt of applicable permits.

Table 15-1 Project Schedule

Milestone	Date(s)
Land Leasing	2017 – 2019
Environmental Studies	2015 – 2016 and 2018 – 2019
Finalize Layout	March 2019
SEP/WES Process with Deuel County	March 2019 – June 2019
SDPUC Energy Facility Permit Process	June 2019 – December 2019
Preconstruction Engineering	Fourth Quarter 2018 – Fourth Quarter 2019
Apply for building permits	First Quarter 2020
Construction	First Quarter 2020 – Fourth Quarter 2020
Testing Operations	Third – Fourth Quarter 2020
Commercial Operations	Fourth Quarter 2020
Restoration	2021

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

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.

16.1 Socioeconomic and Community Resources

16.1.1 Existing Socioeconomic and Community Resources

The Project is located in the southern half of Deuel County, South Dakota. According to the 2010 Census, Deuel County had a population of 4,364 (United States Census Bureau, 2019b). The City of Clear Lake, located approximately six miles north of the Project, is the largest city in Deuel County (29% of the total population of Deuel County (United States Census Bureau, 2019a). There are three other towns in the Project vicinity (refer to Table 16-1).

Table 16-1 Populations of Communities in the Project Vicinity

Community	2010 Population	Approximate Distance to Project (miles)
City of Clear Lake	1,273	6.0
Town of Astoria	139	2.0
Town of Brandt	107	1.5
Town of Toronto	212	0.5

Data Source: (United States Census Bureau, 2019a)

Table 16-2 details the demographics of Deuel County compared to the state as a whole according to the 2010 Census (United States Census Bureau, 2019b).

Table 16-2 Population Demographics

Race	Deuel County (%)	South Dakota (%)
White	94.8	84.8
Black or African American	0.9	1.3
American Indian and Alaska Native	0.5	7.3
Asian	0.2	0.9
Two or More Races	1.1	2.1
Hispanic or Latino	2.8	2.7
Other	0.0	0.9
Data Source: (United States Census Bureau, 2019a)		

According to the 2013-2017 American Community Survey Five-Year Estimates, the median household income in Deuel County is $57,969, compared to $54,126 for the state as a whole (United States Census Bureau, 2019a). In 2017, the three most common job groups in Deuel County were (United States Census Bureau, 2019a):

- Management, business, and financial occupations;
- Sales and office occupations; and
- Natural resources, construction, and maintenance occupations.

In 2017, the three most common employment sectors in Deuel County were (United States Census Bureau, 2019a):

- Agriculture, forestry, fishing and hunting, and mining;
- Manufacturing; and
- Educational services, and health care and social assistance.

The unemployment rate in Deuel County in March 2019 was 5.9%, almost twice as high as the unemployment rate in South Dakota for the same month (3.1%) (South Dakota Dept. of Labor & Regulation, n.d.). The current estimated poverty level for Deuel County according to the 2013-2017 American Community Survey Five-Year Estimates is 10% (United States Census Bureau, 2019a).

16.1.2 Socioeconomic and Community Resource Impacts

16.1.2.1 Economic Impacts

The Project will create both short-term and long-term positive impacts to the local economy. Impacts to social and economic resources resulting from construction will be temporary. Construction and operation of a typical wind project results in an influx of millions of dollars into the local economy both immediately and throughout the life of the project. Refer to Section 17.0 for specific details regarding employment estimates.

As previously noted, the Project will create approximately 200 temporary jobs during construction, which is expected to last about 9 months. As a result, many local businesses will experience increased activity during this period. Businesses that are likely to benefit from the temporary increase in local population include restaurants, grocery stores, hotels, and gas stations. In addition, local businesses that supply materials and equipment will also benefit from the Project. This includes:

- Aggregate and cement suppliers;
- Welding and industrial suppliers;
- Hardware stores;
- Automotive and heavy equipment repair;
- Electrical contractors;
- Maintenance providers; and
- Seed suppliers.

Tatanka Ridge will make payments to landowners before, during, and after construction. The project will act as a natural hedge for landowners to help offset annual instability in crop yields and prices. These payments are not dependent on the amount of energy generated from the turbines, and will increase with inflation. Tatanka Ridge estimates the Project will pay landowners approximately $1million annually over the entire life of the facility.

Current state law taxes wind farms on a nameplate capacity and an actual production basis. Those payments are made to the state, which then allocates the revenue among itself, the school districts, counties and townships. Tatanka Ridge estimates that the Project will pay approximately $720,000 annually in taxes. Of this, Tatanka Ridge estimates that the school districts will divide approximately $260,000 between them, based on tower locations. Deuel County will receive approximately $180,000 on an annual basis. The townships will divide approximately $75,000 between them. Finally, the Project will pay sales and use tax, and the contractors will pay excise taxes based upon construction costs. Each will receive a rebate of a portion of those taxes through the state's current economic development board.

16.1.3 Mitigation Measures for Socioeconomic and Community Resource Impacts

Due to the positive nature of the economic impacts associated with the Project, no mitigation measures are necessary.

16.1.3.1 Population and Housing Impacts

There are potential employment opportunities for residents living near the Project area. Should any non-local construction workers be necessary, they will temporarily relocate to the area, resulting in a brief increase in population and need for short-term housing. Short-term housing will likely include existing

facilities at multiple towns and cities throughout the area, including hotels, apartments, and campgrounds. The increase in population and housing demand will be temporary in nature.

16.1.3.2 Mitigation Measures for Population and Housing Impacts

Based on the temporary increase in population and housing demand, Tatanka Ridge does not anticipate long-term population trend impacts requiring mitigation measures.

16.2 Commercial, Industrial, and Agricultural Sectors

16.2.1 Existing Commercial, Industrial, and Agricultural Sectors

The area within and surrounding the Project is primarily agricultural. There are no commercial or industrial facilities within the Project area. There are commercial facilities (seed suppliers, automobile/equipment repair, etc.) within the Town of Toronto and the City of Clear Lake that could see an increase in business during construction of the Project.

Deuel County has 634 farms with a total of 335,322 ac, producing $184 million in agricultural products. Of this amount, 79% is from crop sales and 21% is from livestock sales. The primary crops include corn, soybeans, and wheat. Cattle and calves are the largest livestock component produced in the county (U.S. Department of Agriculture, 2019a).

16.2.2 Commercial, Industrial, and Agricultural Sector Impacts

The Project will take a small amount of existing agricultural land out of crop and forage production associated with the around wind turbine foundations, access roads, and the Project Substation. Agricultural activities can occur up to the edge of access roads and turbine pads. The buried underground collection system would not affect agricultural activities.

Tatanka Ridge estimates the Project will temporarily affect approximately 317.2 and 39.2 ac of prime agricultural land during construction and operations, respectively.

16.2.3 Mitigation Measures for Commercial, Industrial, and Agricultural Sectors

Tatanka Ridge will compensate landowners for losses to crop production during construction. In addition, as detailed in Section 19.0, Tatanka Ridge will restore land impacted by the Project during decommissioning activities.

16.3 Community Facilities and Services

16.3.1 Existing Community Facilities and Services

The City of Clear Lake, Town of Brandt, and Town of Toronto have existing community facilities and services such as:

- Police;
- Fire and ambulance services;
- Schools;
- Churches; and
- Parks and recreational facilities.

The City of Clear Lake also has a Sanford hospital. H-D Electric Cooperative and Otter Tail Power Company provides electrical service in the Project area. The Brookings Deuel Rural Water System supplies rural water to the Project area and maintains a network of distribution lines within the area. There are no existing municipal sewer systems or landfills in the Project area.

16.3.2 Community Facilities and Services Impacts

Based on the short-term duration of construction activities, Tatanka Ridge does not anticipate impacts to community facilities and services. Existing community facilities and services should be sufficient to support any incremental demand from the workforce during construction and operation.

16.3.3 Mitigation Measures for Community Facilities and Services Impacts

During Project construction and operation, Tatanka Ridge will work with local and Deuel County emergency management to develop procedures for response to emergencies, natural hazards, hazardous materials incidents, and potential incidents. The Project will register each turbine location and the O&M facility with the rural identification / addressing (fire number) system and 911 systems.

16.4 Transportation

16.4.1 Ground Transportation

16.4.1.1 Existing Ground Transportation

Table 16-3 summarizes the types of existing roads within the Project boundary. In general, the existing county and township roads follow section lines. There are also single-lane farm roads and driveways that provide access to private properties.

Table 16-3 Existing Road Types

Road Type	Length (miles)
County	14.6
Private Driveways	7.3
Township	60.6
State	5.5

16.4.1.2 Ground Transportation Impacts

A variety of small to large construction vehicles will use area roadways during Project construction. Once construction is complete, only small-to-medium sized vehicles will access local roadways to perform routine maintenance on turbines and associated facilities. Heavy equipment will occasionally return to the site as part of the maintenance of large turbine components. Tatanka Ridge estimates that the maximum construction workforce at the Project will create approximately 350 to 450 additional trips per day on local roadways during peak construction. Total trips per day will decrease following turbine installation.

Because of the size of the equipment, and the turning radii of the delivery trucks, some local roadways may require upgrades to improve drivability and access. This typically includes widening select intersections to allow long delivery trucks to turn, and upgrading road surfaces by grading or the addition of gravel. Tatanka Ridge is evaluating the degree to which existing roadways will require upgrading for the Project. Pavement reinforcement depends on the time of year, but Tatanka Ridge will return all roads to pre-construction condition at the conclusion of construction of the Project.

Prior to the use of approved haul roads, Tatanka Ridge will make satisfactory arrangements with the appropriate governmental body having jurisdiction for the maintenance and repair of the haul roads that will be subject to extra wear and tear due to transportation of materials, equipment, and turbine components.

Tatanka Ridge anticipates that impacts to traffic impacts during the operation of the Project will be minimal. This will include a small maintenance crew driving through the area in pickup trucks on a regular basis to monitor and maintain the wind turbines and collector lines. There will be a slight increase in traffic for occasional turbine, collector substation repair and/or collector line repair; however, it will not have an impact on traffic function.

16.4.1.3 Mitigation Measures for Ground Transportation Impacts

Tatanka Ridge will return all roads to pre-construction condition at the conclusion of construction of the Project. Unless otherwise negotiated with the affected landowner, Tatanka Ridge will promptly repair all private roads or lanes damaged when moving equipment or when obtaining access to the site during construction and operation of the Project.

16.4.2 Aviation

16.4.2.1 Existing Aviation

There are no airports within or near the Project boundary. The closest airports to the Project are:

- Clear Lake Municipal Airport, Clear Lake, South Dakota (approximately 8 miles);
- Lutgen Airport, White, South Dakota (private, approximately 12 miles);
- Canby Municipal Airport, Canby, Minnesota (approximately 18 miles); and
- Brookings Regional Airport, Brookings, South Dakota (approximately 19 miles).

The nearest US military air installation is the Grand Forks Air Force Base, located approximately 235 miles north of the Project. The nearest South Dakota Air National Guard installation is the 114th Fighter Wing, located approximately 60 miles south of the Project at Joe Foss Field Base in Sioux Falls, South Dakota.

16.4.2.2 Aviation Impacts

Tatanka Ridge submitted Form 7460-1 in April 2019, Notice of Proposed Construction or Alteration with the FAA and will submit Notices of Proposed Construction for the final layout after construction is complete. Tatanka Ridge expects to receive Determinations of No Hazard for the proposed layout. The Project will comply with applicable FAA requirements. Tatanka Ridge will also submit Tall Structures Aeronautical Hazard Applications with the South Dakota Aeronautics Commission (SDAC) for a permit for the proposed turbine and MET tower locations.

Air traffic may be present near the Project for crop dusting of agricultural fields. Highly maneuverable airplanes or helicopters typically conduct crop dusting typically during the daylight hours. The installation of wind turbines and a MET tower in active croplands will create potential hazards for crop-dusting aircraft.

16.4.2.3 Mitigation Measures for Aviation Impacts

The turbines and MET tower will be visible from a distance. The MET tower will be freestanding with no guy wires that could limit the flights of crop dusting aircraft. Furthermore, Tatanka Ridge will notify local airports about the Project including locations of turbines and MET towers in the area to minimize impacts and reduce potential risks to crop dusters. In addition to meeting the required turbine obstruction markings, Tatanka Ridge is electing to use an ADLS at the Project (refer to Section 4.2.1).

16.5 Cultural Resources

16.5.1 Existing Cultural Resources

Cultural resources are the material remains of human activity and can include artifacts, habitation sites, buildings, districts, and landscapes. Federal and state laws and regulations provide the standards for cultural resources identification, evaluation, and mitigation of impacts. If a cultural resource site meets the criteria for listing on the National Register of Historic Places (NRHP), it is significant and deemed a "historic property."

In accordance with the *Guidelines for Cultural Resource Surveys and Survey Reports in South Dakota (For Review and Compliance)* (South Dakota State Historical Society 2005), a records search was conducted for the Project boundary plus a 1-mile buffer (Study Area). In addition, results of the records search were compared to the Archaeological Survey Corridor (Survey Corridor) to determine if any cultural resources may potentially intersect preliminary Project components. The Survey Corridor includes a 500 ft. buffer around turbine center points, the locations of the met tower, laydown area, substation, and O&M building, and a 100 ft. corridor (50 ft. to either side of the centerline) for access roads, collector lines, crane paths, and the transmission line.

Records search requests were sent on August 8 and September 4, 2018 and February 22, 2019 to reflect additions and changes to the Project Boundary. The records search was conducted through the South Dakota Archaeological Research Center (SDARC), and files were collected from the South Dakota Archaeological Resources Management System (ARMS). Information collected during the records search included areas previously surveyed for cultural resources along with the locations of previously recorded archaeological sites, architectural structures, bridges, and cemeteries.

Pursuant to South Dakota Codified Law 1-20-21, information contained within the records search data is considered confidential and not for public distribution. Information collected during the records search will be included as part of the background research section in the Level III Archaeological Intensive Survey Report (report will be provided in a subsequent filing).

SDARC's files include 40 previously identified archaeological sites within the Study Area (Table 16-4). Of the 40 sites in the Study Area, 35 are prehistoric Native American, two are historic Euro-American, two are multi-component (containing both prehistoric and historic artifacts and/or features), and one is of unknown cultural affiliation. Of these 40 sites, five intersect the Survey Corridor (Table 16-4). These sites include three Native American artifact scatters (39DE0049, 39DE0102, and 39DE0107), one Native American stone circle (39DE0101), and one Native American stone circle, alignment, and cairn (39DE0109). Of the 40 sites in the Study Area, two have been determined not eligible for the NRHP; of the remaining 38 sites, 37 are unevaluated and one is unknown. The five sites that intersect the Survey Corridor are unevaluated for listing in the NRHP.

Table 16-4 Previously Identified Archaeological Sites within One Mile of the Project

Site Number	Site Type	Township	Range	Section	NRHP Status
39DE0014	Historic farmstead; Euro-American artifact scatter and depression; Native American artifact scatter; Native American stone circle; Native American alignment; unknown cairn	113N	48W	20	Unevaluated
39DE0032	Native American artifact scatter	114N	50W	23	Unevaluated
39DE0033	Native American stone circle	114N	50W	23	Unevaluated
39DE0034	Native American artifact scatter	114N	50W	24	Unevaluated
39DE0035	Native American artifact scatter	114N	49W	32	Unevaluated
39DE0036	Native American artifact scatter	113N	49W	2	Unevaluated
39DE0037	Native American artifact scatter	113N	49W	1	Unevaluated
39DE0038	Native American artifact scatter	113N	48W	17	Unevaluated
39DE0039	Native American artifact scatter	113N	48W	16	Unevaluated
39DE0040	Native American artifact scatter	113N	48W	25	Unevaluated
39DE0041	Native American artifact scatter	113N	48W	23	Unevaluated
39DE0044	Native American artifact scatter	114N	50W	23	Unevaluated

Site Number	Site Type	Township	Range	Section	NRHP Status
39DE0047	Native American artifact scatter	113N	48W	22	Not eligible
39DE0049*	Native American artifact scatter	113N 113N	49W 48W	7	Unevaluated
39DE0092	Native American artifact scatter	113N	49W	13	Unevaluated
39DE0093	Native American artifact scatter	113N	49W	13	Unevaluated
39DE0094	Native American artifact scatter	113N	49W	23	Unevaluated
39DE0095	Native American artifact scatter	113N	49W	15	Unevaluated
39DE0096	Native American artifact scatter	113N	49W	15	Unevaluated
39DE0097	Native American artifact scatter	113N	48W	20	Unevaluated
39DE0098	Native American cairn; Native American alignment	113N	48W	20	Unevaluated
39DE0099	Native American artifact scatter	113N	49W	15	Unevaluated
39DE0100	Native American artifact scatter	113N	48W	8	Unevaluated
39DE0101*	Native American stone circle	113N	48W	20	Unevaluated
39DE0102*	Native American artifact scatter	113N	48W	17	Unevaluated
39DE0103	Native American artifact scatter	113N	48W	8	Unevaluated
39DE0104	Native American artifact scatter	113N	48W	8	Unevaluated
39DE0105	Native American artifact scatter	113N	49W	13	Unevaluated
39DE0106	Native American artifact scatter; Euro-American artifact scatter; unknown cairn	113N	48W	18	Unevaluated
39DE0107*	Native American artifact scatter	113N	48W	17	Unevaluated
39DE0108	Native American artifact scatter	113N	48W	18	Unevaluated
39DE0109*	Native American stone circle; unknown alignment; unknown cairn	113N	48W	17	Unevaluated
39DE0110	Native American artifact scatter	113N	48W	17	Unevaluated
39DE0111	Native American artifact scatter	113N	48W	17	Unevaluated
39DE0112	Native American artifact scatter	113N	48W	17	Unevaluated
39DE0113	Native American artifact scatter	113N	48W	17	Unevaluated
39DE0122	Native American isolated find	113N	48W	15	Not Eligible

Site Number	Site Type	Township	Range	Section	NRHP Status
39DE0123	Cairn of unknown cultural affiliation	113N	48W	27	Unevaluated
39DE0126	Historic farmstead; Euro-American artifact scatter	113N	48W	22	Unevaluated
39DE0129	Euro American artifact scatter	114N	48W	33	Unknown

*Intersects the Survey Corridor

SDARC's files include eighteen previously inventoried architectural structures within the Study Area (Table 16-5). Architectural structures include farmsteads, agricultural buildings, churches, homes, a commercial building, a culvert, and a school. Of the eighteen architectural structures, four are eligible for the NRHP and the remaining 14 have been determined not eligible. None of the architectural structures intersect the Survey Corridor.

Table 16-5 Previously Identified Architectural Structures within One Mile of the Project

SHPO No.	Property Name/Type	Township	Range	Section	NRHP Status
DE00000008	Blom Prairie Lutheran Church	113N	48W	19	Eligible
DE00000009	House	113N	48W	30	Not Eligible
DE00000010	House	113N	48W	30	Not Eligible
DE00000067	Granary	114N	50W	35	Not Eligible
DE00000071	Blom Prairie Church Parsonage	113N	48W	30	Not Eligible
DE00000072	House	113N	48W	30	Not Eligible
DE00000073	House	113N	48W	30	Not Eligible
DE00000074	House	113N	48W	30	Not Eligible
DE00000075	House	113N	48W	30	Not Eligible
DE00000076	House	113N	48W	30	Not Eligible
DE00000077	House	113N	48W	19	Not Eligible
DE00000078	Café and Bar/Post Office	113N	48W	30	Eligible
DE00000087	Barn	113N	49W	13	Not Eligible
DE00000088	Farmstead	114N	49W	28	Not Eligible
DE00000090	Culvert	113N	48W	3	Not Eligible
DE00000094	Zion Evangelical Lutheran Church	114N	50W	27	Not Eligible
DE00000104	Farmstead	114N	50W	2	Eligible
DE00000107	Roosevelt School, District No. 14	113N	49W	14	Eligible

The SDARC files include the presence of five previously inventoried bridges within the Study Area (Table 16-6). One bridge is eligible and the remaining four bridges have been determined not eligible for the NRHP. None intersect the Survey Corridor.

Table 16-6 Previously Inventoried Bridges within One Mile of the Project

SHPO No.	Structure Type	Township	Range	Section	Construction Date	NRHP Status
DE00000166	Steel slab bridge	114N	50W	35	c. 1940	Not Eligible
DE00000167	Box culvert	113N	50W	19	1940	Eligible
DE00000168	Steel girder bridge	113N	49W	19	1970	Not Eligible
DE00000170	Concrete T-beam culvert	113N	49W	21	1941	Not Eligible
DE00000174	Concrete T-beam culvert	114N	49W	24	c. 1930	Not Eligible

The SDARC files include one previously inventoried cemetery within the Study Area (Table 16-7). The cemetery has been determined not eligible for the NRHP. The cemetery does not intersect the Survey Corridor.

Table 16-7 Previously Inventoried Bridges in the Study Area

SHPO No.	Resource Type	Township	Range	Section	Name	NRHP Status
DE00000108	Cemetery	114N	49W	18	Roos Family Cemetery	Not Eligible

16.5.2 Impacts to Cultural Resources

The Level III Intensive Archaeological Survey is on-going and includes review of the Survey Corridor. The Survey Corridor includes a 500 ft buffer around turbine center points, the location of the met tower, laydown area, substation, and O&M building, and a 100 ft corridor (50 ft to either side of the centerline) for access roads, collector lines, crane paths, and the transmission line. The actual limits of disturbance will be considerably smaller than the Survey Corridor. The larger size of the Survey Corridor provides flexibility for construction, and work space for boring equipment where needed.

Tatanka Ridge will avoid all archaeological resources potentially eligible for listing in the NRHP, sites deemed culturally sensitive, or sites that have not been evaluated for eligibility that are identified in further evaluations. As is stated in Section 16.5.1 above, there are five previously identified sites that intersect the Project survey corridor. Four of these sites are depicted on Figure 3 as point sites, and one (39DE0049) is depicted as an area site that includes turbine E5, a crane path, and a collector line. The exact location of the site, a prehistoric lithic scatter, is not known and therefore is depicted on Figure 3 as a general area. Site 39DE0049 was identified in 1982 during surveys for the natural gas pipeline that crosses the Project area. Field archeological surveys for the Tatanka Ridge Project did not identify any evidence of Site 39DE0049 within the Project survey corridor. The other four sites were either similarly not found

during surveys, or will be completely avoided during Project construction. All five sites remain unevaluated for listing on the NRHP.

The Project will avoid impacts to known cultural resources by installing avoidance buffer fencing (50 to 100 ft) around each resource to ensure that the Project exerts no adverse impacts on these resources. Tatanka Ridge will prepare an Unanticipated Discovery Plan for the Project outlining the procedures to follow to address any unanticipated discoveries of cultural resources, including previously undiscovered archaeological sites and possible human remains. This plan will provide direction to on-site personnel and their contractors as to proper procedure to follow if unanticipated discoveries occur during construction of the Project. If there are minor modifications to the layout based on final engineering, Tatanka Ridge will conduct supplemental archaeological survey and commit to avoiding any NHRP-eligible sites identified. Therefore, Tatanka Ridge does not anticipate the Project will result in impacts to known cultural resources.

16.5.3 Mitigation Measures for Cultural Resources

Impacts to cultural resources are not anticipated; therefore, mitigation is not required.

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

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.*

Construction of the Project will create approximately 200 jobs over an estimated nine-month period. It is likely that general skilled labor is available in Deuel County and surround communities to serve the basic infrastructure and construction needs of the Project. Specialized labor will be necessary for certain components of Project construction. It is likely that Tatanka Ridge will import this labor from the broader region as the relatively short duration of construction makes special training of local labor impracticable. Table 17-1 provides the estimated number of construction jobs by classification and employment expenditures during construction. During peak construction, the number of jobs during the peak of construction may be higher.

Table 17-1 Estimated Construction Jobs and Employment Expenditures

Job Classification	Number	Estimated Annual Salary
Equipment Operators	15	$60,000-85,000
Civil Workers	20	$60,000-85,000
Construction Workers	30	$60,000-85,000
Collection Workers	15	$60,000-85,000
Tower Erectors	50	$60,000-85,000
Substation Workers	20	$60,000-85,000
Foundation Workers	25	$60,000-85,000
Testing and Inspections	10	$60,000-85,000
Design Engineers	15	$60,000-85,000

After construction, an expected 12 to 15 permanent employees will be necessary for ongoing maintenance and operation of the Project (refer to Table 17-2 below). Tatanka Ridge anticipates the annual estimated employment expenditures to be the same for each of the first 10 years of operation.

Table 17-2 Estimated Annual Operation and Employment Expenditures

Job Classification	Number	Estimated Annual Salary
Facility Manager	1	$125,00
Wind Turbine Technicians	8 - 10	$40,000-70,000
Administrative	1	$30,000

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

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.*

Tatanka Ridge is a stand-alone project as detailed in this application. Tatanka Ridge does not have plans for modifications or expansion that should be included in this permit application.

19.0 Decommissioning of Wind Energy Facilities (ARSD 20:10:22:33.01)

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.*

Tatanka Ridge prepared a decommissioning plan for the Project (Appendix Q) that provides:

- A description of the decommissioning and restoration phase of the Project including dismantling, removal, recycling, and disposal of materials and removal;
- A summary of estimated costs and revenues associated with the decommissioning phase; and
- A description of financial assurance.

Table 19-1 summarizes the estimated net decommissioning costs based on 2018 prices, with no market fluctuations or inflation considered.

Table 19-1 Net Decommissioning Summary

Item	Cost
Decommissioning expenses	$9,083,00
Potential revenue - salvage value of turbine components and recoverable materials	($4,093,980)
Net Decommissioning Cost	**$4,989,020**
Per Turbine Decommissioning Cost (based on 56 turbines)	**$89,090**

Tatanka Ridge is responsible for implementing the Decommissioning Plan and will commit to a Letter of Credit for financial assurance adequate to pay the entire cost of the decommissioning process. Tatanka Ridge will re-evaluate the decommissioning costs after the first year of operation, then every 10 years following. The re-evaluation will consider an initial inflation rate of 2.5%. Tatanka Ridge will adjust the inflation rate in future years as appropriate.

20.0 Reliability and Safety (ARSD 20:10:22:33.02(8))

20.1 Reliability

Reliability (Availability) is the ability of the turbine to generate electricity when sufficient wind is available. To provide for reliability and to protect the Project financially, the turbine supply agreements with the manufacturer include availability guarantees. Availability guarantees require the turbine manufacturer maintain the turbine at a minimum of 97%. If the turbine manufacturer fails to maintain the required level of availability, the must pay a project liquidated damages for the lost revenue from lost energy production. Typically, the turbine manufacturer maintains the turbine for the first two years. After the first two years, Tatanka Ridge will manage turbine maintenance or enter into O&M service contracts with outside vendors.

20.2 Safety

Construction and operation of the Project will have minimal impacts on the security and safety of the local population. Tatanka Ridge and its contractors will coordinate with first responders, including but not limited to air ambulance, local sheriff's office(s), and local fire services discuss emergency management plans during construction and operation of the Project. Tatanka Ridge will also contact local first responders to offer information about the Project and to answer any questions response teams may have. Tatanka Ridge will take the following security measures to reduce the chance of physical and property damage, as well as personal injury, at the Project:

- The turbine locations are compliant with the applicable setbacks from occupied residences and non-participating landowners;
- Install temporary (safety) and long-term operational fencing, warning signs, and locks on equipment and wind power facilities;
- Implement regular maintenance and inspections to minimize the potential for blade failures;
- The turbines include steel enclosed tubular towers that include all electrical equipment, except for the pad-mounted transformer where applicable;
- Access to the interior of the tower is only through a solid steel door that remains locked when not in use;
- The permanent MET tower will be freestanding;
- Where necessary or requested by landowners, Tatanka Ridge will construct gates or fences;
- A professional engineer will certify the foundation and tower design of the turbines to be within accepted professional standards;
- Contractors will complete safety training and implement standardized practices for crews and on-site personnel;

- Tatanka Ridge will register each turbine location and the O&M facility with a rural address identifier as outlined in the South Dakota Rural Addressing Procedural Handbook;
- Tatanka Ridge will coordinate with South Dakota One-Call and pipeline companies prior to commencement of construction activities and will register Project underground facilities with the One-Call program following construction; and
- Tatanka Ridge will monitor icing conditions of the turbine. If severe icing condition occur, control systems will either automatically or manually shut down turbines until icing is no longer a concern.

20.3 Electromagnetic Fields and Stray Voltage

The frequency of transmission line electromagnetic fields (EMF) in the US is 60 Hz and falls in the extremely low frequency (ELF) range of the electromagnetic spectrum (any frequency below 300 Hz). For the lower frequencies associated with power lines, the electric and magnetic fields are typically evaluated separately. The intensity of the electric field is related to the voltage of the line, while the intensity of the magnetic field is related to the current flow along the conductors.

Concerns about health effects of EMF from power lines were first raised in the late 1970s. Since then, considerable research has been conducted to determine if exposure to magnetic fields, such as those from high-voltage power lines, causes biological responses and health effects. In 2007, the World Health Organization (WHO) concluded a review of health implications from magnetic fields and concluded, "…virtually all of the laboratory evidence and the mechanistic evidence fail to support a relationship between low-level ELF magnetic fields and changes in biological function or disease status" (World Health Organization, 2007).

Natural and human-made electromagnetic fields are present everywhere in our environment. Natural electric fields in the atmosphere range from background static levels of 10 to 120 volts per meter to well over several kilovolts per meter produced by the build-up of electric charges in thunderstorms. The Earth itself has a magnetic field that ranges from approximately 300 to 700 milligauss (mG). In addition to the presence of the earth's steady state electric field, an average home experiences additional magnetic fields of 0.5 mG to 4 mG that arise from the general wiring and appliances located in a typical home.

Impacts from stray voltage typically result from improper grounding of electrical service to the farm (distribution lines) or on-farm electrical wiring. Transmission and collector lines do not create stray voltage because they do not connect to businesses or residences and they are typically grounded properly. Transmission lines can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line. Tatanka Ridge will take measures, such as proper grounding, to prevent stray voltage.

21.0 Information Concerning Wind Energy Facilities (ARSD 20:10:22:33.02)

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.

Other sections of this application detail the requirements of ARSD 20:10:22:33.02. Refer to Table 21-1 for a cross-reference of each item.

Table 21-1 Information Concerning Wind Energy Facilities (ARSD 20:10:22:33.02)

Requirement	Location
(1) Configuration of wind turbines	Figure 5
(2) Number of wind turbines	Section 1.0
(3) Warning lighting	Section 4.2.1
(4) Setback Requirements	Sections 5.1.3 and 12.0, Figure 6a-d
(5) Sound levels	Section 11.5 and Appendix N
(6) Electromagnetic interference	Section 11.4 and Appendices K, L, and M
(7) Proposed site and major alternatives	Section 5.2, Figure 6a-d, and Figure 7a-d
(8) Reliability and safety	Section 20.0
(9) Right-of-way or condemnation requirements	Sections 5.1.4
(10) Clearing activities	Section 6.0
(11) Configuration of towers and poles for any electric interconnection facilities	Section 4.2.5
(12) Conductor configuration and size	Section 4.2.5
(13) Underground electric interconnection facilities	Section 4.2.3

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

20:10:22:36. Additional information in application. *The applicant shall also submit as part of the application any additional information necessary for the local review committees to assess the effects of the proposed facility pursuant to SDCL 49-41B-7. The applicant shall also submit as part of its application any additional information necessary to meet the burden of proof specified in SDCL 49-41B-22.*

22.1 Permits and Approvals

In addition to the Facility Permit from the SDPUC, Tatanka Ridge will obtain all required permits for the Project, which may include, but are not limited to those listed in Table 22-1.

Table 22-1 Permits and Approvals

Regulatory Authority	Permit/Authorization	Status
USACE	Clean Water Act Section 404 Permit and Section 401 Water Quality Certification	Pending final layout
FAA	Form 7460-1 Notice of Proposed Construction or Alteration (Determination of No Hazard)	Submitted in April 2019
SDAC	No hazard permit for structures exceeding 200 ft in height	Pending submittal
SDDENR	Surface Water Discharge Permit (National Pollutant Discharge Elimination System Permit) – General Permit for Stormwater Discharges	Pending submittal, will obtain prior to construction
	Temporary Water Use Permit	Pending submittal, will obtain prior to construction
	General Permit for Temporary Discharges	Pending submittal, will obtain prior to construction
	Water Rights Permit for Non-irrigation Use	Pending submittal, will obtain prior to construction
SDDOT	Highway Access Approach and Utility Crossing Permits	Pending submittal, will obtain prior to construction
Deuel County	SEP and WES permits	Submitted May 2019
	Building Permit, Utility Crossing, ROW Occupancy, and Access Approach Permits.	Pending submittal, will obtain prior to construction
	Utility Crossing Permit	Pending submittal, will obtain prior to construction
	ROW Occupancy Permit	Pending submittal, will obtain prior to construction
	Access and Approach Permits	Pending submittal, will obtain prior to construction

22.2 Agency Coordination

As previously stated, Tatanka Ridge first began developing the Project in 2005 with initial landowner outreach. Development activities resumed in 2012 and landowner outreach continued in addition to evaluation of the wind resource in the area. Leasing, stakeholder outreach, engineering, and additional Project development activities continued throughout 2018 and into 2019. In addition to local stakeholder and government outreach, Tatanka Ridge initiated agency consultations in 2018 with the following:

- USFWS;
- SDGFP; and
- SHPO.

In May 2019, Tatanka Ridge sent consultation letters to the following agencies:

- USFWS;
- SDDENR;
- SDGFP;
- SHPO; and
- Deuel County.

Appendix R includes responses received as the date of this Application. The following sections summarize the primary agency meetings completed to date as well as responses received in response to the consultation letters noted above.

22.2.1 USFWS

On September 5, 2018 and April 4, 2019, Tatanka Ridge representatives met with USFWS to provide an overview of the Project, discuss the status of complete and pending field surveys, and potential impacts to listed species and USFWS easements.

Additionally, Tatanka Ridge sent a consultation letter to the USFWS to seek comments regarding any potential concerns or issues that may exist within the Project area. The USFWS responded on May 30, 2019 recommending avoidance of grassland and wetland habitats, advising of the potential for indirect impacts to grassland nesting birds and waterfowl in these habitats, indicating the need to offset such impacts.

They indicated that they have conveyed potential concerns regarding the Topeka shiner and stream crossings and that additional coordination may be necessary to ensure compliance with the Endangered Species Act through the COE.

22.2.2 SDDENR

Tatanka Ridge sent a consultation letter on May 6, 2019 to the SDDENR to inform them of the proposed Project and to seek comments regarding any potential concerns or issues that may exist within the Project area. The SDDENR responded on May 10, 2019 indicating the Project will have little or no impact to waste management in the area and on May 13th that the project will have little or no impact on the air quality in the area.

On June 3, 2019, the SDDENR made the following comments:

- At a minimum and regardless of project size, appropriate erosion and sediment control measures must be installed to control the discharge of pollutants from the construction site. Any construction activity that disturbs an area of one or more acres of land must have authorization under the General Permit for Storm Water Discharges Associated with Construction Activities;
- A Surface Water Discharge permit may be required if any construction dewatering should occur as a result of this Project;
- The Project should avoid impacts to tributaries, creeks, wetlands, and lakes should be avoided by this Project. These waterbodies are considered waters of the state and are protected under Administrative Rules of South Dakota (ARSD) Chapter 74:51. Special construction measures may have to be taken to ensure that water quality standards are not violated. The Project is in close vicinity to North Deer Creek (Section 31, Township 113 North, Range 49 West) and Hidewood Creek (Section 6, Township 114N, Range 49 West). These waterbodies are classified by the South Dakota Surface Water Quality Standards and Uses Assigned to Streams for the following beneficial uses:

  (6) Warmwater marginal fish life propagation waters;
  (8) Limited contact recreation waters;
  (9) Fish and wildlife propagation, recreation, and stock watering waters; and
  (10) Irrigation waters.

  Because of these beneficial uses, special construction measures may be necessary to ensure that the 30-day average total suspended solids criterion of 150 mg/L is not violated; and,
- The discharge of pollutants from any source, including indiscriminate use of fill material, may not cause destruction or impairment except where authorized under Section 404 of the Federal Water Pollution Control Act.

22.2.3 SDGFP

On April 4, 20019, Tatanka Ridge representatives held a conference call with staff from the SDGFP to provide an overview of the Project, including a discussion of state-listed species documented in Deuel County.

On May 6, 2019, Tatanka Ridge sent a letter to the SDGFP to document that the Project will not impact state-listed species, to conclude consultation under SDLC 34A-8-9, and to seek comments regarding any potential concerns or issues that may exist within the Project area. As of June 13, 2019, the SDGFP has not responded.

22.2.4 SHPO

On September 5, 2018, Tatanka Ridge held a conference call with SHPO staff to provide an overview of the Project. During that call, Tatanka Ridge provided an overview of plans for conducting surveys Based on the information provided during the call, SHPO was comfortable with Tatanka Ridge's archaeological resource consideration approach.

On April 3, 2019, Tatanka Ridge held another conference call with SHPO staff to provide a Project update, including the need for a Facility Permit from the PUC. During the conversation, Tatanka Ridge indicated the plans to consider archaeological resources in all areas of proposed disturbance was adequate, consider known architectural resources within one mile of the Project boundary, and the reporting schedule would meet the needs of SHPO and PUC.

On May 6, 2019, Tatanka Ridge send a letter to the SHPO staff to summarize the previous conference calls as well as to seek comments regarding any potential concerns or issues that may exist within the Project area. As of June 13, 2019, SHPO has not responded.

22.2.5 Deuel County

Tatanka Ridge has been conducting frequent meetings with Deuel County representatives to provide an overview of the Project, discuss public outreach efforts, and permitting status.

On April 29, 2019, Tatanka Ridge submitted SEP and WES permit applications to Deuel County. In addition, on May 6, 2019, Tatanka Ridge send a letter to the Deuel County Board of Commissioners to seek comments regarding any potential concerns or issues that may exist within the Project area. As of June 13, 2019, Deuel County's Board of Commissioners has not responded.

23.0 Testimony and Exhibits (ARSD 20:10:22:39)

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.*

The individuals identified in Table 23-1 below are providing testimony is support of the Application. Tatanka Ridge reserves the right to provide supplemental and/or rebuttal testimony, as needed, to further support this Application.

Table 23-1 List of Individuals Providing Testimony

Individual	Title	Company
Mark Bastasch	Principal Acoustical Engineer	Jacobs Engineering Group, Inc.
Jesse Bermel	Business Developer	Tatanka Ridge Wind, LLC
Dan Flo	Senior Environmental Consultant	Barr Engineering Co.
Mark Mullen	Regional Director - Engineering	Tatanka Ridge Wind, LLC
Janelle Rieland	Project Manager	WEST

23.1 Application Verification

Jesse Bermel, Business Developer, and authorized representative of the Applicant, is authorized to sign this Application on behalf of the Project Owner/Applicant, Tatanka Ridge Wind, 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 has been verified by him as being true and correct on behalf of the Owner/Applicant.

Dated this 17th day of June, 2019.

Jesse Bermel
Business Developer
Tatanka Ridge Wind, LLC

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